

A CATEGORIAL ANALYSIS OF DYRBAL, AN ERGATIVE CASE-MARKING LANGUAGE

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Dowty's (1982a, b) treatment of grammatical relations in terms of compositional characters of functors (verbs) and arguments (NPs) seem to have problems with respect to case-marking languages such as Korean and Japanese. Particularly, his "Inverse Lexicalization Hypothesis" for the analysis of Dyrbal, an ergative language, is not adequate when we consider various linguistic facts carefully (the pronominal system and conjunction structures in Dyrbal, and some typological considerations, etc.). One version of Montague Grammar developed by Lee (1982) for the treatment of Korean, a case-marking language, works better in the analysis of Dyrbal. So, I argue for the latter system and present a categorial analysis of Dyrbal which does not accept "Inverse Lexicalization Hypothesis" but which treat grammatical processes (e.g., Passive) as category changing rules.

1. Introduction

The main purposes of this paper are to argue for a certain categorial analysis for Korean, a case-marking language, which was developed by Lee (1982), and to extend this analysis to Dyrbal, an ergative case-marking language. Arguments are chiefly against the configurational categorial analysis for case-marking languages (such as Korean, Japanese, and Dyrbal) which is implicit in the theory of grammatical relation (GR) developed by Dowty (1982a, b).

2. Treatment of Grammatical Relations in Categorial Analysis

2.1. Basic Idea

Grammatical relations such as subject and object have been treated as important concepts in traditional grammar. But there has been much controversy about the exact definition of GR. Recently, some linguistic theories such as Relational Grammar and LFG claim that GR is not definable but primitive, and that many universal syntactic phenomena should be explained by using these primitive notions of GR. Dowty (1982a, b) claims that we don't have to treat GR's as primitives nor define them in terms of tree structure as in Chomsky's theory, which has turned out to be insufficient. He claims GR's can be adequately treated in terms of the compositional property of a functor (verb) and arguments (NP's) as follows.

Verbs are classified into intransitive verbs (IV, S/NP) which need one argument, transitive verbs (TV, IV/NP) which need two arguments, and ditransitive verbs (TTV, TV/NP) which need three arguments. The followings are the definitions of GR's (Dowty 1982b: 103).

- (1) a. A subject is any NP combined with an IV to produce a S.
 b. A direct object is any NP combined with a TV to produce an IV.
 c. An indirect object is any NP combined with a TTV to produce a TV.

Dowty claims that the above definition can be applied to not only configurational languages like English but also to nonconfigurational case-marking languages.

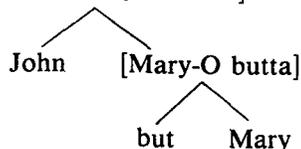
In this system, some grammatical processes such as Passive which have been claimed by some theorists to be treated by crucial reference to GR's can be treated without mentioning GR's. For example, English agentless passive is treated as a relation reducing rule whose input is a TV and whose output is an IV. The semantic operation which accompanies this rule permits us to capture the meaning relations between the two forms.

Among many arguments which are put forward by Dowty (1982a: 97-108) for treating grammatical process as rules changing the argument structure of verbs, I'd like to buy particularly the following three. (And I will use category changing rules in treating Dyrbal.) First, this analysis guarantees the structure preserving nature of rules to the effect that the results of applying the transformations are syntactic structures exactly like those structures produced independently by PS rules. Second, when the application of a relation-changing rule is to assign a morphological marking, it appears on the verb; therefore it is reasonable to treat this rule in terms of changing verb category. Third, this analysis reveals the fact that some relation changing rules are lexically governed by verbs.

2.2. Problems in treating Case-marking Languages

Dowty's basic idea in this analysis is that the compositional structure is the same across all languages including case-marking languages which have relatively free word order. For example, a Japanese transitive sentence is claimed to be derived as follows (Dowty 1982a: 86).

- (2) [John-GA Mary-O butta] 'John hit Mary.'



The crucial point of the above analysis is that case markers (GA, O) are introduced according to the positions of arguments in the compositional tree.

One minor problem of this analysis is that Japanese has also 'Mary-O John-GA butta ('John hit Mary'),' i.e. the order of arguments is relatively free except that the verbs come last, as is the case in Korean. So, we have to have some rearranging rule such as 'scrambling' or we should derive by syntactic

rules a set of expressions which come freely in order with the constraint that the verb comes last. If we can derive the sentence without scrambling or the above constraint, it will be better.

The major problem comes in deriving the following sentences in Korean. (I think the following argument may be applicable to Japanese, too.)

- (3) Joe-KA məkniŋta.
SM is eating
'Joe is eating (something).'
- (4) Joe-LIL čapassta.
OM caught
'(Someone) caught Joe.'

To derive (3), what we need is a rule which reduces the number of arguments of the TV (mək-'eat'), i.e. make the verb intransitive. This rule is like English Unspecified object deletion (Dowty 1982a: 91) and can be stated as follows.

- (5) If $@ \in P$, then $F5 (@) \in P$, where $F5 (@) = \mathscr{P}$
Translation: $\lambda \mathscr{P} [@' (\exists x^*) (\mathscr{P})]$
($\exists x^*$ abbreviates ' $\lambda P [\exists x [P\{x\}]]$,' cf. Dowty 1982b)

So, (3) causes no problem. However, we have no way to derive (4) because, by the definition of GR's in (1), if a verb has only one argument, the argument NP must be a subject. In (4) we do not have a subject but an object although the verb has only one argument. One possible way may be to have a rule which changes IV to S. That is we assume that 'Joe-LIL čapassta' be originally an IV, which is composed of T ('Joe') and TV ('čapassta'), and this phrase becomes S by the above rule. However, this method does not work for two reasons. First, Korean does not have the Unspecified subject deletion rule for intransitive verbs (*wassta. '(Someone) came'), so IV→S rule does not apply to basic IV. Second, Unspecified object deletion seems to be unproductive like Unspecified subject deletion, so this rule must be treated as a lexical rule that is applied to basic expressions.¹ Then, (4) is a serious problem in treating Korean categorially, but I think that this problem can be overcome by adopting a different version of Montague Grammar developed by Lee (1982), while still treating syntactic rules (such as passive) as category changing rules for verbs. I will discuss this problem in section 3.

Another serious problem in using Dowty's treatment of GR universally comes from the analysis of ergative (and case-marking) languages such as Dyrbal. Dowty (1982a) suggests that Dyrbal be analyzed under the 'inverse lexicaliza-

¹ In Korean, any argument NP can be deleted which may be recovered from contexts. I treat only those structures which have the unspecified participant ('someone,' or 'something') by category changing rules. I admit that differentiating two cases (contextually dependency vs. unspecifiedness) is not always simple.

tion hypothesis' to the effect that relational concepts are lexicalized in the opposite order to non-ergative (i.e. accusative) languages such as English. As we shall see in section 4, this treatment of Dyrbal runs across a great number of problems. I will try to suggest a direct analysis (cf. Johnson 1976: 4) in a categorial manner on the basis of the idea of Lee (1982).

3. An Alternative Categorial Analysis

3.1. Basic Idea

This section is chiefly based on the idea of Lee (1982). What I am going to show is that some of the problems of treating case-marking languages in the manner of Dowty (1982a, b) can be solved by adopting Lee's (1982) categorial analysis for Korean. While doing this, I will assign IV the semantic type of functions from NP denotations to sentence denotations (i.e. treat IV as t/T rather than t/e which Lee (1982) assumed). Also I will add some category changing rules (e.g., Unspecified subject deletion) which Lee (1982) does not mention but which are straightforward consequences of the theory.

In general, Lee's RPTQ was proposed

“to accomodate case assignment and free concatenation in Korean. Korean word order is relatively free, resulting from full concatenation of a verb phrase with its argument term phrases. This concatenation is, however, strictly constrained in RPTQ by case indexing of verb phrases. Both basic and derived verb phrases are subcategorized with respect to case indices that indicate what cases are admissible for concatenation. Besides case indexing of verb phrases, RPTQ employs two other operations of case marking and case shifting; case marking assigns cases to term phrases, while case shifting reassigns case indices to derived complex verb phrases.” (Lee 1982: 498)

3.2. Case Marking and Concatenation

Let me illustrate the system as far as it is concerned with my purpose. He defines syntactic categories as follows.

- i) 0 is a category.
- ii) Any natural number is a category.
- iii) If A is a category, then A' is a category.²
- iv) If A and B are categories then (A, B) is a category.

The comparison of this system with PTQ system is as follows (Lee 1982: 499, abridged here);

² He introduced iii) to treat Korean state verbs (adjectives) differently from action verbs (verbs). I will not mention state verbs here. But I adopt iii) to treat Dyrbal in section 4.

(6) RPTQ ³	Abbreviation	PTQ	Description
0		t	sentence
n		e	entity
(n, 0)	IV	t/e	intransitive verb
((n, 0), 0)	T, or n*	t/(t/e)	term phrase
(m*, (n, 0))	TV	(t/e)/T	transitive verb

As we see above he uses 'the star convention'; $((n, 0), 0) = n^*$. As I said above, since I will treat IV as t/T (in PTQ's terms), IV and TV will be treated as categories $(n^*, 0)$ and $(m^*, (n^*, 0))$ respectively from now on. (Therefore, the exact formalization are mine although the basic idea is not.)

Basic expressions for some categories are as follows.

- (7) $Bn^* = \{\text{Joe, Mary, ...}\}$
 $B(1^*, 0) = \{\text{čuk- 'die,' kət- 'walk,' ...}\}$
 $B(2^*, (1^*, 0)) = \{\text{mək- 'eat,' čap- 'catch,' salaŋha- 'love,' ...}\}$
 $B(3^*, (2^*, (1^*, 0))) = \{\text{ču- 'give,' ...}\}$

The case marking rule is:

- (8) (Case Marking) If $@ \in Bn^*$, then $F1, m(@) \in Pm^*$, where
 $F1, m(@) = @-K$. Here, $K = KA(\text{Nom})$ if $m = 1$,
 $K = LIL(\text{Acc})$ if $m = 2$, and
 $K = EKE(\text{Dat})$ if $m = 3$.

Translation: '@' (identity mapping)

This rule generates $[Mary-KA]_1^*$, $[Mary-LIL]_2^*$, and $[Mary-EKE]_3^*$. Note that case-markers are introduced independently of the position of NP's in a sentence in contrast to Dowty (1982a). With simple rules of functional application we can derive the following sentences.

- (9) $[[Mary-KA]_1^* [kətnɪnta]_{(1^*, 0)}]_0$
SM walks
'Mary walks.'
- (10) $[[Joe-KA]_1^* [[Mary-LIL]_2^* [salaŋhanta]_{(2^*, (1^*, 0))}]_{(1^*, 0)}]_0$
SM OM loves
'Joe loves Mary.'

To get not only (10) but also 'May-LIL Joe-KA salaŋhantz ('Joe loves Mary'),' IV derivation rule includes not only functional application (11a) but also (11b).

- (11) (IV formation)
a. If $@ \in Pm^*$ and $\$ \in P(m^*, (n^*, 0))$ then $@\hat{\$} \in P(n^*, 0)$.
b. If $@ \in Pn^*$ and $\$ \in P(m^*, (n^*, 0))$ then $@\hat{\$} \in P(m^*, 0)$.

³ n and m are primarily variables which represent natural numbers. But Prof. Lee uses n as a category name too in order to introduce the basic expressions of term phrases, i.e. n^* , cf. (7).

Translation: (a) $\lambda \not\varphi \lambda \alpha [\$' (\not\varphi) (\alpha)] (\hat{\ } @')$ = $\lambda \alpha [\$' (\hat{\ } @') (\alpha)]$
 (b) $\lambda \not\varphi \lambda \alpha [\$' (\alpha) (\not\varphi)] (\hat{\ } @')$ = $\lambda \alpha [\$' (\alpha) (\hat{\ } @')]$

If we use (b) we can get the following sentence.

- (12) [[Mary-LHL]₂* [[Joe-KA]₁* [salanhanta]_{(2*,(1*,0))}]_(2*,0)]₀
 OM SM loves
 ‘Joe loves Mary.’

Note that by independent case marking and crucial use of (11b) we can catch the relatively free word order in Korean without stipulating a rearranging rule.

Another possible way to treat free word order in Korean is by adopting a category changing rule such as the following instead of having the syntactic rule (11b).

- (11') If $\$ \in P (m^*, (n^*, 0))$ then $\$ \in P (n^*, (m^*, 0))$.

Translation: $\lambda \not\varphi \lambda \alpha [\$' (\alpha) (\not\varphi)]$.

I think (11') is as compatible with the whole system as (11b). I'd like to have (11b) instead of (11') for the following reasons. First, free concatenation is a fully productive phenomena and has no exceptions, so it is not a 'lexical' but a 'syntactic' rule in the sense of Dowty (1978). Although a category changing rule may be either lexical or syntactic, it seems to me more appropriate to treat lexical phenomena by category changing rules. Second, relation rearranging rules such as Passive tend to accompany morphological changes of verbs. Because verbs do not undergo morphological change in different order of arguments, it doesn't seem appropriate to treat the phenomena by category changing rules. I think these arguments are not decisive since they are based on certain tendencies. Without further arguments, I will adopt (11b).

3.3. Relation Changing Rules (Case Shifting)

Although this system does not define GR in terms of compositional structure as in Dowty (1982a, b), the treatment of syntactic rules as rules changing categories of verbs is retained. For example, agentless passive sentences are derived by the following rule.

- (13) Mary-KA čap-hi-əssta.
 SM catch-Pass-Past
 ‘Mary was caught.’

- (14) (Agentless passive) If $@ \in P (2^*, (1^*, 0))$ then $F10 (@) \in P (1^*, 0)$
 where $F10 (@)$ is the passive form of $@$.
 Translation: $\lambda \not\varphi [@' (\not\varphi) (\exists x^*)]$

A rule which can explain (4) in section 2 (analyzed in (16)) is the following Unspecified subject deletion.

- (15) (Unspecified subject deletion) If $@ \in P(2^*, (1^*, 0))$
 then $F11(@) \in P(2^*, 0)$, where $F11(@) = @$.
 Translation: $\lambda \mathscr{P} [@' (\mathscr{P}) (\exists x^*)]$

- (16) $[[\text{Joe-LIL}]_{2^*} [\text{čapassta}]_{(2^*, 0)}]_0$
 $[\text{čapassta}]_{(2^*, (1^*, 0))}$

(16) can be derived because this system does not require that every IV has a subject. (But the particular grammar of Korean may require that every IV has an argument NP, since, as I mentioned in 2.2. Korean does not have Unspecified subject deletion for intransitive verbs.) I think this is a way we can overcome the problem of Dowty's analysis.

The other point that gives advantage to the RPTQ system in treating case-marking languages is that Korean has fully case-marked NP's in isolation, i.e. not in a phrase or a sentence. To the question 'Who walks?' Koreans reply 'Mary-KA' as well as 'Mary.' Because Dowty's system introduces the case marker while combining it with TV or IV, this system cannot get 'Mary-KA' which is fully well-formed in Korean.

Until now, I have shown the inadequacies of configurational analysis and some advantages of analysis which gives emphasis to case marking in treating case-marking languages such as Korean and Japanese. In the next section, I will show that the latter analysis gives more satisfactory results in treating an ergative language, Dyrbal.

4. Categorical Analysis of Dyrbal

4.1. Inverse Hypothesis and the Problems

Dyrbal is an ergative language in the sense that the notional subject of an intransitive verb is treated the same as the notional object of a transitive verb (Absolutive), and the notional subject of a transitive verb is treated differently (Ergative). For example,⁴

- (17) yaRa baniNu.
 man-A come
 'Man is coming.'

- (18) djugumbil yaRangu balgan.
 woman-A man-E hit
 'Man hit woman.'

Under the inverse hypothesis that transitive verbs of Dyrbal are inversely lexicalized to those of English, Flip analysis assumes that the absolutive case in

⁴ I gathered data from Johnson (1976), Dixon (1979), and Jake (1978). I omitted noun markers which precede nonpronominal NP's in Dyrbal. Abbreviations; A(bsolutive), E(rgative), N(ominative), and Acc(usative).

the intransitive clause as well as in the transitive clause marks subject, and the ergative case marks object. Dowty's (1982a) suggestion of analyzing Dyrbal under Flip analysis is motivated by the fact that many syntactic phenomena such as Relativization, Reflexivization, Equi-NP deletion, and Conjunction reduction are sensitive to absoluteness of NP.

But Flip analysis has many problems which are real counter examples to this analysis. Many of Johnson's (1976) arguments are concerned with these problems. Among others, I agree with the following arguments (Johnson 1976: 41-44). First, any language, even Dyrbal, does not show ergativity in the whole morphology and syntax. So even if we should apply Flip analysis to Dyrbal with some exceptions, we cannot do the same thing to less ergative languages such as Eskimo and Walbiri. Second, the suffix *na^oNa* which is optionally attached to proper nouns is unable to be attached to the absolutive NP of a intransitive clause nor to the ergative NP. So, in this case Flip analysis also has to treat the subject of an intransitive verb and object in the same way. Third, addressees of imperative constructions are either ergators or a unary absolutive NP and both can be deleted. If Flip analysis treats 'ninda' in (20) as an object, it violates the universal principle that the addressee of an imperative clause is the underlying subject of that clause.

(19) { *ninda* } *bani.*
 { \emptyset }
 you-N come
 '(You) come.'

(20) { *ninda* } *yaRa balgan.*
 { \emptyset }
 you-N man-A hit
 '(You) hit the man.'

More fundamental arguments against Flip analysis come from the pronoun system of Dyrbal and constructions where pronouns and other NP's cooccur.

(21) Pronoun Systems of Dyrbal

	<SUI>	<SUT>	<DO>
speaker	<i>nadja</i>	<i>nadja</i>	<i>nayguna</i>
hearer	<i>nindja</i>	<i>nindja</i>	<i>ninuna</i>

(<SUI>: notional subject of an intransitive clause
 <SUT>: notional subject of a transitive clause)

(22) *nada baniNu.*
 I-N come
 'I am coming.'

(23) *nada ninuna balgan.*
 I-N you-Acc hit
 'I hit you.'

For example, we can derive [yaRa]₁* ('man-A'), [yaRa]₂* ('man-A'), [yaRangu]₁* ('man-E'), [ɲadja]₁* ('I-N'), [ɲadja]₁* ('I-N'), and [ɲayguna]₂* ('I-Acc'). By assigning IV to (1*, 0) and TV to (2*, (1', 0)) categories, we can analyze sentences (17)-(18) and (22)-(25) categorially without causing the problems of Flip analysis. Let me give a few illustrations.

- (17') [[yaRa]₁* [baniNu]_(1*,0)]₀
 man-A come
 'Man is coming.'
- (18') [[yaRangu] [[djugumbil]₂* [balgan]_{(2*,(1',0))}]_(1*,0)]₀
 man-E woman-A hit
 'Man hit woman.'
- (22') [[ɲada]₁* [baniNu]_(1*,0)]₀
 I-N come
 'I am coming.'
- (23') [[ɲada]₁* [[ɲinuna]₂* [balgan]_{(2*,(1',0))}]_(1*,0)]₀
 I-N 'you-Acc hit
 'I hit you.'
- (24') [[ɲada]₁* [[yaRa]₂* [balgan]_{(2*,(1',0))}]₀
 I-N man-A hit
 'I hit man.'
- (25') [[yaRangu]₁* [ɲaygund]₂* [balgan]_{(2*,(1',0))}]_(1*,0)]₀
 man-E I-Acc hit
 'Man hit me.'

As for (18') and (25'), we can also derive (18'') and (25'') by adopting the IV formation rule similar to (11) which guarantees that non-subjects can be attached to the verb as the last argument.

- (18'') [[djugumbil]₂* [[yaRangu]₁* [balgan]_{(2*,(1',0))}]_(2*,0)]₀
 woman-A man-E hit
 'Man hit woman.'
- (25'') [[ɲaygund]₂* [[yaRangu]₁* [balgan]_{(2*,(1',0))}]_(2*,0)]₀
 I-Acc man-E hit
 'Man hit me.'

More convincing data which supports my analysis come from the conjunction structures of Dyrbal. Before discussing Conjunction, I'd like to show how my system handles the so called Anti-passive (or Passive in Flip analysis) which attaches '-ɲay' to transitive verbs.

- (27) yaRa djugumbilgu balgaɲaNu.
 man-A woman-D hit-ɲay-tns
 'Man hit woman.'

(30) and (31) seem to support the Flip analysis because deleted NP's (in terms of transformational analysis) assume the same GR (subject) in this analysis, while direct analysis has to stipulate a syntactic ergativity. In addition, with the finding that some conjunction constructions are to be treated as conjoined VP's rather than conjoined sentences (e.g., 'Few men walk and talk' is different in meaning from 'Few men walk and few men talk'), the fact that Flip analysis seems to be the unique way to derive (30) and (31) as VP conjunctions gives some support to this analysis. But (32) and (33) present a serious problem. Flip analysis has no way to derive (32) and (33). So conjunction structure is another serious counter example to Flip analysis.

My system can generate (30)-(33). In addition I can generate them as VP conjunctions, not as sentence conjunctions with NP deletion as in Johnson (1976).

The rule is formulated as follows.

- (36) (IV conjunction) If $@ \in P(1^*, 0)$ and $\$ \in P(2^*, 0)$ then
 $@\hat{\sim}\$ \in P(1^*, 0)$ and $\$\hat{\sim}@ \in P(2^*, 0)$.
 Translation: $\lambda\mathcal{P} [@' (P) \wedge \$' (\mathcal{P})]$

(30) and (31) can be analyzed as follows.

- (30') $[[yaRa]_{1^*} [[baniNu]_{(1^*,0)} [[djugumbiRu]_{1^*}$
 man-A come-here woman-E
 $[balgan]_{2^*(1^*,0)}]_{(2^*,0)}]_{(1^*,0)}]_0$
 hit
 'Man came here and woman hit (man).'

- (31') $[[yaRa]_{2^*} [[[djugumbiRu]_{1^*} [balgan]_{(2^*,(1^*,0))}]_{(2^*,0)}$
 man-A woman-E hit
 $[baniNu]_{(1^*,0)}]_{(2^*,0)}]_0$
 come-here
 'Woman hit man and (man) came here.'

The crucial point of the above analysis is that IV can be formed by combining with a transitive verb either the object first or the subject first (cf., (11) in section 3). Also it is stipulated that $(1^*, 0)$ category and $(2^*, 0)$ category can be conjoined to form a new category.

From (30) and (31) alone, we cannot decide whether $@\hat{\sim}\$$ or $\$\hat{\sim}@$ in (36) belong to $(1^*, 0)$ or $(2^*, 0)$ because yaRa ('man-A') belongs to both 1^* and 2^* . It is sentences (32) and (33) that make the decision possible. The analyzed structure of these sentences are as follows.

- (32') $[[\eta ana]_{1^*} [[banagaNu]_{(1^*,0)} [[Nura]_{1^*} [buran]_{(2^*,(1^*,0))}]_{(2^*,0)}]_{(1^*,0)}]_0$
 we-N return you-N see
 'We returned and you saw (us).'

- (33') $[[\eta ana]_{2^*} [[[Nura]_{1^*} [[haran]_{(2^*,(1^*,0))}]_{(2^*,0)}$
 we-Acc you-N see

[banagaNu]_(1*,0)[_(2*,0)]₀
 return
 'You saw us and (we) returned.'

Note that 'nana' belongs to category 1* or 1**, but not 2*.

In addition to the IV conjunction rule of (36), Dyrbal has another conjunction rule in which the two IV categories are the same. This is usual in other languages, i.e. universal.

(37) (IV conjunction 2) IF @, \$ ∈ P (m*, 0) then
 @~\$, \$~@ ∈ P (m*,0), where m = 1, 1', and 2.
 Translation: λ \mathscr{P} [@' (\mathscr{P}) ∧ \$' (\mathscr{P})]

So, (34) and (35) are analyzed as follows.

(34) [[η uma]_{1*} [[banaguNu]_(1*,0) [[bural η anu]_{(3*,(1*,0))}
 father-A return see-nay
 [yabugu]_{3*}]_(1*,0)]_(1*,0)
 mother-D
 'Father returned and saw mother.'

(35) [[η adja]_{1*} [[yugu]_{2*} [yuban]_{(2*,(1*,0))}]_(1*,0)]
 I-N stick put-down
 [[djugumbil]_{2*} [djilwan]_{(2*,(1*,0))}]_(1*,0)]_(1*,0)
 woman-A kick
 'I put down the stick and kicked the woman.'

Although I could not get an example of (37) where m=2, I predict that the following sentence can be accepted as grammatical.

(38) [[η uma]_{2*} [[djugumbiRu balgan]_(2*,0) [yaRangu buran]_(2*,0)]_(2*,0)]₀
 father-A woman-E hit man-E see
 'Woman hit father and man saw (father).'

Also, I predict that the following sentence with pronouns is grammatical according to the rule (36).

(39) [[η ada]_{1*} [[banaga]_(1*,0) [yaRa buran]_(2*,0)]_(1*,0)]₀
 I-N return man-E see
 'I returned and man saw (me).'

In short, my grammar (which is based on Lee (1982)) can derive many conjunction structures with pronouns and other NP's *categorially* as *IV conjunctions* rather than sentence conjunctions with NP-deletion. In doing this, I was crucially dependent on the rule (36) which conjoins two syntactically different but semantically identical categories, in addition to the universal conjunction rule (37) which conjoins two syntactically identical categories. The theoretical implication of my analysis is two-fold. First, the sameness of the syntactic category is a sufficient condition for the existence of a rule which conjoins the

two expressions. Second, the sameness of the semantic type is a necessary condition for such a conjunction rule.

Other constructions in Dyrbal can be formalized as category changing rules in the present system, too. Dyrbal has Unspecified object deletion and Unspecified subject deletion, as is the case in Korean.

(40) yaRa balgalŋaNu.
man-A hit-ŋay-tns
'Man hit (someone).'

(41) nayguna balgan.
I-Acc hit
'(Someone) hit me.'

The responsible rules are similar to those in Korean (cf., (15)).

(42) (Free deletion) If $@ \in P(m^*, (n^*, 0))$ then $F15 (@) \in Pn^*$
and $F16 (@) \in Pm^*$, where $F15 (@) = F16 (@) = @$
Translation: $F15 (@) = \lambda \mathscr{P} [@' (\exists x^*) (\mathscr{P})]$
 $F16 (@) = \lambda \mathscr{P} [@' (\mathscr{P}) (\exists x^*)]$

Inchoative and causative verbs may also be formed by the following rules.

(43) (Inchoative) If $@ \in P(1^*, 0)$ then $F17 (@) \in P(1^*, 0)$
where $F17 (@)$ is the inchoative form of
Translation: $\lambda \mathscr{P} [BECOME @' (\mathscr{P})]$

(44) (Causative) If $@ \in P(1^*, 0)$ then $F18 (@) \in P(2^*, (1^*, 0))$
where $F18 (@)$ is the causative form of
Translation: $\lambda \mathscr{P} \lambda \alpha [\alpha CAUSE @' (\mathscr{P})]$

(45) a. yaRa gulgiRi.
man-A pretty
'Man is pretty.'

b. raRa gulgiRi-bin.
man-A pretty-become
'Man will become pretty.'

c. ŋadja yaRa gulgiRi-mban.
I-N man-A pretty-cause
'I will make the man pretty.'

It is not difficult to make a rule which generates committative forms, either.

(46) (Committative) If $@ \in P(1^*, 0)$ then
 $F19 (@) \in P(2^*, (1^*, 0))$ where
 $F19 (@)$ is the committative form of
Translation: $\lambda \mathscr{P} \lambda \alpha [\text{with}' (\mathscr{P}) (\sim @') (\alpha)]$

- (47) djugumbil yaRangu yanu-man.
 woman-A man-E went-with
 'Man went with woman.'

This rule can be applied to a -*ŋay* verb combined with its object (Dative).

- (48) djugumbiRu Nalna djubalagu Nuga-*ŋay*-mban.
 woman-E boy-A flour-D grind-*ŋay*-with
 'Woman ground wild flour with boy.'

There are many other constructions which can be treated well in this system and many which may not. Among others, I have not mentioned Relative clauses and Equi-NP deletion. The former may be concerned with the variable binding, which I am not sure how to handle now, and the latter is closely related with the complex problem of control.

5. Concluding Remarks

In this paper, I have tried to argue for a categorial analysis of case-marking language which is slightly different from the original MG. Also I made an attempt to apply the system to the analysis of Dyrbal.

Surely, the present system is a richer system than the original MG. It has categories which correspond to natural numbers which are infinite. However, the following two considerations seem to me to make the system itself plausible. First, the number of categories is infinite in the PTQ system, too. Second, the present system is also tightly constrained by semantic types. In addition, the real advantage of the present system is that it can handle the data of previous sections. As Jacobson (1983) reveals, the configurational languages such as English may have to be treated in terms of constituent structures of certain higher levels. But case-marking languages seem to refuse such an analysis.

I admit that, by adopting the present system, I may have abandoned the universal way of treating GR's suggested by Dowty (1982a,b). However, the true universal theory, which is still to be found, may be neither the present system nor Dowty's. What I want to do is just to show the inadequacy of Dowty's system and some advantages of the present system in treating a few case-marking languages, especially an ergative language.

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