Korean Postpositional Particle *wa(kwa)* in Categorial Grammar

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Kim, Soo-Kil (1995). **Korean Postpositional Particle *wa(kwa)* in Categorial Grammar** *Linguistics vol. 3.* In describing the uses of the partcle *wa,* I adopt Partee & Rooth's idea (1983) that a category may correspond to multiple types, and the type can be lifted without a category lifting in appropriate situations. The advantage of the multiple types for a single category and the type-lifting without the category lifting over the treatment of every syntactic category as a single type is that the syntax is not affected by the type incoherence with the help of type lifting. In the case of the particle of conjoining *wa,* it is given a single category, but it is given multiple types. It is shown that if the type-lifting is allowed in the syntactic derivations of sentences, the syntactic category of *wa* is maintained as a single syntactic category, not influenced by the category lifting. The postpositional particle *wa* which forms an adjunct with a noun phrase also undergoes the type lifting to maintain the uniform syntactic treatment of the phrases of the adjuncts. Each of the syntactic and semantic characteristics of the sentences of symmetric particle *wa* is represented by a syntactic feature and a meaning postulate.

Montague (1974) assumed that the mapping of syntactic categories to semantic types is an into-function. Every syntactic category is assigned a single semantic type. For example, he treated uniformly every NP including proper nouns as a term phrase whose type is <<e,t>,t>, and every transitive verb including extensional verbs as the intensional verb whose type is <<<e,t>,t>,<e,t>> if we don't take into account the index *s* which expresses the intensionality of the types. He assigned to all members of a given category the highest type needed for them. Observe the following

pair of sentences.

(1) a. John and every woman swim.
b. John seeks and finds a woman.

In the above sentences, suppose the conjoining of phrases requires not only their syntactic categories, but their semantic types to be equivalent to each other. Then a proper noun of *John* must be regarded as a generalized quantified noun phrase in (1a), and the type of extensional verb *find* must be that of intensional verb in (1b), semantically supplemented by an appropriate meaning postulate.

However, as noted by Partee and Rooth (1983), when the extensional verbs are given a type of <<<e,t>,t>,<e,t>>, it results in a problem, which is shown in the following derivation.

(2) John caught and ate a fish
--- ---- --- -----
T VP/T VP/T T
---------- C
VP/T
----------FA
VP
---------- FA
S

Translation : catch'(a'(fish'))(j) ∧ eat'(a'(fish'))(j)

The natural interpretation of the sentence (2) must be ∃x[fish'(x) ∧ catch'(x)(j) ∧ eat'(x)(j)].[1] That is, only one fish is involved in its interpratation.

Hence, Partee (1987) and Partee & Rooth (1983) dicarded Montague's idea that a syntactic category is realized semantically only as a single semantic type. They suggested that a certain syntactic category be allowed to correspond to multiple types. For example, according to Partee (1987), an NP is of type e, <e,t>, or <<e,t>,t>. In the case the noun phrase behaves as a predicate, it is assumed to be realized as the type of <e,t>.

Partee & Rooth (1983) suggested that, on the asumption that a syntactic category may correspond to a set of types, we should 'posit as a processing strategy that all expressions are interpreted at the lowest type possible, invoking higher type homonyms only when needed for type coherence'.[2]

Kang (1987) interpreted their proposal as a type lifting without a category lifting.

The following derivation of the sentence (3) and its translation show what their proposal implies.

(3) John caught and ate a fish

NP TV TV NP/CN CN

C FA

TV NP

FA

VP

FA

S

Translation:

a. caught and ate $\Rightarrow \lambda x \lambda y[catch'(x)(y) \wedge eat'(x)(y)]$

$\lambda P \lambda y[P(\lambda x[catch'(x)(y) \wedge eat'(x)(y)])]$ TL

b. a fish $\Rightarrow \lambda P \exists x[fish'(x) \wedge P(x)]$

c. caught and ate a fish $\Rightarrow \lambda y[\exists x[fish'(x) \wedge catch'(x)(y) \wedge eat'(x)(y)]]$

d. John caught and ate a fish $\Rightarrow \exists x[fish'(x) \wedge catch'(x)(j) \wedge eat'(x)(j)]$

The syntactic derivation of (3) is well-motivated, but the incoherence of types does occur in the process of its translation. The minimal type of conjoined verb phrase of *catch and ate* is <e,<e,t>>. However, if it is a functor of *a fish* whose type is <<e,t>t>, as the syntactic derivation implies, it must be lifted to its homonym of $\lambda P \lambda y[P \lambda x[catch'(x)(y) \wedge eat'(x)(y)]$ to dispense with the type discrepancy.

In this paper, I will attempt to describe the various uses of Korean postpositional particle *wa* (*kwa*)[3] on the assumption that a syntactic category corresponds to a set of types, and that every lexical item should be interpreted in its minimal type if possible, and be lifted to its homonym only to resolve type incoherence.

Korean particles of *wa*'s which are suffixed to nouns are classified into three types, according to their syntactic and semantic characterisitcs (Hong 1987) ; *wa* of symmetricity, *wa* of accompanying, and *wa* of conjoining. The following sentences demonstrate the various uses of the particle *wa*. The sentence (4a) expresses the symmetric use of the particle *wa*, the sentence (4b), *wa* of accompanying, and the sentence (4c), the use of the particle *wa* of conjoining, respectively.

(4) a. John-i Mary-wa chinha- ess- ta.
NOM SYM be-familiar-to PAST DEC
'John is familiar to Mary.'
b. John-i Mary-wa nol-ass-ta.
NOM with play PAST DEC
'John played with Mary.'
c. Mary-wa John-i youngliha-ess-ta.
and NOM be-clever PAST DEC
'Mary and John were clever.'

To begin with, let me discuss the *wa* of symmetricity. The syntactic characteristic of the symmetric verb is that the verb governs two arguments. However, the case particle which is attached to the second argument of the verb is *wa*, different from the normal transitive verbs whose second argument is suffixed by the accusative case particle *lul*(*ul*). This is demonstrated in the following sentences.

(5) a. John-i Mary-wa ssawu-ess-ta.
NOM SYM fight Past Dec
'John fought Mary.'
b. *John-i Mary-lul ssawu-ess-ta
NOM ACC fight Past Dec
'John fought Mary.'

(6) a. John-i Mary-wa chinha-ess-ta.
b. *John-i Mary-lul chinha-ess-ta.

The syntactic constraint that the first argument of the symmetric predicate be realized as a noun phrase suffixed by the particle *wa* should be expressed as a feature in the syntactic category of the symmetric verb like the following.

(7) S\NP[NOM]\NP[WA]

The symmetric verbs will be combined only with a noun phrase suffixed by the particle *wa*, which is shown in the following syntactic derivation of the sentence (6a).

(8) John -i Mary-wa ssawu-ess-ta

NP NP[NOM]\NP NP NP[WA]\NP S\NP[NOM]\NP[WA]

FA FA

NP[NOM] NP[WA]

FA

S\NP[NOM]

FA

S

Translation : fight'(m)(j)

In general, it is assumed that every morpheme is to have a syntactic category as far as categorial grammar is concerned. This leads us to give syntactic categories to the particles which are related to the grammatical function such as case particles. The case particles and the particle *wa* are the phrasal affixes which are syntactically related to a phrase, not a word (Kang 1987). The semantic function of the case particles is an identity mapping which does not contribute to the whole meaning of the sentence.

The semantic characteristic of the symmetric sentence is that the exchange of arguments does not have any semantic effect on the sentences of symmetric verbs, which is shown in the following sentences.

(9) a. Mary-ka John-kwa chinha-ess-ta.
b. John-i Mary-wa chinha-ess-ta.

The symmetricity of the verbs can be described in terms of the following meaning postulate.

(10) $\forall x \forall y [\alpha(x)(y) \leftrightarrow \alpha(y)(x)]$ where α is a two-place constant such as kyelhonha'(marry), heyeci'(part with), ssawu'(fight), and etc.

The phrase suffixed by the accompanying particle *wa* is an adverbial phrase whose grammatical function is an adjunct, exactly like English counterpart of preposition *with*. *Wa* is a kind of extensional postpositional particle whose type is <e,<<e,t>,<e,t>>>. It is optionally realized in sentences different from the noun phrase of the symmetric particle *wa* which is an argument of the verb. The derivation of the sentence which contains the accompanying phrase may be represented like the following.

(11) John-i Mary-wa nol-ass-ta

NP NP[NOM]\NP NP (VP/VP)\NP VP

---------- FA ---------- FA

NP[NOM] VP/VP

----------FA

VP

---------- FA

S

Translation : with'(m)(play')(j)

However, when, given a minimal type of <e,<<e,t>,<e,t>>>, *wa* is combined with a noun phrase, the following sentence posits a problem.

(12) John-i ku ai-wa nol-ass-ta.
Nom the child with play Past Dec
'John played with the child.'

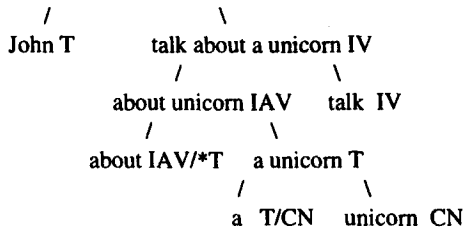
The NP of *ku ai* which is combined with *wa* is of type <<e,t>,t>. The semantic translation of the sentence above meets the type incoherence if the particle *wa* is assigned a minimal semantic type <e,<<e,t>,<e,t>>>. That is, it can't be a functor of *ku ai*.

Montague (1974) treated every preposition of adjuncts including extensional prepositions as intensional prepositions, supplemented by a meaning postulate for the extensional preposition.[4] Every preposition of adjuncts is given a single syntactic category.

Lee (1987), however, distinguishes the extensional preposiotions from the intensional prepositions in their categories to dispense with Montague's meaning postulates. For example, in treating the prepositions, the extensional preposition is given a category of IAV/e, and the intensional preposition, a category of IAV/*T.[5] If we follow Lee's proposal, the sentences (13) may be derived like (14).

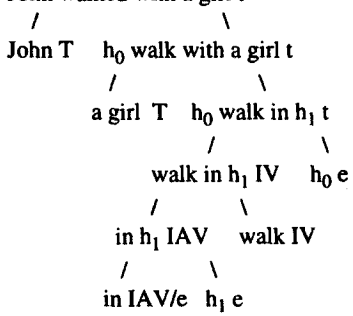
(13) a. John talked about a unicorn.
b. John worked with a girl.

(14) a. John talked about a unicorn. t



Translation: about'(^P ∃ x[unicorn'(x) ∧ P{x}])(^talk')(j)

b. John walked with a girl t



Translation: ∃ x[girl'(x) ∧ with'(x)(^walk')(j)]

The syntactic derivations above show that, if we follow Lee's proposal, the syntactic derivation of the sentence (13a) may be quite different from that of the sentence (13b). Furthermore we should posit the morphologically null elements of pronouns in the derivation of the sentence of an extensional preposition.

However, if we adopt the type-lifting in the process of translation, the syntactic derivations of the sentences (13a) and (13b) are equivalent to each other. Of course, we need not adopt Montague's meaning postulate for the extensional prepositions. The following is the derivation of the sentence (12) whose derivation is equivalent to (11) syntactically, but the type-lifting is needed in the process of translation.

(15) John-i ku ai-wa nol-ass-ta

NP NP[NOM]/NP NP/CN CN VP/VP\NP VP

FA FA

NP[NOM] NP

FA

VP/VP

FA

VP

FA

S

Translation:

a. ku ai $\Rightarrow \lambda P \exists x[\forall y[child'(y) \leftrightarrow x=y] \wedge P(x)]$

b. wa $\Rightarrow \lambda x \lambda Q \lambda y[with'(x)(Q)(y)]$

$\lambda f \lambda Q \lambda y[f(\lambda x[with'(x)(Q)(y)])]$ TL

c. ku ai-wa $\Rightarrow \lambda f \lambda Q \lambda y[f(\lambda x[with'(x)(Q)(y)])](\lambda P \exists x[\forall y[child'(y) \leftrightarrow x=y] \wedge P(x)])$

$= \lambda Q \lambda y[\lambda P \exists x[\forall y[child'(y) \leftrightarrow x=y] \wedge P(x)](\lambda x[with'(x)(Q)(y)])]$

$= \lambda Q \lambda y \exists x[\forall y[child'(y) \leftrightarrow x=y] \wedge \lambda x[with'(x)(Q)(y)](x)]$

$= \lambda Q \lambda y \exists x[\forall y[child'(y) \leftrightarrow x=y] \wedge with'(x)(Q)(y)]$

d. ku ai-wa nol-ass-ta $\Rightarrow \lambda y \exists x[\forall y[child'(y) \leftrightarrow x=y] \wedge with'(x)(play')(y)]$

e. John-i ku ai-wa nol-ass-ta $\Rightarrow \exists x[\forall y[child'(y) \leftrightarrow x=y] \wedge with'(x)(play')(j)]$

What should be noted in the translation above, the postpositional particle is lifted from the minimal type of <e,<<e,t>,<e,t>>> of *wa* to its homonym of type of <<<e,t>,t>,<<e,t>,<e,t>>> to solve the type incoherence.

The particle of conjoining *wa* plays a role of the conjoining of noun phrases. The conjoining of noun phrases by the particle *wa* results in a noun phrase. Let me give a syntactic category NP/NP\NP to the conjoining particle of *wa* uniformly. The minimal semantic type of NP/NP\NP may be <e,<e,<<e,t>,t>>>. The possible derivation of the sentence (4c) can be represented like the following.

(16) Mary-wa John-i youngliha-ta

NP NP/NP\NP NP NP[NOM]\NP VP

NP\NP

NP

NP[NOM]

S

Translation:

a. wa $\Rightarrow \lambda x \lambda y \lambda P[P(x) \wedge P(y)]$

b. Mary-wa John-i $\Rightarrow \lambda P[P(m) \wedge P(j)]$

c. youngliha-ta $\Rightarrow$ clever'

$\lambda f[f[\lambda y[clever'(y)]]]$ TL

d. Mary-wa John-i youngliha-ta $\Rightarrow$ clever'(m) $\wedge$clever'(j)

However, the following sentences raise a type incoherence when *wa*'s are given a single type of <e,<e,<<e,t>,t>>> uniformly.

(17) a. Mary-wa motun-sonyen-i youngliha-ta.
and every boy NOM is-clever
'Mary and every boy were clever.'

b. motun sonyen-kwa Mary-ka youngliha-ta.
'Every boy and Mary are clever.'

c. motun sonyen-kwa motun sonye-ka yongliha-ta.
every boy and every girl NOM are-clever
'Every girl and every boy are clever.'

In the above sentences the noun phrase of *motun sonyen* or *motun sonye* which is combined with a particle *wa* is of type <e,<e,t>>. This implies that the types of the embedded NP in NP/NP\NP is of type e or <<e,t>,t>>. For example, *wa* is of type <e, <<<e,t>t>,<<e,t>,t>>> in (17a), of type <<<e,t>,t>,<e,<<e,t>,t>>> in (17b), and of type <<<e,t>,t><<<e,t>,t><<e,t>,t>>> in (17c). Each of them can be translated like the following.

(18) wa $\Rightarrow \lambda x \lambda f \lambda P[f(P) \wedge P(x)]$
$\lambda f \lambda x \lambda P[P(x) \wedge f(P)]$
$\lambda f \lambda g \lambda P[f(P) \wedge g(P)]$

The following is the syntactic derivation of the sentence (17c) and its translation.

(19) motun sonyen-kwa motun-sonye-ka youngliha-ta
NP/CN CN NP/NP\NP NP/CN CN NP[NOM]\NP VP
---------- FA ---------- FA
NP NP
---------- FA
NP/NP
----------FA
NP
---------- FA
NP[NOM]
---------- FA
S

Translation:

a. motun sonyen $\Rightarrow \lambda Q \forall x[boy'(x) \rightarrow Q(x)]$

b. kwa $\Rightarrow \lambda f \lambda g \lambda P[f(P) \wedge g(P)]$

c. motun sonyen-kwa $\Rightarrow \lambda f \lambda g \lambda P[f(P) \wedge g(P)](\lambda Q \forall x[boy'(x) \rightarrow Q(x)])$
$= \lambda g \lambda P[\forall x[boy'(x) \rightarrow P(x)]) \wedge g(P)]$

d. motun sonye $\Rightarrow \lambda Q \forall y[girl'(y) \rightarrow Q(y)]$

e. motun somyen-kwa motun sonye-ka $\Rightarrow$
$\lambda P[\forall x[boy'(x) \rightarrow P(x)] \wedge \forall y[girl'(y) \rightarrow P(y)]$

f. motun sonyen-kwa motun sonye-ka youngliha-ta $\Rightarrow$
$\forall x[boy'(x) \rightarrow clever'(x)] \wedge \forall y[girl'(y) \rightarrow clever'(y)]$

When more than two noun phrases are conjoined, *wa* can't be treated uniformly as a single type even though every NP which is combined with *wa* is of type e, which is demonstrated in the following derivation.

(20) John-kwa, Mary-wa, Tom-i
NP NP/NP\NP NP NP/NP\NP NP NP[NOM]\NP
---------- FA ---------- FA
NP/NP NP/NP
----------FA
NP
---------- FA
NP
----------FA
NP[NOM]

Translation:

a. John-kwa $\Rightarrow$ $\lambda f \lambda Q[f(Q) \wedge Q(j)]$

b. Mary-wa Tom $\Rightarrow$ $\lambda P[P(m) \wedge P(t)]$

c. John-kwa, Mary-wa Tom-i $\Rightarrow$ $\lambda Q[Q(m) \wedge Q(t) \wedge Q(j)]$

In the derivation above *kwa* which is suffixed to *John* is of type <e,<<<e,t>,t>,<<e,t>,t>>>, but *wa* which is suffixed to *Mary* is of type <e,<e,<<e,t>,t>>>.

In Korean any noun phrase is freely posited before a verb. The following are well-formed sentences in which noun phrases are placed randomly before a verb.

(21) a. John-lul Mary-ka sarangha-ess-ta.
Acc Nom love Past Dec
'Mary loved John.'
b. John-eykey chaik-ul Mary-ka cuw-ess-ta.
Dat book Acc Nom give Past Dec
'Mary gave a book to John.'

To derive above sentences, we can adopt the Dowty's type-raising rule (Dowty, 1988) which is sensitive to grammatical functions. He does not distinguish the type-raising from the category raising. If we adopt Kang's terminology, it is a category lifting. The following is the syntactic derivation of (21a) if we follow Dowty's approach.

(22) John-ul Mary-ka sarangha-ess-ta
NP NP TV
--- CL --- CL
VP/TV CL S/VP
---------- FC
S/TV
---------- FA
S

In the case of the conjoined noun phrase, the following derivation is possible if we adopt Dowty's idea.

(23) John-kwa Tom-ul Mary-ka sarangha-ess-ta
NP VP/TV/NP\NP NP NP TV
---------- FA ---- CL
VP/TV/NP S/VP
---------- FA
VP/TV
----------FC
S/TV
---------- FA
S

Translation:
a. wa ⇒ λx λy λR λz[R(x)(z) ∧ R(y)(z)]
b. John-kwa Tom-ul ⇒ λR λz[R(j)(z) ∧ R(t)(z)]
c. Mary-ka ⇒λP[P(m)] CL
d. John-kwa Tom-lul Mary-ka ⇒λR[R(j)(m) ∧R(t)(m)]
e. John-kwa Tom-lul Mary-ka sarangha-ess-ta ⇒ love'(j)(m) ∧love'(t)(m)

Dowty's problem is that the conjoining particle *wa* is syntactically ambiguous.[6] In the case of the conjoined subject noun phrase, the syntactic category of *wa* may be S/VP/NP\NP. Furthermore the syntactic category of the case particle is not determined. To solve this problem, we should adopt the type-lifting approach.

(24) John-kwa Tom-ul Mary-ka sarangha-ess-ta
NP NP/NP\NP NP NP[ACC]\NP NP NP[NOM]/NP TV
---------- FA ---------- FA
NP/NP NP[NOM]
---------- FA ---------- CL
NP S/VP
---------- FA
NP[ACC]
---------- CL
VP/TV
----------FC
S/TV
---------- FA
S

Translation:

a. John-kwa Tom-ul $\Rightarrow$ $\lambda P[P(j) \wedge P(t)]$

$\lambda R \lambda g[R(\lambda P[P(j) \wedge P(t)])(g)]$ CL

b. Mary-ka $\Rightarrow$ $\lambda Q[Q(m)]$ CL

$\lambda f[f(\lambda Q[Q(m)])]$ TL

c. John-kwa Tom-ul Mary-ka $\Rightarrow$

$\lambda h[\lambda f[f \lambda Q[Q(m)]](\lambda R \lambda g[R(\lambda P[P(j) \wedge P(t)])(g)](h))$

$= \lambda h[\lambda f[f \lambda Q[Q(m)]](\lambda g[h(\lambda P[P(j) \wedge P(t)])(g)])$

$= \lambda h[\lambda g[h(\lambda P[P(j) \wedge P(t)])(g)](\lambda Q[Q(m)])]$

$= \lambda h[h(\lambda P[P(j) \wedge P(t)])(\lambda Q[Q(m)])]$

d. sarangha-ess-ta $\Rightarrow$ love'

$\lambda K \lambda Z[K(\lambda yZ[\lambda x[love'(y)(x)]])]$ TL

e. John-kwa Tom-lul Mary-ka sarangha-ess-ta $\Rightarrow$

$\lambda h[h(\lambda P[P(j) \wedge P(t)])(\lambda Q[Q(m)])](\lambda K \lambda Z[K(\lambda yZ[\lambda x[love'(y)(x)]])]$

$= \lambda K \lambda Z[K(\lambda yZ[\lambda x[love'(y)(x)]])](\lambda P[P(j) \wedge P(t)])(\lambda Q[Q(m)])$

$= \lambda Z[\lambda P[P(j) \wedge P(t)](\lambda yZ[\lambda x[love'(y)(x)]])](\lambda Q[Q(m)])$

$= \lambda Z[Z[\lambda x[love'(j)(x) \wedge love'(t)(x)]]](\lambda Q[Q(m)])$

$= love'(j)(m) \wedge love'(t)(m)$

What should be noticed in the translation above is that the types of the NP of the raised VP/TV are different from those of TV of *sarangha-ess-ta*; the NP embedded in VP/TV is of type <<e,t>,t>, but the NP embedded in TV is of type e. The types of e in TV should be lifted to <<e,t>,t> simultaneously to cope with the type incoherences. That is, the type of <e,<e,t>> is lifted to the type of <<<e,t>,t>,<<<e,t>,t>,t>>. Furthermore the NP embedded in the raised S/VP is of type e. It also is to be raised to type <<e,t>,t> to combine with the raised VP/TV in terms of a functional composition.

The advantages of the type-lifting approach over Dowty's is that the syntactic category *wa* is given a single syntactic category, and futhermore the category lifting is sensitive to the grammatical functions, which means that the syntactic feature of [NOM] or [ACC] triggers the category lifting.

To summarize, in the case of the symmetric *wa*, its syntactic characteristic is expressed by the feature in the syntactic category of the symmetric verbs. The semantic characteristic of symmetry is expressed in terms of a meaning postulate. In the use of the accompanying *wa*, the type-lifting approach allows us to dispense with a meaning postulate which is required to treat the adverbial prepositional (or postpositional) phrases in the Montague's approach. The particle *wa* of conjoining is given a single syntactic category, but it is given multiple types. An advantage of the type-

lifting over Dowty's type-raising in treating the particle of conjoining is that the syntactic category of *wa* is given a single syntactic category uniformly, and the category lifting is sensitive to the grammatical functions if the type-lifting is allowed in the dervations of the sentences of conjoined noun phrases.

Notes

1. Natural interpretation is possible if 'Quantifying-in' is allowed in the derivation of the sentence (2).
2. What I mean by the type-lifting is TL4 of Partee and Rooth (1983), which lifts an entity argument to a term phrase argument. This principle mainly concerns the syntactic categories of transitive verbs, the double transitive verbs, and prepositons whose type ends in t. According to TL4, 'for any type a which ends in t, given α' of type <e,a> we can predict an interpretation $\alpha''$of type <<<e,t>,t>,a>: $\alpha''= \lambda P \lambda v_1 \ldots \lambda v_n[P(\lambda u[\alpha'(u)(v_1) \ldots (v_n)])]$ where IP is of type <<e,t>,t>, u is of type e, and $v_1 \ldots v_n$ are of types such that $\alpha'(u)(v_1) \ldots (v_n)$ is of type t.'
3. The forms of the particle wa are phonologically conditioned; It is realized as *wa* after a vowel but *kwa* after a consonant.
4. The meaning postulate for the particle of accompanying may be the following: $\exists G \forall p \forall P \forall x \Box[\delta(p)(P)(x) \leftrightarrow p\{\hat{}\lambda y[[\check{}G](y)(P)(x)]\}]$ where δ translates *wa*.
5. Lee distinguishes the intensionality from the extensionality of the syntactic categories through the following definition of function *f* which expresses the correspondence between the categories and their types.
   [i] f(e) = e
   f(t) = t
   [ii] f (A/B) = f(A//B) = <f (B), f (A)>
   f (A/*B) = f(A//*B) = <<s, f (B)>, f (A)>
6. The multiple categories of *wa* is parallel to the multiple categories of the determiners of noun phrases if we follow Dowty's type-raising. The categories of the determiners are multipled four-fold in his raising of types.

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