Topicalization and Truth Conditions: A Categorial Grammar Account*

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Abstract. In this paper we will consider how the choice between the topic marker wa and nominative marker for subjects affects truth conditions of sentences. We derive the proper interpretations for sentences with topics and nominative subjects in terms of syntax-semantics interface. The categorial framework adopted here allows us to account for significant difference in meaning with respect to the choice of markers for subjects while maintaining the principle of strong compositionality.

Keywords: information structure, focus, topic, exhaustiveness, contrastiveness, syntax-semantics interface.

1 Introduction

In Japanese linguistics, contrastive analyses of the topic and nominative markers has long received a great deal of attention, especially in terms of semantic or pragmatic notions like giveness/aboutness/contrastiveness/exhaustiveness, etc, whereas it seems that the truth conditional information they convey have been the subject of much less study. Though this paper examines truth conditional aspects of the use of the topic marker WA and nominative marker GA, I do not agree with the parallel treatment of WA and GA due to the fact that there are significant differences in syntax/semantics between these particles. Before presenting my analysis, let us review some properties of these markers.

It has been agreed that sentences expressing categorical judgment (mostly, individual or kind-level sentences) strongly tend to have their subjects marked with WA (see papers in Kuroda 2003, among others), as illustrated in (1):

(1) Saikin-no nihonjin-wa/*?nihonjin-ga se-ga takai.
Recent-Gen Japanese-Top /Japanese-Nom height-Nom high.
'Recent Japanese are tall.'

As often pointed out in the literature, WA marking is usually permitted only in matrix clauses (often called the root phenomena, see Heycock 2008), and even in matrix sentences expressing enduring properties of the subjects, question words answers corresponding to them can never be marked with WA (the complex form of which + N can be followed by WA, with contrastive connotations).

(2) a. Dare-ga/*Dare-wa se-ga takai-no?
Who-Nom/Who-Top height-Nom tall-Q
'Who is tall?'

* Variants of this material has been presented in part at several conferences including the past PACLIC. I'd like to thank the audiences at those presentations. I also indebted to two anonymous reviewers for helpful comments and discussion. All errors, of course, are my responsibility.

b. Tanaka-san-ga/*Tanaka-san-wa takai-desu.
Tanaka-Mr.-Nom/Takana-Mr.-Top tall-Pres.

(2b) can be acceptable if the topic marked subject is interpreted as a contrastive topic.

Since Kuno (1973), it is also assumed that WA marks constituents whose referent is already present in the common ground (in other words, given, familiar, recoverable, etc.), but this generalization does not seem correct. New referents can be introduced into discourse marked with WA, as in (3), and the point is that the subject cannot be replaced with the nominative case.

(3) a. Syaku Esyo-wa/*ga Enkou-ji-no syamon nari-ki. Houshi, ikeri-si toki, ...
Priest Esyo-Top/Nom Enko-temple-Gen priest be-Past Priest alive-Be when
'Priest Esyo was a monk of Enko temple. When he was alive, he ...'
Nihon-Reiiki: *Dai-19*, p. 136

b. Sou Esyo-wa/*ga Enko-ji-no sou -de-atta. Kono-sou-wa, seizen, ...
Priest-Esho-Top Enko-temple-Gen priest-be -Past this-Priest-Top in life ...

In (3a) from a story contained in *Nihon-Reiiki*, one of the oldest texts in Japanese, the WA-marked subject is used to introduce a new discourse referent, just as in its Modern Japanese translation in (3b), and these subjects can never be marked with the nominative marker GA.

Another important point repeatedly mentioned in the literature is that the topic marker, different from the subject marker, can attach to expressions of various grammatical categories. Though the nominative and accusative markers are deleted when subjects and objects are topicalized, other postpositions and conjunctions can be followed by the topic particle.

(4) Nihon-no daigaku-de-wa/*ga eigo-kyouiku-ga juushi-s-are-te-iru.
Japanese-Gen university-Loc-Top English-education-Nom be-thought-much-of-Pres
'In Japanese universities, teaching of English is given great importance.'

Postpositional phrases or conjunctions can never be followed by the nominative marker.

In this paper, we will concentrate on the truth-conditional effects of the choice between the topic and subject (or other grammatical function) markers. Rooth (1992) shows, for instance, that focus is decisive for the interpretation of the sentences like (5).

(5) a. In English orthography, a '**U**' always follows a 'Q'. (true)
b. In English orthography, a 'U' always follows a '**Q**'. (false)

Based on our knowledge about English orthography, (5a) conveys true meaning that, whenever there is a 'Q', it is followed by a 'U', whereas (5b) states 'U's only appear after 'Q's in English, which is wrong. We can observe the same contrast in Japanese sentences, as in (6a) and (6b), where the difference in the use of topic and subject markers is not merely pragmatic:

(6) a. Eigo-no seisyo-hou-ni-oite, U-ga tuneni Q-no atoni arawarer-u. (true)
English-Gen orthography-In U-Nom always Q-Gen after appear-Pres
b. Eigo-no seisyo-hou-ni-oite, U-wa tuneni Q-no atoni arawarer-u. (false)
English-Gen orthography-In U-Top always Q-Gen after appear-Pres

Even if the nominative marked NP is stressed and yields an exhaustive listing reading in (6a), the truth of this statement does not change (and even becomes closer to the meaning of English sentence (5a)). (6b) should be taken to be a characterizing sentence, in the sense of Krifka et al. (1995), representing the predication of an enduring property of the 'U's. If the topic is interpreted as thematic one, (6b) is simply wrong. When the topic is focalized and the contrastive reading is forced here, however, the proposition can be true. (6b) with the contrastive topic states that, at least (some) 'Us' always follow 'Qs', conveying a sense of incompleteness, non-finality (Tomioka 2010). In general, the topic and other case-markers in Japanese can be said to play a similar role as the placement of focus in English does.

I will make no attempt to develop a comprehensive theory of the topicalization phenomena or semantic notions like exhaustiveness, contrastiveness, etc. here, but try to give an account of some truth conditional effects caused by the selection of the topic and nominative particles in terms of the syntax-semantics interface.

2 Variations in Truth-Conditional Meaning

Let us assume that, following Ruth, focus induces a set of alternatives, by some rule like Existential Introduction in natural deduction (von Stechow 1989). In logic, Existential Introduction is freely available based on entailment. 'John loves Mary' can be translated as ∃x∃y.loves(y)(x), because the sentence entails 'someone loves someone'. But in terms of question-answer congruence, we need to constrain the application of the rule linguistically and to generate relevant alternative sets, and it is quite natural to assume that focal accent plays a crucial role in application of the rule.

In this section we will consider how the choice of the particles and focal accent induces relevant alternatives to the subjects. In Japanese simple sentences, there are four possibilities of subject marking. It can be followed by the normal (thematic) WA, stressed (contrastive) WA, normal GA (for neutral description), and stressed GA (for exhaustive listing). Here let us consider what the sentences with different marking of subjects mean, using the diagrams Lewis Carroll proposed in his book entitled "Symbolic Logic/The Game of Logic".

Carroll's representation of denotations of quantifiers uses the following diagram. The number of cells are determined depending on the number of sets (properties). Since we treat simple sentences comprising subjects and predicates, we will present the meaning of sentences by simple diagrams with four cells. A diagram is an enclosure assigned to a small set (which he calls 'Class') of entities. The diagram is divided in four cells, by two properties (which he calls 'Adjuncts'). The first differentia divides the diagram into x-things, to which the upper half (called 'the North Half') is assigned, and x' (non-x)-things which enter the lower half (called 'the South Half'). The second differentia, y, divides them into the left half (called the 'West Half' occupied by y-things) and the right half (called the 'East Half' occupied by y'-things). Then we have the diagram of entities of some class comprising four cells representing the subclasses, as in (7):

(7)

xy	xy'
x'y	x'y'

It should be noticed that the whole Diagram represents the set of entities of a very small class (e.g., books, cats, etc.), so as we need a number of larger cells to accommodate things of different kinds in discourse. Since the Diagram with a lot of subclasses should be too complicated, Carroll also proposes an algebraic method of representation.

Let us see how sentences with the subjects marked with WA or GA using these diagrams. First, observe the sentence with GA for a neutral description, as in (6a):

(8) Eigo-no seisyo-hou-ni-oite, U-ga tuneni Q-no atoni arawarer-u.

Sentence (8) can be taken to be a kind of generic sentence, but the subject is not marked with the topic particle, and its meaning should be represented as in the Diagram (9):

(9) U(x)

Follow-Q(y)

1	

1 in the North-West Cell in Diagram (9) indicates that there is at least one occurrence of U following a Q (let us ignore how to represent occurrences of 'Q' for the time being, and consider the property of 'following a Q' as a whole), and with adverbs associated with universal quantification *tuneni* 'always', assume that the meaning of diagram (9) holds in every world. The other cells are not marked with anything, which means that this sentence states nothing about Us following other alphabets (= the North-East Cell), and about non-Us (=the South-Half).

Next consider sentence (6b), which have the subject marked with thematic WA.

(10) Eigo-no seisyo-hou-ni-oite, U-wa tuneni Q-no atoni arawarer-u.
English-Gen orthography-In U-Top always Q-Gen after appear-Pres

Since we take (10) to be false, the falsehood must be incorporated into the meaning of WA. Let us assume that the relation of sets of (6) is expressed with material implication (that is, the subset relation). In generic sentences like (10), WA-marked phrases express universal quantification with an implicit generic/universal quantifier because the subjects of kind-/individual level predicates have strong tendency to be marked with WA. Then proposition (10) can be shown in diagram (11):

(11)

Follow-Q(y)	U(x): 1	U(x): 0

In Caroll's representation, the proposition "All x are y" are taken to be equivalent to the two propositions (which he calls a Double Proposition), comprising 'Some x are y' and 'No x are y'. Diagram (11) means that there are some occurrences of 'U' after 'Qs' (the North-West Cell), and no Us follow alphabets other than 'Q' (the North-East Cell). The combined meaning of the two propositions is clearly false based on our knowledge on the English orthography. We can represent the negation of a topic marked sentence like *I-wa Q-no ato-ni araware-nai* 'All manifestations of 'I' do not follow 'Qs' by putting 1 in the North-East Cell and 0 in the North-West Cell, whereas the negation of sentences with GA-marked subjects is represented by putting 0 in the North-West Cell, which means that 'there are no 'Is' following 'Qs.' It should be noted here that this representation is actually three-valued.

So far, the diagrams for GA-marked and WA-marked sentences actually do not say anything about the Southern Half, which might contain things which are not 'Us'. We can take the Southern Half to denote the set of alternatives to Us, e.g., potential occurrences of alphabets (vowels) instead of Us, and in ordinary meaning, it is irrelevant to determine the truth values of sentences with not focalized GA and WA, and can be ignored. So, the representations of sentence (6a) and (6b) can be simplified in (12a) and (12b), respectively.

(12) a.

Follow-Q(y)	U(x): 1	

b.

Follow-Q(y)	U(x): 1	0

Based on the denotations in (12a) and (12b), we can assume that GA for neutral descriptions and thematic WA do not provides the sets of alternatives which do not affect the meaning of sentences and are marked with nothing in Carroll's diagrams, but focal accents on GA- and WA-phrases cause the set of alternatives to be present and crucially affect the truth conditions of sentences.

Let us see how this proposal work to give proper interpretations for sentences with the exhaustive listing GA and contrastive WA. First, observe sentence (13), which means that only Us follows Qs and nothing else, which is completely correct in English orthography. (We indicate stressed phrases with bold capitals.)

(13) Eigo-no seisyo-hou-ni-oite, U-**GA** tuneni Q-no atoni arawarer-u.
English-Gen orthography-In U-Only-Nom always Q-Gen after appear-Pres

Without adverbs like *tuneni* 'always', the sentence is still true. Let us assume the standard meaning of exhausitivity, as in (X):

(14) $\lambda P \lambda Q \exists x[P(x) \& Q(x) \& \forall y[Qy(y) \rightarrow y = x]]$

Carroll's diagram representations assume existential presupposition from the beginning. In order to concentrate on truth-conditional interpretations, let us simplify (14) as in $\forall x[Q(x) \rightarrow P(x)]$, which simply reverses the set associated with the antecedent and the one associated with the consequent, so the proposition means that the set of occurrences of any character following 'Qs' is included in the set of occurrences of 'Us', i.e., only 'Us' can follow 'Us'. This interpretation for exhaustive listing GA can be represented in the diagram (15):

(15) U(x)

Follow-Q(y)

1	
0	

A focal accent on the GA-constituent elicits the set of alternatives to 'Us' in the South-West Cell (the set of non-Us), and assign the value '0' to the cell (which means that the cell is empty), so no vowels other than 'Us' follow 'Qs'. Different from the Diagram in (11) for the sentence with the thematic topic, note that it says nothing about the possibility of 'Us' following characters other than 'Qs', and actually 'Us' appear after other characters, so this diagram represent the most accurate situation concerning the combination of 'Us', 'Qs' and other alphabets/vowels. Note that the rule like Existential Introduction generates a simple disjunctive set of alternatives, but we need to add some condition of exclusiveness on this set.

Finally, let us turn to the semantics of the contrastive topic WA. Observe sentence (16):

(16) Eigo-no seisyo-hou-ni-oite, U-**WA** tuneni Q-no atoni arawarer-u.
English-Gen orthography-In U-Cont. always Q-Gen after appear-Pres

This sentence means that at least 'Us' can follow Qs'. Tomioka (2010) suggests that the contrastive topic conveys a sense of incompleteness, non-finality and/or uncertainty. We need to take a closer look at what this sense of incomleteness/non-finality/uncertainty means. So let us see the sentence cited by Tomioka (2010:(5))

(17) A: Who passed?
B: KEN-wa/Ken-WA uka-ta.
KEN-TOP/Ken-TOP pass-PAST
'(At least) Ken passed.'

To interpret sentence (17) with the contrastive topic explicitly, he creates a scenario like this: Speaker B is an examiner, and Speaker A assumes that B has full, complete knowledge of the outcome of the exam. Suppose that three persons, let's say Ken, Mari and Erika, took the exam. He suggested that A would conclude that, "based on the assumption that B knows the outcome of the exam, coupled with the general Gricean principle that requires B to be as informative as possible, would lead the conclusion that Mari and Erika did not pass." Sentence (17) implies that the speaker wishes not to communicate the outcomes of the two to the hearer.', according to Tomioka.

But we can easily come up with many contexts in which B's answer, which sounds incomplete or underinformative, can be natural even if he does not have full knowledge of the outcome. For example, it is clearly possible that B does not know the result of the others, and wishes to say that he is sure that at least Ken passed, though he does not commit himself to the result of Mari and Erika. How can we represent this situation on the Carroll's Diagram? Since a value of the partition represents disjunction in the relevant half of the diagram, we can represent the meaning of proposition (17B) as in Diagram (18):

(18) Ken(x)

Passed(y)

1	
	1

Instead of treating a proper name like Ken as a simple individual, let us consider it to be a singleton set containing only one individual here because we need to induce an explicit of alternatives to Ken. Speaker B implies (and possibly Speaker A assumes) that there are individuals who took the exam (the set of non-Kens occupying the South Half), and whose results B actually may or may not know (or does not want to commit himself to), so the speaker A' guess should be something like Diagram (18), which shows only the possibility that Mari and/or Erika may or may not have passed.

Comparing the meaning of the contrastive topics with that of thematic topics, we need to pay attention to another point. It is widely assumed that contrastive topics can take narrow scope with respect to negation, as illustrated in (19):

(19) a. Rijikai-ni kyoju-wa zenin-(ga) syusseki-sina-katta.
borad-meeting-At professors-Top all-(Nom) attend-Neg-Past
'All of the professors did not attend the board meeting.'
b. Rijikai-ni kyoju-wa zenin-wa syusseki-sina-katta.
board-meeting-At professors-Top all-CT attend-Neg-Past
'Not all the professors attend the board meeting.'

The second topic-marked constituent can never be interpreted as a thematic topic in (19b). Then, the meaning of the second sentence can be represented in the following formula.

(20) $\neg\forall x[\text{Professor}(x) \rightarrow \text{Attend}(\text{Meeting})(x)]$
$= \exists x[\text{Professor}(x) \wedge \neg\text{Attend}(\text{Meeting}')(x)]$

(19b) is true only if there is at lease one professor who did not attend the board meaning. The difference in scope between (19a) and (19b) can be shown in Diagrams (21a) and (21b):

(21) a.

Attend(y) \ Professor(x)	0	1

b.

Attend(y) \ Professor(x)		1

Remind that the vertical partition indicates the presence and absence of individuals satisfying the property expressed by the predicate. Going back to the meaning of the assertion case in (16), the Diagram should be something like (22):

(22)

Follow-Q(y) \ U(x)	1	
		1

Though Diagram (11) for the sentence with the thematic WA has the North East Cell indicated with 0 (which means that there are no 'Us' not following 'Qs'), (22) allows the possibility of 'Us' which follow letters other than 'Qs', which makes the sentence with the subject marked with the topic particle only if the topic is focalized. We found the two kinds of incompleteness involved with the contrastive topic. It elicits the set of alternatives which are vague or ambiguous in that alternative elements may or may not satisfy the property denoted by the predicate (the vagueness is indicated by '1' on the partition of the South Half). It also eliminates the interpretation involving universal quantification, and simply suggests nothing about the possibility of entities in the North East Cell. So sentence (16) means that there are some Us following 'Qs', and there are some other vowels which can substitute 'Us' but may or may not follow 'Qs'. In the next section, we will present how to derive the meaning indicated by Diagrams we have seen so far in terms of the tight syntax-semantics interface.

3 Syntactic Derivations of Sentences with Nominative-marked and Topic-marked Subjects

Since, instead of using the GB-jargon as in von Stechow (1989), we adopt a version of categorial grammars as a descriptive framework to derive the interpretations for sentences with WA- and GA-marked constituents, let us briefly introduce the flexible syntactic formalism of Combinatory Categorial Grammar (henceforth, CCG; See Steedman 1996, 2000). This formalism can deal with nonstandard surface constituency and corresponding interpretations in a parallel fashion, maintaining direct compositionality. Only the three rules of concatenation in CCG are relevant for our purpose here:

(23) a. X/Y:*f* Y:*a* => X:*fa* Y:*a* X\Y:*f* => X:*fa*
b. X/Y:*g* Y/Z:*f* =>$_{\mathbf{B}}$ X/Z:*gf* Y\Z:*f* X\Y:*g* =>$_{\mathbf{B}}$ X\Z:*gf*
c. X:*a* =>T T\(T/X) or T/(T\X): λ*f.fa*

(23a) is the rule of function application. An expression of functional category X/Y combines with an adjacent argument of category Y to yield a result of category X and interpretation *fa*, the result of applying *f* to *a*. This rule, for example, combines a transitive verb with an object to yield the verb phrase, and then, combines the verb phrase with a subject to produce the sentence. The rule of function composition (23b) allows a main function of category X/Y to combine with a subordinate function of category Y/Z to yield a function of category X/Z. (23c) is the rule of type-raising and we will devise a version of this rule to deal with a wide range of topicalization phenomena. For instance, this operation converts a subject NP, which would normally be an argument to a verb phrase of category NP\S, into a function looking forward for a verb phrase to produce a sentence, S/(S\NP). In order to see how the rules in (23b) and (23c) interact, consider (24), the case of topicalization in English:

(24) Mary, John loves
NP_{Obj} NP_{Subj} **T** $(S\backslash NP_{Subj})/NP_{Obj}$: λxλy.love'(y)(x)
S/(S\NP): λP.Pj <**B**
$S\backslash NP_{Obj}$: λy.love'(y)(j)

In (24), *loves* of category (S\NP)/NP cannot combine with the object Mary because it is preposed. Thus, it has to combine with the subject *John* by function composition (11b) first, which is type-raised into the function taking a verb phrase as argument. The resulting expression *John loves* of category $S\backslash NP_{Obj}$ finally combines with the dislocated object *Mary*.

Let us begin with the simplest case with the nominative subject for a neutral description in (6a). Japanese has no articles to indicate the difference in definiteness. We treat every noun phrases as generalized quantifiers to derive the intended interpretations suggested in the previous section (also cf. Kempson, et al. 2000). The GA-marked phrase, therefore, should have the interpretation involving an implicit existential quantifier, and the meaning of sentence (6a) can be derived, as in (25):

(25) U-ga Q-no-ato-ni araware-ru.
S/(S\NP): ∃x[U(x)&P(x)] S\NP:λx.Follow-Q(x) <
S: ∃x[U(x) & Follow-Q(x)]

Here, occurrences/manifestations of 'U' are treated as individuals. If adverbs like *itsumo* 'always' as in (6a), the interpretation (similar to the universal quantifier) quantifies over event variables which I omit here, and the meaning of (25) holds in all situations in which 'Qs' appear. Assume that the meaning in (25) correspond to the Diagrams in (9) or (12a), saying nothing on possibilities of 'Us' occurring after alphabets other than 'Qs', and on alternatives to 'Us'.

Similarly, we derive the sentence with thematic topic in (6b) if we assign the proper meaning proposed above to the particle WA. We hypothesized in the previous section, that sentences with thematic topics have the semantic representation as in (11) (or (12b)), in which it yields the meaning associated with material implication. This seems to be one reason for the particle WA to be used for the subjects of generic sentences if we consider generic statements to contain some kind of implicit universal quantifiers. We need two assumptions to derive the intended meaning for (6b). First, the interpretation given in (11) above for topic sentences must be induced solely by the topic marker WA. Second, we assume that the topic marker must show a kind of concord/coherence with sentence-final predicates. In Japanese traditional grammar, WA has been treated as a concord/coherence particle called *kakari-joshi*, which functions to assemble all elements in the remaining part of the sentence, and forms a comment segment corresponding to a nuclear scope in the logical form. This property as a concord/coherence particle is a crucial feature of WA to derive the tripartite structure associated with a kind of universal quantification. Let us take the radical lexicalist approach as assumed in any categorial grammar formalism and assign the meaning similar to universal quantification to the lexical

meaning of WA, as in (Xa), then we derive the proper interpretation for the sentence with the thematic topic in (Xb):

(26) a. -WA := $(S_{Top}/(S\backslash X))\backslash X$ where X = NP, PP, or S

b. U- wa tuneni Q-no atoni arawarer-u.

N: $(S_{Top}/(S\backslash X))\backslash X$:

TOP x[P(x)→Q(x)] S\N: λx[Follow-Q)(x)]

S/(S\N):TOP x[U(x)→Q(x)]

S: TOP x[U(x)→Follow-Q (x)]

The relation between the property denoted by the topic (corresponding to the North/South partition) and the property denoted by the comment part (corresponding to the East/West partition) is an implication relation, so the derived interpretation shows that all manifestations of 'U' appear only after 'Qs'. This is false based on our knowledge on English orthography.

As argued in the previous section, we assume that the thematic topic WA and GA for neutral descriptions do not induce the application of Existential Introduction to generate alternative sets (or which are taken to be invisible because they are irrelevant for truth-conditional meanings of sentences). On the other hand, the focalized subject marked with the exaustive listing GA elicits a set of alternatives (or make it relevant and visible for the interpretation). Actually, this is not limited to the nominative subject. Since any noun phrase or postpositional phrase must provide an exhaustive list of referents if it is focalized, the following derivation should hold for any focus phrase. Again, maintaining the radical lexicalist approach, we pack all the meaning necessary to induce exhaustiveness to the focalized GA, as follows:

(27) a. $GA_{[+F]}$:= S/(S\NP): λQ∃x[P(x) & ∀y[Q(y)→y=x]

b. U-GA Q-no atoni arawarer-u.

$S/(S\backslash N)$: $\forall y[Q(y)\rightarrow U(y)]]_{simplified}$ S\N:λx[Follow-Q(x)]

$\exists x[U(x) \,\&\, \forall y[Follow\text{-}Q(y)\rightarrow y=x]$

We propose that, in addition to the assumption proposed by Rooth (1984) that focus accentuation generates a set of alternatives as referents of a focalized phrase, the focal accent on GA-phrases adds a sense of exhaustiveness to its meaning in the lexicon, the category of which is raised to an expression denoting a set of sets with a unique member (or unique group of individuals). In the English orthography, only 'U's follow 'Q's in general, so derivation (27) simply ensures that the derived meaning, that a set of vowels following 'Qs' is a subset of 'Us', is correct. Notice here that type-shift as in (27) can be applied to any focalized NP or PP (possibly, in the lexicon), so we do not need to distinguish the exhaustive-listing GA from other focalized expressions.

Finally, let us apply this treatment of the focalized subject to the contrastive WA-marked phrases. As suggested in the previous section, the contrastive WA also generates an alternative set to the topic denotations. The focal accent on the topic phrases did two jobs: one is to indicate that there is a set of alternatives other than denotations of WA-phases (suggesting the statement is underinformative), and the other is to delete the 0-mark in the North Ease Cell (which allows the narrow scope readings of topic phrases with respect to negation). We assign the following interpretation to the topic marker with a focal accent:

(28) WA[+focalized] := S|(S|NP) : $\exists x[(P(x) \,\&\, Q(x)) \,\&\, \overline{\ }P(x)]$

The slashes in the definition of the category for the contrastive WA indicate that contrastive topics can occupy any position in sentences. By converting implication relation to disjunctive one in the definition, the topic phrase can be within in the scope of negation, but we cannot give an account to scalar implicature often conveyed by the contrastive topics (ordering of elements in the relevant set) here. We omit the derivation of sentences with contrastive topics but the category in (28) will yield proper interpretations similar to the Diagram in (22).

4 Conclusion

In this paper, we have seen that the choice between the topic marker WA and nominative marker GA (or other case markers) is not just pragmatic, but often conveys significant truth conditional information. We suggest that the topic-comment articulation of sentences with WA-marked expressions yields tripartite semantic structures, and similar characterization should be possible for sentences with the exhaustive-listing GA and contrastive WA, for which focal accents generate sets of alternatives to the denotations of common nouns marked with these particles. The proper interpretations for all GA- and WA-phrases including focalized ones are defined in the meaning of the particles (as generalized quantifiers). In this paper, we attempted to account for the truth conditional effects caused by the choice of these particles within the categorial grammar framework which tightly couples the syntax and the semantics.

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