

# Contrastive Function of Japanese Particle *WA*

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## 1 Introduction

The Japanese ‘adverbial particle’<sup>1</sup> *wa* is usually argued to have topic (thematic) and contrastive functions [Kuno , 1972, among others] as exemplified in the following two short spoken discourses (**boldface** indicates phonological prominence).<sup>2</sup>

(1) Topic *wa*:

a. “The person who came here was Ken.”

b. Ken-*wa*    **banana-o**    **tabeta.**

Ken-TOP    banana-ACC    ate

“Ken ate *a*/the banana.”

(2) Contrastive *wa*:

Q: “Among those people, who ate the banana?”

A: **Ken**-*wa*    banana-o    tabeta.

Ken-CONT    banana-ACC    ate

“Ken ate the banana (someone else didn’t eat the banana).”

In (1), the first utterance introduces a person whose name is Ken, and the second utterance provides new information about Ken. In (2), the question sets a context. The response not only answers the question but also carries a presupposition indicated in ‘(...)’, which will be analyzed in detail in this paper.

Analysis of these functions is not only linguistically interesting but also important for computational application such as mechanical identification of information structure (topic/focus) in monologue texts and machine generation of contextually-appropriate particles in Japanese.<sup>3</sup> While topic and contrastive *wa* provide useful materials in relation to the study of information structure [Vallduví , 1990] and formal analysis of contrast/focus [Rooth , 1985], the existing analyses are mostly informal and not as detailed as a computational application requires. In this paper, I attempt to remedy the situation by providing a new analysis of the contrastive function of *wa*.

In this paper, we mainly consider two phenomena involving contrastive *wa*. The first is about asymmetry with respect to the universal quantifier as shown below.

(3) a. “Did Ken praise Naomi?”

b. Ken-*wa*    **minna**-o/\**wa*                    hometa.

Ken-TOP    everyone-ACC/CONT    praised

“Ken praised everyone (in contrast to just Naomi).”

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<sup>1</sup>I follow Shibatani [1990] to use the term ‘adverbial particle’ but other terms are also used (esp. in the linguistic literature written in Japanese).

<sup>2</sup>The following grammatical labels are used in this paper: TOPic, CONTRastive, NOMinative, ACCusative, DATIVE, GENitive, COPula, COMPLEMENTizer, NOMinalizer, NEGation, and Question.

<sup>3</sup>Our current project is to develop a Computer-Assisted Writing system for English and Japanese, which can identify the information structures of utterances, and suggest an alternative where the identified information structure is not ‘appropriate’.

While “everyone” in (b) is in contrast to *Naomi* in (a), contrastive *wa* cannot be used in this sentence. The asymmetry is independent of the grammatical relations, underlying case marking (on the *wa*-marked phrase), and scrambling of the *wa*-marking.

The second is about the case where contrastive *wa* is attached to a complex phrase structure as shown below.

- (4) a. Ken-wa [ Naomi-no banana ] -wa tabeta.  
 Ken-TOP Naomi-GEN banana -CONT ate  
 “Ken ate Naomi’s banana.”  
 Presupposition: “Ken didn’t eat *someone else*’ banana.”
- b. Ken-wa [ Naomi-no **banana** ] -wa tabeta.  
 Ken-TOP Naomi-GEN banana -CONT ate  
 “Ken ate Naomi’s banana.”  
 Presupposition: “Ken didn’t eat *something else* of Naomi.”

Depending on the position of phonological prominence, there is a clear distinction between the presuppositions in the above example.

Basically none of the previous work reviewed in this paper can account for the above simple observations. Very few of the previous work discuss the role of phonological prominence in the analysis of contrast. Thus it is natural that no analysis is proposed for the case like (4), involving the association of contrast with *wa*. In most cases, the analysis of presupposition associated with contrast is inaccurate and vague. In particular, the relation between the interpretation of the *wa*-marked phrase and the corresponding semantic contents in the presupposition is often incorrectly analyzed. This leads to inability to distinguish the asymmetry shown in (3).

In this paper, I start from an assumption that the basic contrastive meaning is carried by phonological prominence, and argue that *wa* interacts with such a contrast resulting in a distinct presupposition. I pursue an analysis based on “alternative semantics” [Rooth, 1996]. This enables us to develop a simple, accurate analysis of contrastive *wa* naturally applicable.

This paper is organized as follows: In the next section, we briefly go over the background traditionally assumed for contrastive *wa*. Then, in Section 3, we review the data and identify the problems with previous analyses. Section 4 presents a new analysis of contrastive *wa* based on alternative semantics.

## 2 Background

First, I assume that the role of *phonological prominence* is crucial for the analysis of contrast in Japanese, as in other languages. While I have little to say about the phonetic reality of phonological prominence, it has been argued that a certain notion of ‘prominence’ in English can be identified computationally [Maghbouleh, 1996]. I expect that more research be done in this area for Japanese as well.

The literature often makes a distinction between implicit and explicit contrast of *wa* as follows, e.g., [Noda, 1996].

- (5) a. *Implicit contrast*
- Ken-wa banana-o tabeta.  
 Ken-CONT banana-ACC ate  
 “Ken (but not someone else) ate a/the banana.”
- b. *Explicit contrast*
- |   |     |   |
|---|-----|---|
| Ken-wa <b>banana</b> -o tabe,             |     | Naomi-wa <b>mango</b> -o tabeta. <sup>4</sup> |
| Ken-CONT banana-ACC ate (and)             |     | Naomi-CONT mango-ACC ate                      |
| ↓   | ↗ ↘ | ↓   |
| (presup.: someone else didn’t eat banana) | ↔   | (presup.: someone else didn’t eat mango)      |
- “Ken ate a/the banana, and Naomi ate a/the mango.”

In case of implicit contrast, the presupposition must be consistent with the context. On the other hand, in case of explicit contrast, the presupposition of each contrastive *wa* must be consistent with the explicit meaning of the other part of the utterance. If there is inconsistency in any of these interactions, the resulting utterance appears ungrammatical

<sup>4</sup>‘(and)’ indicates that the associated verb morphology is usually used for conjunction-like continuation [Hasegawa, 1996, for more detail about this ‘-te’ linkage].

(regardless of the context).<sup>5</sup> Although the most natural conjunctives used between the clauses are often contrastive in nature, e.g., *ga* “but”,<sup>6</sup> I try to avoid the use of this conjunctive in order to exclude the presupposition associated with it. If the occurrences of *wa* are replaced by the nominative case marker (*ga*) in (5), the same presupposition is not available and the conjunction sounds more like a coincidence.

Many analyses of *wa* concentrate on the post-nominal positions, often contrasting the case particle *ga* [Kuno , 1972]. But the distribution of contrastive *wa* is *cross-categorical*, including positions after other particles, quantifiers, verbs, adverbs, and complementizer [Aoki , 1992; Tateishi , 1994; Noda , 1996]. An example of post-verbal, contrastive *wa* is shown below.

- (6) Ken-wa **tabe**-wa site, **nomi**-wa sinakatta.  
 Ken-TOP eat-CONT did (and) drink-CONT didn't  
 “Ken ate and didn't drink.”

Also considering the presence of phonological prominence and clause-level distinction, the distribution of *wa* can be outlined as follows:<sup>7</sup>

(7)

Position: (clause level)	Post-nominal		Others (e.g., post-verbal)	
	Matrix	Embedded	Matrix	Embedded
Topic <i>wa</i> (with/without prominence)	yes	no	no (controversial)	no
Contrastive <i>wa</i> (with prominence)	yes	yes	yes	yes

In this regard, contrastive *wa* behaves very much like other adverbial particles such as *dake* “only”, *mo* “too”, *sae* “even”, and *koso* “in particular” with respect to the distribution, except for the distinct semantics and presuppositions. This point is shared by English *only* but not with determiners. Our account of contrastive *wa* must be applicable to all of these positions.

Particle *wa* usually attaches at the end of a phrase. When *wa* appears after case particles, *ga*, *o*, and (in some case) *ni*, these case particles do not show at the surface. Thus, a *wa*-marked NP may have ambiguous underlying case marking.

In this paper, we use the term *presupposition* to refer to ‘non-truth-conditional’ meaning of an utterance, in contrast to ‘truth-conditional’ *assertion* [Beaver , 1997]. We assume that the contrastive force seen in the previous examples is a presupposition. A usual test for presupposition is projection across negation (i.e., non-truth conditional/functional) as seen in the following example:<sup>8</sup>

- (8) a. “There were a banana and a mango on the table. Ken didn't eat the mango.”  
 b. Sosite, [ Ken-ga **banana**-wa tabeta ] -toiu koto-ga hiteisareta.  
 and Ken-NOM banana-CONT ate -NML fact-NOM was denied  
 “The fact that [Ken ate the banana] was denied.”

In (b), the embedded clause is negated and does not convey its (positive) meaning as a part of the assertion. But the presupposition associated with the contrastive *wa* survives across the negation and available as a part of non-truth-conditional meaning of the utterance. This presupposition happens to be consistent with the context, resulting in a felicitous utterance. Let us compare the situation with the following case:

- (9) a. “There were a banana and a mango on the table. Ken ate the mango.”  
 b. #Sosite, [ Ken-ga **banana**-wa tabeta ] -toiu koto-ga hiteisareta.  
 and Ken-NOM banana-CONT ate -NML fact-NOM was denied  
 “The fact that [Ken ate the banana] was denied.”

The utterance (b) is identical to the above case with respect to both assertion and presupposition. But the presupposition is now inconsistent with the context, i.e., the previous utterance, resulting in an infelicity.

<sup>5</sup>A sequence of multiple explicit contrasts is also possible. For example, “Erika ate tomato,” can be added in the middle of (5 b).

<sup>6</sup>This particle is considered different from the case particle *ga*.

<sup>7</sup>Although Kuno [1972] suggested that the thematic and the contrastive functions were exclusive, it is in general considered that there is an overlap [Noda , 1996, among others]. This overlap can often be seen for occurrences of phonologically-prominent, sentence-initial *wa*. Applicability of topic function to post-complementizer *wa* is controversial [Tateishi , 1994, for discussion].

<sup>8</sup>A rather unusual form of negation is used here to avoid the interaction of *wa* and the matrix-level negative operator.

In some cases, we may want to distinguish two subcases of presupposition between *conventional implicature*, which is non-cancellable, grammaticalized implicature, and *conversational implicature*, which is cancellable, inference-level one [Grice, 1975; Karttunen and Peters, 1979]. The contrastive force associated with *wa* is conventional because it is not cancellable as shown in the following example:

(10) a. “Ken ate all the fruits.”

b. # **banana**-wa tabeta.  
     banana-CONT ate  
     “He ate banana.”

The utterance (b) is infelicitous in this context because no contrastive element which Ken didn’t eat.

Although contrastive force is closely related with the issues of information structure (roughly topic/focus structure), we will not directly discuss this point. Contrastive force can coincide with either topic or focus. I do not distinguish the contrastive force between contrastive topic and contrastive focus, cf. [Choi, 1997, for Korean]. As it has been observed that the functions of Japanese *wa* and Korean *n(un)* are very close, we will refer to analyses for Korean where they are relevant.

### 3 The Problem

In this section, we review the phenomena we are focusing on more in detail and demonstrate that the previous analyses of contrastive *wa* have problems in accounting for them.

#### 3.1 The Data Revisited

Han [1995] observes that the Korean counterpart of contrastive *wa* cannot appear with the universal quantifier at the object position. This holds for Japanese as well, and can be seen in comparison with contrast without *wa* as in (3), repeated below as (11).

(11) a. “Did Ken praise Naomi?”

b. Ken-wa **minna**-o/\*wa hometa.  
     Ken-TOP everyone-ACC/CONT praised  
     “Ken praised everyone (in contrast to just Naomi).”

In the second utterance, the universally-quantified phrase “everyone” is used in contrast to *Naomi* in the previous utterance. The use of *wa* in this utterance is ungrammatical (independent of the context). The same observation holds independent of the grammatical relation, the underlying case of the *wa*-marked phrase, and the presence of scrambling, as long as the function of *wa* is contrastive (i.e., associated with a phonologically-prominent element). The situation can be seen as follows:

(12) a. **Minna**-ga/\*wa Ken-o hometa.  
     everyone-NOM/CONT Ken-ACC praised  
     “Everyone (in contrast to just someone) praised Ken.”  
     b. **Minna**-o/\*wa Ken-wa hometa.  
     everyone-ACC/CONT Ken-TOP praised  
     “Ken praised everyone (in contrast to just someone).”  
     c. Minna-wa **Ken**-o hometa.  
     everyone-TOP Ken-ACC praised  
     “Everyone praised Ken (in contrast to someone else).”

Thus this phenomenon is more widespread than the observation of Han [1995]. As various factors with respect to syntax are ruled out, it is safe to assume that the effect comes from the distinct contrastive force with or without *wa*.

We also have seen in (4), repeated here as (13), that contrastive *wa* associates with contrastive element marked by phonological prominence.

(13) a. Ken-wa **Naomi**-no banana-wa tabeta.  
     Ken-TOP Naomi-GEN banana-CONT ate  
     “Ken ate Naomi’s banana.”  
     Presupposition: “Ken didn’t eat *someone else*’ banana.”

- b. Ken-wa Naomi-no **banana**-wa tabeta.  
 Ken-TOP Naomi-GEN banana-CONT ate  
 “Ken ate Naomi’s banana.”

Presupposition: “Ken didn’t eat *something else* of Naomi.”

This situation requires an analysis which can properly treat phonological prominence and compose the semantic elements in a manner more flexible than rigid phrase-by-phrase composition.

### 3.2 Previous Analyses

None of the previous analyses reviewed here explicitly discuss distinction between the contrastive presuppositions with and without *wa*. Naturally, the asymmetry in (3b) is not discussed in this light either (except for [Han , 1995]). Thus it is rather obvious that we need an analysis to remedy this situation, and we will do so in the next section. But to be complete, we review the previous analyses more in detail with respect to this point. Main problems with previous analyses in general are the following:

- (14) a. Phonological prominence is ignored.  
 b. The analysis of presupposition is inaccurate with respect to the observation and incorrect with respect to the specification of ‘contrast relation’ between involved elements.

One analysis of presupposition associated with contrastive *wa* is that there is another element in the context in contrast to the one marked with *wa* [Miyagawa , 1987; Shibatani , 1990], [Han , 1995, for the Korean counterpart]. We might call this approach ‘mere contrast’ analysis. There are two problems shared by the analyses. First, contrast without *wa* is not treated on its own right. Only the case of nominative marking (with *ga*) in contrastive setting is usually assumed to have ‘exhaustive’ effect [Kuno , 1972].<sup>9</sup> But contrastive effect with other case particles (such as *-o*, or *-ACC*) is rarely discussed.

The second problem is that ‘mere contrast’ presupposition is too weak as shown in the following example:

- (15) a. “Here are a banana and a mango.”  
 b. Ken-wa **banana**-o/#wa tabe, **mango**-mo tabeta  
 Ken-TOP banana-ACC/CONT ate (and) mango-too ate  
 “Ken ate the banana, and ate the mango too.”

The *wa*-marking is infelicitous in this context even though ‘mere contrast’ requirement is satisfied.

Choi [1997] (citing Szabolcsi) argues that there are distinct contrastive forces for contrastive topic and contrastive focus. In particular, contrastive focus is said to have ‘exclusive’ force such as “nothing else is true for the case.” But this is too strong for contrastive *wa* as shown below.

- (16) a. “Here are a banana, a mango, and a tomato.”  
 b. Ken-wa **banana**-wa tabenakatta-ga, **mango**-wa tabeta.  
 Ken-TOP banana-CONT didn’t eat-but tomato-CONT ate  
 “Ken didn’t eat a/the banana, but ate a/the mango.”  
 c. Ken-wa motiron **tomato**-mo tabeta.  
 Ken-TOP of course tomato-too ate  
 “Of course, Ken ate tomato, too.”

The next group of analyses assume a presupposition that considers contrasts with and without *wa* basically identically Teramura [1991], [Noda , 1996, very briefly], also in some respect [Choi , 1997, for the Korean counterpart]. Their analyses share the basic idea shown in the following example:

- (17) Ken-wa **Peru**-de-wa **banana**-o tabeta.  
 Ken-TOP Peru-in-CONT banana-ACC ate  
 “Ken ate bananas in Peru.”  
 Presupposition: “Ken ate something else somewhere else.”

<sup>9</sup>Shibatani [1990] points out that the ‘exhaustive’ presupposition of nominative marking is a conversational implicature because it can be cancelled. Choi [1997] makes a similar observation.

Crucially, the contrast relations between *Peru* and *somewhere else* and between *banana* and *something else* are identical. We might call this ‘parallel contrast’ analysis.

There are several problems with this approach. First, the analysis assumes that, in addition to the *wa*-marked contrast, there is another contrast (*banana* in the above example). But this is not necessarily the case as can be seen in (3).

Second, even when there are two contrasts, the analysis has inherent difficulty dealing with the asymmetry involving the universal quantifier as in the following example:

(18) In response to “Who praised whom?”

- a. **Ken**-wa    **minna**-o    hometa.  
 Ken-CONT    everyone-ACC    praised  
 “Ken (not someone else) praised everyone.”
- b. \* **Minna**-wa    **Ken**-o    hometa.  
 everyone-CONT    Ken-ACC    praised  
 “Everyone praised Ken.”

Whatever the analysis of quantifier and the relation between elements, the analysis predicts that there is no asymmetry.

Most of the previous analyses do not distinguish between the cancellability of presupposition. Only Choi [1997] explicitly states that ‘parallel contrast’ presupposition is a conversational (cancellable) implicature. But as I will discuss in the next section, for certain cases, we need to distinguish conventional (non-cancellable) and conversational (cancellable) implicatures. ‘Parallel contrast’ analysis may be overlooking this aspect and losing some distinctions between the cases with and without *wa*.

Huruta [1982] analyzes the presupposition of contrastive *wa* as follows:

(19) a. “Did Ken eat mango?”

- b. Ken-wa    **banana**-wa    tabeta.  
 Ken-TOP    banana-CONT    ate  
 “Ken ate a/the banana.”

Presupposition: “Ken didn’t eat something else.”

Among the analyses reviewed here, I consider this as the most accurate intuition. But this cannot be the end of the story. Huruta does not compare the presupposition of contrastive *wa* with that without *wa*. Thus the asymmetry (3) remains to be explained.

There is another problematic component in his analysis, which is also shared by Teramura [1991]. The relation between *banana* and “something else” in many of the examples above is given by a rather non-systematic way. For the semantic representation  $X$  for the *wa*-marked phrase, let us denote the corresponding semantic representation in the presupposition as  $X^c$ . For example, for  $X = ken'$ , Huruta’s intuition is  $X^c = (\text{something other than } ken')$ . For different phrase types, he proposes the following instances:<sup>10</sup>

(20)

Phrase type	$X$	$X^c$
NP (proper noun)	$ken'$	$\lambda P. \exists Y [(Y \neq ken') \wedge P(Y)]$
NP (common noun)	$\lambda X. child'(X)$	$\lambda P. \exists Y [\neg child(Y) \wedge P(Y)]$
NP (quantified noun)	$\lambda P. \forall Y [child(Y) \Rightarrow P(Y)]$	$\lambda P. \neg \forall Y [child(Y) \Rightarrow P(Y)]$ or $\lambda P. \forall Y [\neg child(Y) \Rightarrow P(Y)]$
Predicative adjective	$\lambda X. pretty'(X)$	$\lambda X. \neg pretty'(X)$

Huruta [1982] and Teramura [1991] attempt to capture the generality among this diversity by misleadingly represent  $X^c$  as  $\neg X$ . They characterize the presupposition for “*Subj-wa Pred*” as “ $(\neg Subj) (\neg Pred)$ ”. This would give a presupposition for (19b) as  $\exists Y [(Y \neq banana') \wedge \neg eat'(Y) (ken')]$ .<sup>11</sup> But this does not work for the case where contrastive *wa* is within the predicate.

Next, we see that this is not a solution to the asymmetry in (3). First, Huruta makes some errors in deriving presupposition. For (3b), he would argue that the following two derivations are possible:

- (21) a.  $\lambda P. \neg \forall Y [human(Y) \Rightarrow P(Y)] \xrightarrow{*} \lambda P. \exists Y [human'(Y) \wedge P(Y)]$   
 $\longrightarrow \lambda P. \exists Y [human'(Y) \wedge \neg praise'(Y) (ken')]$

<sup>10</sup>Huruta’s formulas are translated in a more or less standard logical language.

<sup>11</sup>In addition, Huruta [1982] has two separate formulas for the negative case, reflecting ambiguity of negative scope.

$$\begin{aligned}
b. & \lambda P.\forall Y [-human(Y) \Rightarrow P(Y)] \xrightarrow{*} \lambda P.\exists Y [-human'(Y) \wedge P(Y)] \\
& \longrightarrow \lambda P.\exists Y [-human'(Y) \wedge \neg praise'(Y) (ken')]
\end{aligned}$$

The steps indicated by ‘ $\xrightarrow{*}$ ’ are incorrect. The result (a) contradicts with the assertion of (3b). This could be used as an argument for the asymmetry if the derivation were correct. The result (b) seems irrelevant for this case.

Let us continue with the correct derivation.

$$\begin{aligned}
(22) \ a. & \lambda P.\neg\forall Y [human(Y) \Rightarrow P(Y)] \longrightarrow \lambda P.\exists Y [human'(Y) \wedge \neg P(Y)] \\
& \longrightarrow \lambda P.\exists Y [human'(Y) \wedge praise'(Y) (ken')] \\
b. & \lambda P.\forall Y [-human(Y) \Rightarrow P(Y)] \longrightarrow \lambda P.\exists Y [-human'(Y) \wedge \neg P(Y)] \\
& \longrightarrow \lambda P.\exists Y [-human'(Y) \wedge praise'(Y) (ken')]
\end{aligned}$$

The result (a) is consistent with the assertion. The result (b) again seems irrelevant. Thus we should conclude that Huruta’s formulation is inadequate for accounting for the asymmetry.

We now turn to the second point, i.e., the example (13). Again, the previous analyses reviewed here cannot account for the phenomenon. The only analysis which comes close is [Huruta, 1982]. It has fairly detailed account of the case for complex *wa*-marked NP. But the contrast relation is distributed to the subcomponent in a non-systematic manner. No way of composing subcomponent to derive the whole meaning is discussed.

There is a related point about ‘parallel contrast’ analysis. That is, the analysis offers no account for the choice of second contrastive element for a complex phrase structure.

Wee [1995] adopts ‘alternatives semantics’ of Rooth [1992] for the Korean counterpart, which I will follow in the next section. But she does not discuss the problem of association with contrast either.

## 4 Analysis of Contrastive WA: Alternative-Semantics Approach

In this section, I will argue for the following main points:

- (23) a. Contrast is always associated with phonological prominence.
- b. Contrast relation between  $X$  and  $X^c$  can be characterized in terms of ‘alternatives’
- c. There are two types of contrast depending on the presence of contrastive *wa*.
- d. ‘Alternative semantics’ provides an appropriate way of putting these things together.

### 4.1 Presupposition Associated with Different Types of Contrasts

Let us first discuss the relation between the element  $X$  in the utterance and the element  $X^c$  in contrast in the presupposition. I argue that this can be uniformly captured by a relation involving the notion of ‘alternative’ in relation to the phonological prominence. This generalizes the case of [Huruta, 1982] where distinct relations are used for different phrase types. Then I argue that the presupposition for the two types of contrasts is as follows:

- (24) a. Contrast without *wa*: The presupposition is that there is some distinct  $X^c$  (or, something else is involved).
- b. Contrast with *wa*: The presupposition is that there is some  $X^c$  which does not hold in the current situation.<sup>12</sup>

We first observe that the presupposition for contrast without *wa* involves conventional (non-cancellable) and conversational (cancellable) implicatures. In fact, the following situation seems identical to English.

- (25) a. Ken-wa **banana**-o tabeta.  
Ken-TOP banana-ACC ate  
“Ken ate a/the banana.”  
Presupposition: (i) “Something else is involved.” (conventional, non-cancellable)  
(ii) “Ken didn’t eat something else.” (conversational, cancellable)
- b. Ken-wa **banana**-o tabenakatta.  
Ken-TOP banana-ACC didn’t eat  
“Ken didn’t eat a/the banana.”  
Presupposition: (i) “Something else is involved.” (conventional, non-cancellable)  
(ii) “Ken ate something else.” (conversational, cancellable)

<sup>12</sup> $X^c$  is necessarily distinct from  $X$  in this case.

McGloin [1987] observed that the case like (25*b*) is ambiguous between the scope of negation. Here, we consider a related ambiguity in terms of applicability of the conversational implicature (ii), while (i) is always available with the phonological prominence. Although Rooth [1996] proposes the presupposition for a focus in negative contrast as (ii), we distinguish between conventional and conversational implicatures as it becomes important when we compare this type of contrast with the one involving contrastive *wa*. In the following, we focus on conventional (non-cancellable) implicature.

We now examine the case with contrastive *wa*, which is again always accompanied with prominence.

(26) *a.* Ken-*wa* **banana**-*wa* tabeta.

Ken-TOP banana-CONT ate

“Ken ate *a/the* banana.”

Presupposition: “Ken didn’t eat something else.” (conventional)

*b.* Ken-*wa* **banana**-*wa* tabenakatta.

Ken-TOP banana-CONT didn’t eat

“Ken didn’t eat *a/the* banana.”

Presupposition: “Ken ate something else.” (conventional)

The presuppositions has a propositional form identical to (25ii). But it is now conventionalized/grammaticalized. This distinction can be observed in the example (15). The utterance (15*b*) cannot be felicitous if the contrast without *wa* has the same presupposition as the case with *wa*. We say this presupposition with *wa* (26) is *stronger* than that without *wa* (25i). The situation can be summarized as follows:

(27)

		Contrastiveness (conventional implicature)
Phrase without <i>wa</i>	Non-prominent	None
	<b>Prominent</b>	Weak
Phrase with <i>wa</i>	Non-prominent	* (not applicable)
	<b>Prominent</b>	Strong

The following example shows the case where both types of contrasts are involved, as mentioned in the analysis of ‘parallel contrast’.

(28) *a.* Ken-*wa* **Peru**-*de*-*wa* **banana**-*o* tabeta.

Ken-TOP Peru-in-CONT banana-ACC ate

“Ken ate bananas in Peru.”

Presupposition: (i) “Ken didn’t eat bananas somewhere else.” (from **Peru**-*de*-*wa*)

(ii) “Something other than banana is involved.” (from **banana**-*o*)

*b.* Ken-*wa* **Peru**-*de*-*wa* **banana**-*o* tabenakatta.

Ken-TOP Peru-in-CONT banana-ACC didn’t eat

“Ken didn’t eat bananas in Peru.”

Presupposition: (i) “Ken ate bananas somewhere else.” (from **Peru**-*de*-*wa*)

(ii) “Something other than banana is involved.” (from **banana**-*o*)

The analysis is that both types of presupposition simply coexists. It is also possible that, for example in (*a*), there is a conversational implicature such as “Ken ate something else somewhere else”, corresponding to ‘parallel contrast’ analysis. It is not easy to show that such ‘parallel contrast’ is only conversational (cancellable). But the following example seems to provide a support to the current position.

(29) *a.* “Ken ate neither bananas nor mangos in Montana.”

*b.* Ken-*wa* **Peru**-*de*-*wa* **banana**-*o* tabeta.

Ken-TOP Peru-in-CONT banana-ACC ate

“Ken ate bananas in Peru.”

Presupposition: (i) “Ken didn’t eat bananas somewhere else.” (from **Peru**-*de*-*wa*)

(ii) “Something other than banana is involved.” (from **banana**-*o*)

## 4.2 Alternative-Semantics Analysis: Formalization

The arguments in the previous section can be formalized nicely within alternative semantics framework [Rooth , 1985; Rooth , 1992; Rooth , 1996]. The point of these formulations is that some semantic element (e.g., English *only*) operates on two semantic values, ordinary meaning and alternatives sets.

Let us formalize the following example:

- (30) Ken-wa **banana**-wa tabeta.  
 Ken-TOP banana-CONT ate  
 “Ken ate a/the banana.”  
 Presupposition: “Ken didn’t eat something else.”

First, we take the utterance as  $\phi = [{}_S \text{Ken} [\text{banana}]_{C/wa} \text{ate}]$  where the contrast marked by phonological prominence within a *wa*-marked phrase is represented as ‘ $[\ ]_{C/wa}$ ’. Particle *wa* is analyzed as operator and not included in this representation. The ordinary meaning  $\llbracket \phi \rrbracket^o$  is a usual proposition *eat’ (banana’) (ken’)*, with a simplified semantics for *banana* and ignoring tense.<sup>13</sup> The alternatives set with respect to the contrast *C* is represented as

$\llbracket \phi \rrbracket^{c/wa} = \left\{ \text{eat}' (\underline{\text{banana}}') (\text{ken}'), \text{eat}' (\underline{\text{mango}}') (\text{ken}') \right\}$ , where alternative elements are underlined for illustration purposes. In general, we need a mechanism to properly fix the set. But to avoid complexity in the representation, we will ignore this aspect in this paper, cf. [Rooth , 1992]. The assertion of the utterance is simply the ordinary meaning  $\llbracket \phi \rrbracket^o = \text{eat}' (\text{banana}') (\text{ken}')$ .

Next, the semantics of particle *wa* can be represented as follows:  $\exists p \in \llbracket \phi \rrbracket^{c/wa} \left[ {}^v p = \text{FALSE} \right]$  with ‘ ${}^v p$ ’ standing for the extension of *p* at the current world as in the Montague tradition. That is, it is an operator that applies to the alternatives set and derive a certain proposition at the utterance level. This is a natural treatment of presupposition, which can project from an embedded position to the utterance level. This position is closest to [Rooth , 1996].

For the case of contrast without *wa*, we represent the utterance as  $\phi = [{}_S \text{Ken} [\text{banana}]_C \text{ate}]$  where ‘ $[\ ]_C$ ’ indicates that the contrast is not within a *wa*-marked phrase. The only difference here is that we assume some operator to derive presupposition:  $\exists p \in \llbracket \phi \rrbracket^c \left[ p \not\Leftarrow \llbracket \phi \rrbracket^o \right]$ . This operator applies to both ordinary meaning and alternatives set and derives a presupposition that there is an alternative which is logically distinct from the ordinary meaning and possible in some world. We glossed this situation as “something else is involved” before.

Let us now consider the negative case such as follows:

- (31) Ken-wa **banana**-wa tabenakatta.  
 Ken-TOP banana-CONT didn’t eat  
 “Ken didn’t eat a/the banana.”  
 Presupposition: “Ken ate something else.”

We represent the utterance as follows:  $\phi = [{}_S \text{Ken} [\text{banana}]_{C/wa} \text{ate } \textit{neg}]$  where negative morphology is represented in  $\phi$  as in [Büring , 1997] but unlike [Rooth , 1996]. The assertion and the presupposition can then be formulated in exactly the same way as the positive case.

Finally, we consider the case with two types of contrasts.

- (32) Ken-wa **Peru**-de-wa **banana**-o tabeta.  
 Ken-TOP Peru-in-CONT banana-ACC ate  
 “Ken ate bananas in Peru.”  
 Presupposition: (i) “Ken didn’t eat bananas somewhere else.” (from **Peru**-de-wa)  
 (ii) “Something other than banana is involved.” (from **banana**-o)

The presupposition is basically the conjunction of the two presuppositions we have already seen. As argued earlier, we consider that presupposition such as “Ken ate mangos in Indonesia” only as conversationally implicated, i.e. a result of inference outside linguistic processing proper. The presuppositions of contrastive *wa* and the other contrast operate simultaneously but not symmetrically.

## 4.3 Solution to the ‘Association’ Problem

As soon as we consider phonological prominence and alternative-semantics approach, we obtain a solution to the problem of ‘association with contrast’. Let us consider the model case (13) repeated below.

<sup>13</sup>In this paper, I use the following representation for functor-argument structure *functor*(*Arg*) ... (*Arg*<sub>*k*</sub>).

- (33) a. Ken-wa [ Naomi-no banana ] -wa tabeta.  
 Ken-TOP Naomi-GEN banana -CONT ate  
 Assertion: “Ken ate Naomi’s banana.”  
 Presupposition: “Ken didn’t eat *someone else*’ banana.”
- b. Ken-wa [ Naomi-no **banana** ] -wa tabeta.  
 Ken-TOP Naomi-GEN banana -CONT ate  
 Assertion: “Ken ate Naomi’s banana.”  
 Presupposition: “Ken didn’t eat *something else* of Naomi.”

Reflecting the phonological prominence, we represent the sentence structure as follows:

- (34) a.  $\varphi_a = [{}_S \text{Ken} [{}_{C/wa} \text{Naomi's} \text{banana} \text{ate}]]$   
 b.  $\varphi_b = [{}_S \text{Ken} \text{Naomi's} [{}_{C/wa} \text{banana} \text{ate}]]$

The ordinary meaning may look like the following:  $[[\varphi_{a/b}]^o = \text{eat}'(\text{banana}')(\text{ken}') \wedge \text{possess}'(\text{banana}')(\text{naomi}')$ . The alternatives sets are as follows:

- (35) a.  $[[\varphi_a]^c = \left\{ \begin{array}{l} \text{eat}'(\text{banana}')(\text{ken}') \wedge \text{possess}'(\text{banana}')(\underline{\text{naomi}}'), \\ \text{eat}'(\text{banana}')(\text{ken}') \wedge \text{possess}'(\text{banana}')(\underline{\text{erika}}') \end{array} \right\}$   
 b.  $[[\varphi_b]^c = \left\{ \begin{array}{l} \text{eat}'(\text{banana}')(\text{ken}') \wedge \text{possess}'(\text{banana}')(\text{naomi}'), \\ \text{eat}'(\underline{\text{mango}}')(\text{ken}') \wedge \text{possess}'(\underline{\text{mango}}')(\text{naomi}') \end{array} \right\}$

We then have *wa* as operator,  $\exists p \in [[\varphi]^c/wa] [{}^\vee p = \text{FALSE}]$ , as before. The resulting presupposition may look like the following:

- (36) a.  ${}^\vee \left( \text{eat}'(\text{banana}')(\text{ken}') \wedge \text{possess}'(\text{banana}')(\text{erika}') \right) = \text{FALSE}$   
 b.  ${}^\vee \left( \text{eat}'(\text{mango}')(\text{ken}') \wedge \text{possess}'(\text{mango}')(\text{naomi}') \right) = \text{FALSE}$

Thus the analysis correctly represent the situation with respect to these data.

#### 4.4 Solution to the ‘Asymmetry’ Problem

We now tackle the ‘asymmetry’ problem with the same example:

- (37) Ken-wa **minna**-o/\*wa hometa.  
 Ken-TOP everyone-ACC/CONT praised  
 “Ken praised everyone (in contrast to just Naomi).”

First, the sentences for the above cases can be represented as follows:

- (38) a.  $\varphi_a = [{}_S \text{Ken} [{}_{C/wa} \text{everyone}] \text{praised}]$   
 b.  $\varphi_b = [{}_S \text{Ken} [{}_{C/wa} \text{everyone}] \text{praised}]$

The ordinary meaning is simply  $[[\varphi_{a/b}]^o = \forall X [\text{praise}'(X)(\text{ken}')] ]$ . The constraints on *X* to be human is omitted. For the alternatives set, we consider alternative quantifiers in the spirit of Generalized Quantifier [Barwise and Cooper, 1981].

- (39)  $[[\varphi_a]^c = [[\varphi_b]^c/wa = \left\{ \begin{array}{l} \exists X_{=naomi}' [\text{praise}'(X)(\text{ken}')] = [\text{praise}'(\text{naomi}')(\text{ken}')] \text{ (Naomi)}, \\ \forall X [\text{praise}'(X)(\text{ken}')] \text{ (everyone)}, \\ \neg \forall X [\text{praise}'(X)(\text{ken}')] \text{ (not everyone)}, \\ \exists X [\text{praise}'(X)(\text{ken}')] \text{ (someone)}, \\ \neg \exists X [\text{praise}'(X)(\text{ken}')] \text{ (nobody)} \end{array} \right\}$

By applying the presupposition operator  $\exists p \in [[\varphi]^c [{}^\vee p \neq [[\varphi]^o]]$  on the ordinary meaning and the alternatives set, any of the alternative except for the one identical to the ordinary meaning can be successfully obtained.

On the other hand, when the operator for contrastive *wa*,  $\exists p \in [[\varphi]^c/wa [{}^\vee p = \text{FALSE}]]$ , applies to the alternatives set, all but  $\neg \exists X [\text{praise}'(X)(\text{ken}')] ]$  result in a contradicting proposition. Thus there is a significant asymmetry about the availability of generalized quantifiers. As for  $\neg \exists X [\text{praise}'(X)(\text{ken}')] ]$ , as long as the alternatives set involves something,  $\neg \exists X [\text{praise}'(X)(\text{ken}')] ]$  would lead to internal contradiction.

## 5 Conclusion

This paper has shown that the proposed analysis considering phonological prominence and the presupposition of contrastive *wa* more accurately can explain certain problematic data. The analysis is formalized within a framework of ‘alternative semantics’ [Rooth, 1996].

This approach is more explicit than the previous analyses in many aspects. It brings the analysis to the level comparable to the ones for focusing particles in English and some other languages. With slight modification about the treatment of negation, which is under development, we will be able to provide a fairly general picture of contrast and negation, also a good candidate for the analysis of scoping phenomena as well.

I believe that the analysis can also provide a useful materials for the discussion about the relation between topic and contrastive *wa*, a long-standing, never resolved issue. This direction is particularly useful for natural language processing applications.

There are other languages, e.g., Korean and Hindi, that have topic and contrastive functions associated with a single morpheme. It is interesting to see if our analysis applies to these languages.

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