

Partition Semantics and Pragmatics of Contrastive Topic

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Abstract Two existing approaches to the semantics and pragmatics of contrastive topic (CT) will be examined, and it will be shown that neither of them is adequate because one cannot account for what the other can; moreover, there is a garden-variety class of CT sentences that is problematic for both of them. Against this backdrop, an alternative approach will be proposed couched in the (dynamic) partition semantics of questions and answers proposed by Groenendijk and Stokhof. The alternative approach will be demonstrated to be able to handle the class of CT sentences in question as well as capture the insights of both existing approaches, thus having the best of both worlds, so to speak.

Keywords Contrastive topic (CT) • Semantics • Pragmatics • Partition semantics of questions and answers

1 Introduction

For the semantics and pragmatics of contrastive topic, two approaches have been proposed in the literature: one is to take contrastive topic as an information-structural discourse-regulating notion on a par with focus (Roberts 1996; Büring 1999; Kadmon 2001) and the other is to analyze a contrastive marker, phonetic or morphological, as a focus-sensitive operator with its inherent semantic and pragmatic content (Lee 1999, 2006; Hara 2006; Oshima 2002). In the current work, we will review the two approaches and show that both of them have empirical problems; then, we will present an alternative analysis of contrastive topic couched in the so-called partition semantics of questions proposed by Groenendijk and Stokhof (1984) and Groenendijk (1999). It will be seen that the proposed analysis has the

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best of both worlds, so to speak, being empirically more adequate than either of the existing analyses. A word is in order about the marking of contrastive topic. Crosslinguistically, there is more than one way of marking CT: by means of, e.g., a morpheme like—*wa* in Japanese and—*nun* in Korean, and H * LH % or L + H * LH % tone in English (Pierrehumbert 1980). In the following, a CT-marked constituent is marked with a subscript CT or a CT-marker morpheme.

2 Two Existent Approaches to Contrastive Topic

2.1 CT as an Information-Structural Discourse-Regulating Device (Roberts 1996; Büring 1999; Kadmon 2001)

Consider the question-answer discourse in (1). It is intuitively clear that CT has as much to do with the fact that the questions and the answer are congruent with each other as with the fact that they occur in the order in which they do. The congruence can be described as follows: (1c) directly answers (1b), and (1b) is a sub-question of (1a), or to use Roberts' terms, (1b) is part of a "strategy of inquiry" aimed at answering (1a).

- (1) a. Who kissed whom?
 b. Well, who did Larry kiss?
 c. [Larry]_{CT} kissed [Nina]_F

Büring (1999) proposed that a contrastive topic induces a third type of semantic value besides ordinary and focus semantic values, called *topic* semantic value. He proposed that the topic semantic value of an expression is the set of alternatives of the focus semantic value in the sense of Rooth (1985, 1992). Then, the topic semantic value of a declarative sentence is a set of sets of propositions, i.e., a set of questions; the topic semantic value of (1c) is (2).

- (2) {'Who did Larry kiss?', 'Who did Bill kiss?', 'Who did John kiss?', ...}

Kadmon (2001) argued the focus and the topic semantic values for (1c) can account for the congruence in question; first, the focus semantic value of (1c) being equal to the ordinary value of (1b) is considered to be a formal semantic characterization of (1c) being a direct answer to (1b), and second, (1b) being an element of

the topical semantic value of (1c), which is the set of the sub-questions of (1a) accounts for the intuition that (1c) answers (1b) as part of a “strategy of inquiry” aimed at answering (1a).

The above analysis of CT as an information-structural discourse-regulating device seems to be very successful as long as it is applied to sentences with one instance of CT and one instance of focus, like (1c). However, in Japanese, there are simply garden-variety examples with instances of CT but no instance of focus as in (3).¹ Here are some example sentences, all of which have at least one instance of CT but no focus.²

- (3) a. John-wa hashitte-imasu.
 John-CT running-is
 ‘John_{CT} is running.’
- b. John-wa Mary-wa aishiteimasu.
 John-CT Mary-CT loves
 ‘John_{CT} loves Mary_{CT}.’
- c. John-wa Mary-wa Bill-ni-wa shookai-shi-ta.
 John-CT Mary-CT Bill-Dat-CT introduction-do-Past
 ‘John_{CT} introduced Mary_{CT} to Bill_{CT}.’

Let us present a congruent question-answer discourse in which there appear a sentence with two instances of CT but no instance of F, (4), and a similar but incongruent one, (5), which is minimally different from (4) in that *Larry* and *Nina* in the second sentence are not contrastive-topic marked (or focus-marked):

¹Constant (2014) has English examples of multiple CT, i.e. sentences with more than one instance of CT (but along with a focus phrase). One of which is (iB) with the following background scenario. Person B is practicing a diet called “ABC diet”, which is something like this. Every day, eat the following three meals: one avocado, one burrito, and one cheesecake in any order you like. Person A is interested in B’s diet and asks B to tell her more about it, saying (iA), to which B responds starting with (iB).

(i) (= Constant (2014: (26), p. 76)

A: For each day of the week, tell me what time you have each food.

B: On [SUNDAYS]_{CT} ... [the BURRITO]_{CT} ... I have for [LUNCH]_{Exh.}
 L+H* L-H% L+H* L-H% H L-L%

²Japanese particle *-wa* has two uses: “thematic” and “contrastive”, the latter of which is the case relevant to the current issue, i.e. CT. It is the general understanding in the literature since Kuno (1973) that all the occurrences of *-wa* phrases in a sentence can be interpreted as contrastive, while only the first (left-most) occurrence can be interpreted as thematic; that is, the first occurrence is ambiguous. From which, all the instances of *-wa* phrases in (3) can be interpreted as instances of CT.

- (4) a. Dare-ga dare-ni kisu-o-shita no.
 who-Nom who Dat kiss-Acc-did Q
 ‘Who kissed who(m)?’
- b. Dewa, Larry-wa Nina-ni-wa kisu-o-shita no
 well, Larry-CT Nina-Dat-CT kiss-Acc-did Q
 ‘Well, did Larry_{CT} kiss Nina_{CT}?’
- c. Hai, Larry-wa Nina-ni-wa kisu-o-shita
 yes Larry-CT Nina-Dat-CT kiss-Acc-did
 ‘Yes, Larry_{CT} kissed Nina_{CT}.’
- (5) a. Dare-ga dare-ni kisu-o-shita no.
 who-Nom who-Dat kiss-Acc-did Q
 ‘Who kissed who(m)?’
- b. #Dewa, Larry-ga Nina-ni kisu-o-shita no
 well, Larry-Nom Nina-Dat kiss-Acc-did Q
 ‘Well, did Larry kiss Nina?’
- c. #Hai, Larry-wa Nina-ni-wa kisu-o-shita
 yes Larry-CT Nina-Dat-CT kiss-Acc-did
 ‘Yes, Larry_{CT} kissed Nina_{CT}.’

I will argue that the Roberts-Büiring-Kadmon analysis of CT cannot characterize the incongruence of (5) as a discourse, or the difference in congruence between (4) and (5).

For a critical review of Kadmon’s analysis, the formal rendition of the above regulations on question-answer discourses will be presented here. Kadmon formulated the conditions on the discourse congruence as two constraints, *the Question-Under-Discussion constraint on FOCUS-focus* and *the Question-Under-Discussion constraint on TOPIC-focus*, which are (F-1) and (F-2) in Kadmon (2001: 389).³ The constraints can be represented in our terms as (6a) and (6b), respectively.

- (6) a. An utterance B is felicitous only if the focus semantic value of B is identical to the ordinary semantic value of the immediately preceding interrogative sentence.
 b. An utterance B is felicitous only if the topic semantic value of B is identical to the focus semantic value of the immediately preceding interrogative sentence.

³Kadmon’s *FOCUS-focus* and *TOPIC-focus* correspond to our *focus* and *contrastive topic*, respectively.

Now, let us see if the proposed constraints account for the (in)congruence of (4) and (5). First, (6a) is supposed to capture the relation of being-a-direct-answer-to. The relevant semantic values here are the focus semantic value of (4c) (= (5c)) and the ordinary semantic values of (4b) and (5b). The focus semantic value of (4c) (= (5c)) is considered to be as follows: As (4c) (= (5c)) has no instances of focused phrase, the focus semantic value is considered to be the singleton set containing the ordinary semantic value, i.e., the proposition that Larry kissed Nina, denoted $\{\text{kissed}(l, n)\}$. On the other hand, the ordinary semantic values of (4b) and (5b) as interrogatives are both $\{\text{kissed}(l, n)\}$, as they do not have instances of focused phrases. Consequently, both (4) and (5) satisfy constraint (6a); however, as is shown, the continuation from (4b) to (4c) is felicitous while that from (5b) to (5c) is infelicitous. One might argue that (6a) is a necessary condition, not a sufficient condition, for the felicitousness. That is true, but since, as it stands, Kadmon's analysis does not have other relevant conditions or constraints, it cannot but be said to be inadequate for an account of the relation of being-a-direct-answer-to. Second, (6b) is supposed to account for the relation of being a direct answer for a question as a sub-question for another question, as in the relation among (1c), (1b) and (1a). Let us see if (6b) is effective in characterizing the relevant relation in (4). The topic semantic value of (4c) is $\{\{\text{kissed}(x, y)\}: x \in D \text{ and } y \in D\}$ and the focus semantic value of (4b) is a singleton set containing its ordinary semantic value, i.e. $\{\{\text{kissed}(l, n)\}\}$ as (4b) does not have an occurrence of focused phrases. That is, (4) does not satisfy (6b); nonetheless, the questions and the answer in (4) are congruent with one another; specifically, (4b) is a sub-question of (4a). From this, it can be said that (6b) is inadequate in characterizing the relevant relation in (4). We have reviewed Kadmon's (2001) analysis of contrastive topic as an information-structural discourse-regulating device to see that it cannot adequately characterize the congruence and incongruence of question-answer discourses (4) and (5).

I argue that the inadequacy is due to the fact that the analysis is not designed to deal with examples where there are no focus phrases along with contrastive-topic phrases like (4) and (5), and that the analysis based on the three types of semantic values is too "rigid" for a flexible treatment of examples with contrastive topic phrases but no focus phrases. One might argue that the alleged problem with Kadmon's analysis is merely due to the non-canonicity of examples like (4) and (5) and that, thus, it is not a problem with the analysis itself. To that refutation of my argument, I would say that (4) and (5) are genuine data of contrastive topic, whose (in)congruence needs to be accounted for by any reasonable analysis of contrastive topic.

In this section, we have reviewed an approach to contrastive topic in which contrastive topic is analyzed as a discourse device regulating the congruence among sentences in a discourse along with focus; specifically, Kadmon's (2001) analysis based on Roberts (1996) and Büring (1999). And we have found that the basic setup of the analysis is tailor made for "canonical" examples in which there is exactly one instance of contrastive topic and exactly one instance of focus;

however, the analysis is not flexible enough for the treatment of “non-canonical” examples in which, for example, there are two instances of contrastive topic but no instances of focus, as in (4c).

2.2 CT as a Focus-Sensitive Operator

2.2.1 Lee (1999, 2006) and Hara (2006)

The other approach takes CT to be a focus-sensitive operator on a par with particles like English *even*, *only*, and *also*, or their counterparts in the other languages. Lee (1999, 2006) and Hara (2006) proposed the following analysis of CT:

(7) Semantics and Pragmatics of CT as a Focus-Sensitive Operator

- a. $CT(\langle \beta, \alpha \rangle)$ (semantic representation)
- b. $\beta(\alpha)$ (assertion)
- c. $\exists x [x \neq \alpha \wedge \neg[\beta(x)]]$ (conventional implicature)

A word is in order about the notations in (7). First, in (7a), which is the semantic representation of a sentence with a CT, $\langle \beta, \alpha \rangle$ is the structured meaning of the sentence, with β and α being the background and the focus parts, respectively. Second, in (7b), which is the assertion of the sentence, $\beta(\alpha)$ is the result of function-applying β to α —or α to β , whichever is possible—and is the ordinary semantic meaning of the sentence. (7c) is supposed to capture the so-called “Reversed Polarity Implicature” (RPI) of CT; a sentence with a CT-marked constituent tends to imply a “contrasting” sentence with the constituent replaced by an alternative of the opposite polarity. In fact, however, the alleged implicature can be absent, as seen in (8), which should not be the case if it were really a conventional implicature.⁴

- (8) John-wa kita ga sonohokano hito-nikanshite-wa shira-nai.
 John-CT came but the other people-about-CT know-not
 ‘[John]_{CT} came, but as for the other people, I don’t know whether they came.’

2.2.2 Oshima (2002)

The above problem, in fact, can be got around by Oshima’s (2002) variant in which the pragmatic feature of a CT sentence is not a conventional implicature, but rather the presupposition that there is some alternative to the CT-marked constituent such that it is not known if it has the property denoted by the background part, formalized as in (7c’).

⁴Despite evidence like (8), Lee (2017) maintains that implicatures associated with CT are conventional, not conversational.

- (7) $c'. \exists x[x \neq \alpha \wedge \neg[\beta(x)]]$ (presupposition), where \neg is a weak negation in three-valued logic.

However, it is doubtful that (7c') is a presupposition of a CT sentence. Consider the following question-answer dialog:

- (9) Q: Dare-ga paatii-ni ki-mashi-ta ka.
 who-Nom party-to come-Polite-Past Q
 'Who came to the party?'

- A: Jon-wa ki-mashi-ta (kedo).
 John-CT come-Polite-Past (but)
 'John_{CT} came.'

According to (7c'), at the time of the utterance of (9A), it would be presupposed that somebody other than John is not known if she came to the party. From this, it follows that the questioner is required to have the presupposition. But the utterance of (6A) is perfectly felicitous in contexts where she does not have the presupposition, and is rather more natural without the presupposition.

Independently of Oshima (2002), Hara and van Rooij (2007) proposed a very similar analysis. They proposed that CT should have as its pragmatic component the following implicature, which is reformulated in our terms as in (7c'')

- (7) $c''. \exists x[x \neq \alpha \wedge \neg K_{sp}[\beta(x)]]$ (implicature)

In (7c''), K_{sp} is an epistemic operator and ' $K_{sp}\phi$ ' is read as "the speaker knows that ϕ ". (7c'') is different from (7c') only in that the absence of the relevant knowledge is required only of the speaker and the requirement is a conventional implicature, not a presupposition. However, it is as easy to find counterexamples for Hara and van Rooij's version as for Oshima's. Consider the following scenario. A test was administered to a class of pupils; the teacher knows, for all the pupils, whether they passed the test or not, and the father of Mary, a pupil, who is rather nosy, asks the teacher who passed the test in such a way that it is clear he would like the teacher to supply him with an exhaustive list. To the question, the teacher can answer perfectly felicitously as in (10).

- (10) Mary-wa goukakushimashi-ta ga,
 Mary-CT pass (the test)-Past but

hokano seito nikanshite-wa iemase-n.
 other pupils as-to-CT can-say-not

'Mary_{CT} passed the test, but I can't say as to the others if they passed it or not.'

In (10), the speaker, i.e. the teacher, knows of all the students including Mary whether they passed the test or not, but she can felicitously utter "Mary_{CT} passed the test", which is contradictory to Hara and van Rooij's prediction. The use of CT

in (10) is not so much characterized as ignorance on the part of the speaker as confidentiality, or secrecy.⁵

The fact that the implicational/presuppositional features of CT sentences are very elusive or hard to identify, I claim, suggests that they are not inherent attributes of the meaning of CT, but are epiphenomena arising from some unique feature of CT in conjunction with their particular uses. Along the line of this view, I will propose a novel approach to CT in the following section. Before we move on to the new approach, let us demonstrate that sentences with more than one instance of CT are problematic to the currently reviewed approach as well.

Let us restate (4c) (= (5c)), actually the version without the sentence-initial *hai* ‘yes’, as example (11).

- (11) Larry-wa Nina-ni-wa kisu-o-shita
 Larry-CT Nina-Dat-CT kiss-Acc-did
 ‘Larry_{CT} kissed Nina_{CT}.’

In the approach currently under review, which views CT as a focus-sensitive operator, (11) will necessarily be taken to have two instances of the operator, so the semantic representation will be alleged to be something as in (12).

- (12) CT($\langle \lambda x. \text{CT}(\langle \lambda y. \text{KISSED}(x, y), \text{Nina} \rangle), \text{Larry} \rangle$)

What implicature or presupposition is associated with the semantic representation? Whichever analysis we adopt, the implicature or presupposition in question will have the following schematic form:

- (13) $P/I. \exists x[x \neq \text{Larry} \wedge \text{Op}[P/I. \exists y[y \neq \text{Nina} \wedge \text{Op}[\text{KISSED}(x, y)]]]]$

The implicature or presupposition predicted to be associated with (11) by Lee (1999, 2006) and Hara (2006); Oshima (2002), and Hara and van Rooij (2007) will be the result of replacing ‘Op’ in (13) with ‘ \neg ’, ‘ $-$ ’, and ‘ $\neg K_{sp}$ ’, respectively and choosing P or I depending on whether the formula following it is analyzed to be a presupposition or a (conventional) implicature, respectively. Let us see what (13) says using a specific example from e.g. Lee (1999, 2006) and Hara (2006), which is the following:

- (14) $I. \exists x[x \neq \text{Larry} \wedge \neg[I. \exists y[y \neq \text{Nina} \wedge \neg[\text{KISSED}(x, y)]]]]$

In words, (14) reads “It is implied that it is not implied that somebody other than Larry didn’t kiss somebody other than Nina”. The predicted content in itself is

⁵An anonymous reviewer suggested that we could save the approach to CT as a focus-sensitive operator by “adding an intentional operator to specify the option of ‘Speaker wants not to disclose the information’ for capturing the case of secrecy to the semantics in (7)”. That kind of move, I’m afraid, would make the semantics of contrastive topic, or Japanese *wa* too specific, not general enough for the various uses. For example, if the semantics were modified to have the content the reviewer suggested, the resulting interpretational rules would make the speaker using a contrastive-topic marker always secretive. However, the use of contrastive topic is not always motivated by secrecy; for example, recall that in the case of (8), it is rather ignorance.

rather senseless, and more crucially, is not implicated by the utterance of (11) at all. The contents predicted by the other two analyses by Oshima (2002) and Hara & van Rooij (2007), i.e., “It is presupposed that it is not presupposed that it is not known if somebody other than Larry kissed somebody other than Nina” and “It is implied that it is not implied that the speaker does not know if somebody other than Larry kissed somebody other than Nina”, respectively, are equally senseless and implausible.

One could argue that the resulting senseless pragmatic contents are due to the implicit assumptions that a CT operator can be embedded in another one, as is manifested in (12), and that pragmatic operator ‘I/P’ can occur as part of a logical formula, especially under the scope of logical negation, as in (13). Alternatively, we could assume that contrastive-topic operator CT is an n -ary operator that simultaneously binds all the argument places corresponding to the CT-marked constituents on analogy to *binary quantifiers* or *binary wh-operators* proposed by Higginbotham and May (1981), instead of a unary operator that binds one argument place for each CT-marked constituent, which will be iterated over another. With CT as an n -ary operator, the semantic representation for (11) will be as shown in (15), where (x, y) is a sequence of variables and (Larry, Nina) is a sequence of constants, instead of that shown in (12).

(15) $CT(\langle \lambda(x, y).KISSED(x, y), (Larry, Nina) \rangle)$

Consequently, the implicature or presupposition that is predicted by the analyses will be something of the following schematic form, (16) instead of (13).

(16) $P/I.\exists x, y[x \neq Larry \wedge y \neq Nina \wedge Op.KISSED(x, y)]$

Now that we have come up with a way to give a reasonable semantic representation for a sentence with multiple CT phrases and its implicature or presupposition, the question is if the predicted implicature or presupposition is empirically correct. The implicature or presupposition of (11) predicted by (i), Lee (1999, 2006) and Hara (2006); (ii), Oshima (2002); and (iii), Hara & van Rooij (2007) now will be something like, (i), “It is (conventionally) implied that someone other than Larry didn’t kiss someone other than Nina”; (ii), “It is presupposed that there is someone other than Larry and someone other than Nina such that it is not known if the former kissed the latter”; and, (iii), “It is (conventionally) implied that there are someone other than Larry and someone other than Nina such that the speaker does not know if the former kissed the latter”, respectively: sentences with multiple CT phrases are expected to be in this respect analogous to sentences that contain only one CT phrase. It is easy to find a felicitous discourse that is a sweeping counterexample to the predicted implicatures and presupposition. The following sentence can be felicitously uttered by someone who is perfectly knowledgeable about who kissed whom (of the contextually relevant pairs of people):

- (17) Larry-wa Nina-ni-wa kisu-o-shita ga
 Larry-CT Nina-Dat-CT kiss-Acc-did but
 ‘Larry_{CT} kissed Nina_{CT}, but...’

sono hoka no hitotachi nikanshite-wa i-e nai.
 the other of people about say-can not
 ‘(but,) as for the other (pairs of) people, I cannot say (about who kissed whom).’

In this section we have seen that the approach to contrastive topic that analyzes contrastive topic as a focus-sensitive operator is empirically inadequate, by demonstrating that (i) the implicatures and presuppositions for sentences with a contrastive topic-marked phrase that are predicted by the analyses along this line of approach are empirically wrong and furthermore, (ii) the analyses as they are cannot be applied to sentences with multiple instances of contrastive topic-marked phrases, and even if they are modified to be applicable to those sentences, the predicted implicatures and presuppositions will be empirically wrong again. In the next section, we will propose an alternative approach to CT that can capture the insights of both of the existing approaches, yet will remain free of the problems they encounter.

3 Alternative Approach: Partition Semantics and Pragmatics of Contrastive Topic

3.1 *Partition Semantics and Pragmatics of Question and Answer: Groenendijk (1999), Groenendijk and Stokhof (1984)*

In this section, we will briefly review a semantic framework in which our current analysis of CT will be couched. It is a dynamic-semantic analysis of question and answer; specifically, one presented in Groenendijk (1999). The gist of the analysis is that not only indicative sentences but also interrogative sentences are interpreted as context change potentials (CCP). To accommodate interrogative sentences, contexts cannot be simply sets of possible worlds as in Stalnaker (1978); instead, they are now defined as equivalence relations on a set of possible worlds as follows:

- (18) Definition (*Context*)
 A context is an equivalence relation on a subset of the set of possible worlds.

To define the CCP of an interrogative sentence we first specify the *abstract*, or *predicate* meaning of the interrogative sentence.

(19) Definition (*Abstract, or Predicate Meaning of an Interrogative*)

The predicate meaning of an interrogative sentence is a lambda abstract binding the variables substituted for the WH-phrases in the interrogative sentence. (When there is no WH-phrase, i.e., the interrogative sentence is a YES-NO question, the predicate meaning is a proposition denoted by the corresponding declarative sentence.)

The predicate meanings of interrogative sentences will be illustrated with the following examples:

(20)

	<u>Interrogative sentences</u>	<u>Predicate meanings</u>
a.	'Who came to the party?'	$\lambda x.\text{came-to-the-party}'(x)$
b.	'Who bought what?'	$\lambda y\lambda x.\text{bought}'(x, y)$
c.	'Who ate what at which place?'	$\lambda z\lambda y\lambda x.\text{ate-at}'(x, y, z)$
d.	'Did John come to the party?'	$\text{came-to-the-party}'(j)$

In general, when there are n WH-phrases in an interrogative sentence, the predicate meaning of the interrogative sentence is an n -place predicate; notably, when there is no WH-phrase, i.e., the interrogative sentence is a YES-NO question as in (20d), the predicate meaning is a 0-place predicate, i.e., a proposition. In terms of the structured meaning approach to focus, the predicate meaning of an interrogative sentence coincides with the background part of the background-focus meaning.

Now that contexts and predicate meanings of interrogative sentences have been defined, we can proceed to define CCPs of interrogative sentences.

(21) Definition (Context Update by Interrogatives)

Suppose that $\lambda\vec{x}\phi$ is the abstract meaning of an interrogative and C is a context. The update of C by the interrogative, denoted $C + \lambda\vec{x}\phi$, is defined as follows:

$$C + \lambda\vec{x}\phi = \left\{ \langle w, w' \rangle \in C : [[\lambda\vec{x}\phi]]^w = [[\lambda\vec{x}\phi]]^{w'} \right\}.$$

In prose, given a context C and an interrogative sentence whose predicate meaning is $\lambda\vec{x}\phi$, updating C with the utterance of an interrogative sentence turns C into an equivalence relation between possible worlds with respect to their extensions of $\lambda\vec{x}\phi$. In terms of partition, C will be partitioned into the cells of possible worlds such that every possible world in each cell has the same extension of $\lambda\vec{x}\phi$ as do the others.

Let us illustrate how the update works, diagrammatically. Suppose that C is a context in which w_1 , w_2 , and w_3 are compatible with what is known so far, i.e., $C = \{ \langle v, u \rangle : v, u \in \{w_1, w_2, w_3\} \}$, which is represented as in (22).

$$(22) C = \left\{ \begin{array}{ccc} \langle W_1, W_1 \rangle & \langle W_2, W_1 \rangle & \langle W_3, W_1 \rangle \\ \langle W_1, W_2 \rangle & \langle W_2, W_2 \rangle & \langle W_3, W_2 \rangle \\ \langle W_1, W_3 \rangle & \langle W_2, W_3 \rangle & \langle W_3, W_3 \rangle \end{array} \right\}$$

Suppose, furthermore, that John came to the party in worlds w_1 and w_2 and he didn't in w_3 . Then, the update of C with the utterance of 'Did John come to the party?', whose predicate meaning is **came-to-the-party'(j)**, results in the following context, C' , which is diagrammed as in (23).

$$(23) C + \text{came} - \text{to} - \text{party}'(j) = C' = \left\{ \begin{array}{cc} \langle W_1, W_1 \rangle & \langle W_2, W_1 \rangle \\ \langle W_1, W_2 \rangle & \langle W_2, W_2 \rangle \\ & \langle W_3, W_3 \rangle \end{array} \right\}$$

In the form of a partition, C' is diagrammed as in (24).

(24)

$$C + \text{came-to-the-party}'(j) = C' = \begin{array}{|c|} \hline \text{(the set of possible worlds where)} \\ \text{John came to the party} \\ \hline \text{(the set of possible worlds where)} \\ \text{John didn't come to the party} \\ \hline \end{array}$$

Having reviewed how a context is to be updated with an interrogative sentence, let us move on to the case of indicative sentences. The CCP of an indicative sentence is defined as in (25).

(25) Definition (Context Update by Indicatives)

Suppose that ψ is the meaning of an indicative sentence and C is a context. The update of C by the indicative sentence denoted $C + \psi$ is defined as follows:

$$C + \psi = \{ \langle w, w' \rangle \in C : [[\psi]]^w = [[\psi]]^{w'} = 1 \}.$$

What the utterance of an indicative sentence does to a context is to eliminate from C the ordered pairs of possible worlds in which the indicative sentence is false in one or both of the possible worlds. In terms of partition, it eliminates from a partition the cells of possible worlds in which the indicative sentence is false.

Let us illustrate the update of a context with the utterance of an indicative sentence as defined in (25), by going over some examples. Recall context C' , which has been updated with 'Did John come to the party?', i.e. (24), a set of ordered pairs of possible worlds, or equivalently, (25), a partition of a set of possible worlds. The update of C' with e.g. (26) '(Yes,) John came to the party' (**came-to-the-party'(j)**)

will be illustrated in (27) and (28), where John came to the party in possible worlds w_1 and w_2 , but not in w_3 .

(26) (Yes,) John came to the party: $\text{came-to-the-party}'(j)$

$$(27) C': \left\{ \begin{array}{cc} \langle w_1, w_1 \rangle & \langle w_2, w_1 \rangle \\ \langle w_1, w_2 \rangle & \langle w_2, w_2 \rangle \\ & \langle w_3, w_3 \rangle \end{array} \right\} + (26) = \left\{ \begin{array}{cc} \langle w_1, w_1 \rangle & \langle w_2, w_1 \rangle \\ \langle w_1, w_2 \rangle & \langle w_2, w_2 \rangle \end{array} \right\}$$

(28)

$$C': \begin{array}{|c|} \hline \text{John came to the party} \\ \hline \text{John didn't come to the party} \\ \hline \end{array} + (26) = \begin{array}{|c|} \hline \text{John came to the party} \\ \hline \end{array}$$

Next, let us go over the case of a WH-question. (In the following, we will adopt the partition format solely for ease of illustration.) Suppose that C is to be updated with e.g. (20a), an interrogative sentence with one occurrence of a WH-phrase, reproduced here as (29). This results in C'' , shown in (30). There, it is assumed that John and Mary are the only relevant party-goers, and that the block with $\{a_1, a_2, \dots, a_n\}$ represents the cell for the set of possible worlds in which a_1, a_2, \dots , and a_n and only a_1, a_2, \dots , and a_n came to the party.

(29) ‘Who came to the party?’: $\lambda x.\text{came-to-the-party}'(x)$

(30)

$$C'' = \begin{array}{|c|c|} \hline \{ \text{John, Mary} \} & \{ \text{John} \} \\ \hline \{ \text{Mary} \} & \emptyset \\ \hline \end{array}$$

The results of updating C'' with e.g. (31) and (32) are as shown in (33).⁶

(31) Mary to John ga ki-mashi-ta.

Mary and John Nom come-Polite-Past

‘Mary and John came.’

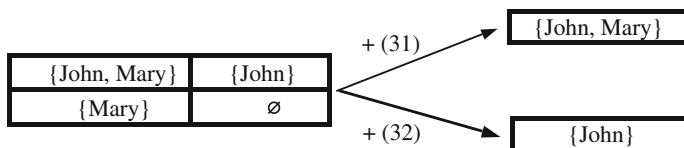
(32) Jon-ga ki-mashi-ta.

John-Nom come-Polite-Past

‘John came.’

⁶Here it is assumed that sentences (31) and (32) are interpreted exhaustively as they share the same focus structure with (29).

(33)



Following is the case of a WH-question with two WH-phrases:

- (34) Dare-ga nani-o tabe-mashi-ta ka.
 who-Nom what-Acc eat-Polite-Past Q
 ‘Who ate what?’

Suppose that the domains of the eaters and the eatens relevant here are {John, Mary} and {hamburger, salad}, respectively. Then, the context resulting from updating C with (34) will be something as in (35) in terms of partition, where each cell represents the set of possible worlds in which, for each ordered pair, the person of the first coordinate ate the foods of the second coordinate and no other eating events obtained.

(35)

$\langle j, \{h, s\} \rangle, \langle m, \{h, s\} \rangle$	$\langle j, \{h\} \rangle, \langle m, \{h, s\} \rangle$	$\langle j, \{s\} \rangle, \langle m, \{h, s\} \rangle$	$\langle j, \emptyset \rangle, \langle m, \{h, s\} \rangle$
$\langle j, \{h, s\} \rangle, \langle m, \{h\} \rangle$	$\langle j, \{h\} \rangle, \langle m, \{h\} \rangle$	$\langle j, \{s\} \rangle, \langle m, \{h\} \rangle$	$\langle j, \emptyset \rangle, \langle m, \{h\} \rangle$
$\langle j, \{h, s\} \rangle, \langle m, \{s\} \rangle$	$\langle j, \{h\} \rangle, \langle m, \{s\} \rangle$	$\langle j, \{s\} \rangle, \langle m, \{s\} \rangle$	$\langle j, \emptyset \rangle, \langle m, \{s\} \rangle$
$\langle j, \{h, s\} \rangle, \langle m, \emptyset \rangle$	$\langle j, \{h\} \rangle, \langle m, \emptyset \rangle$	$\langle j, \{s\} \rangle, \langle m, \emptyset \rangle$	$\langle j, \emptyset \rangle, \langle m, \emptyset \rangle$

3.2 Partition Semantics and Pragmatics of Contrastive Topic

Now that we have reviewed the partition semantics of questions and answers presented in Groenendijk (1999), I will propose to apply it to a novel analysis of contrastive topic. The thesis is intuitively as follows. The use of a sentence with contrastive topics “presupposes” a question under discussion (QUD), explicit or implicit; however, the sentence does not directly answer the QUD, but rather a “sub-question” derived from the QUD by restricting the values of the WH phrases to the denotations of the contrastive topics. The implicational/presuppositional features observed surrounding CT are to be attributed to the reasons why the speaker opts to answer the sub-question instead of the QUD.

Following is our analysis of the semantics and the pragmatics of CT. First is the semantic component:

(36) *Semantics of CT*

Suppose that

- (i) γ is a sentence with CT-marked phrases,
- (ii) $?-\gamma$ is the interrogative sentence directly corresponding to γ in that only the focused phrases are replaced by the corresponding WH-phrases and, if there is no focused phrase, $?-\gamma$ is a polar interrogative sentence;
- (iii) the sequence of the semantic representations of the CT-marked phrases and that of the variables for the WH-phrases are denoted \vec{t} , and \vec{x} , respectively;
- (iv) the predicate meaning of $?-\gamma$ is $\lambda\vec{x}.R$, where R is the semantic representation for γ ;
- (v) $wh-\gamma$ is the interrogative sentence resulting from γ by replacing the CT-marked phrases as well as the focused phrases if any with the corresponding WH-phrases; and,
- (vi) the sequence of variables for the WH-phrases corresponding to the CT-marked phrases is denoted \vec{y} .
Then,
- (vii) the predicate meaning of $wh-\gamma$ is $\lambda\vec{y}\lambda\vec{x}.R[\vec{t}/\vec{y}]$, where $R[\vec{t}/\vec{y}]$ is the result of replacing \vec{t} in R with \vec{y} .

Next is the pragmatic component:

(37) *Pragmatics of CT*

- (i) Sentence γ , indicative or interrogative, explicitly or implicitly assumes interrogative sentence $wh-\gamma$ as QUD;
- (ii) When γ is an indicative sentence, the answerer, or the utterer of γ opts to answer $?-\gamma$ instead of $wh-\gamma$ for some reason.

Let us illustrate the current analysis by going over (1), which is reproduced here as (38).

- (38) a. Who kissed whom?
 b. Well, who did Larry kiss?
 c. [Larry]_{CT} kissed [Nina]_F

The CT sentence in question here, (38c), is γ in (36). Then, (38b) and (38a) are $?-\gamma$ and $wh-\gamma$ in (36), respectively. For the characterization that (38c) is a “direct” answer to (38b) and (38b) is a “sub-question” of (38a), relevant notions have already been worked out in the theory in which the current analysis is couched, i.e., the semantic theory of questions and answers by Groenendijk and Stokhof (1984) and Groenendijk (1999). The relevant notions are *complete answer* and *partial answer*. Given a partition of the set of possible worlds induced by the predicate meaning of an interrogative sentence as in (21), each block of the partition as a proposition represents a *complete* (and exhaustive) answer to the question, while the union of some but not all blocks is a *partial* answer, eliminating some blocks as not being the case. In terms of those semantic notions of answerhood, the following fact holds of $?-\gamma$ and $wh-\gamma$:

(39) Every complete answer to $?-\gamma$ is a partial answer to $wh-\gamma$.

It is reasonable to take *complete answer* to be a formal rendition of “direct answer” and to define that question Q_1 is a “sub-question” of Q_2 when every complete answer to Q_1 is a partial answer to Q_2 . From this and (39), it follows that γ (as interpreted exhaustively) is a direct answer to $?-\gamma$ and $?-\gamma$ is a sub-question of $wh-\gamma$; in particular, (38c) is a direct answer to (38b) and (38b) is a sub-question of (38a). In this sense, the current semantic analysis of CT is as adequate as the Roberts-Büring-Kadmon analysis in characterizing the congruence among the sentences in (38).

In fact, I contend that the current analysis is superior in that it is applicable to the “non-canonical” examples of CT sentences like (3) as well. Note that in the semantic rules of CT in (36), there is no restriction on the number of CT phrases (other than that there be at least one); there is also no restriction on the number of focused phrases in a sentence (and there can be none). Thus, CT sentences with more than one instance of CT and no apparent focused phrase, as in (3), will not be a special case in the current analysis, unlike in the Roberts-Büring-Kadmon analysis.

We have seen that Kadmon’s (2001) analysis has difficulty characterizing the (in)congruence of (4) and (5), or the difference between them in terms of congruence. In our currently proposed analysis, (4) and (5) will be analyzed as follows. In terms of the semantic content, or CCP, (4b) and (5b) have the same content; given a partition of a set of possible worlds, they will induce a two-cell partition such that one cell contains the possible worlds in which Larry kissed Nina and the other one consists of the possible worlds in which Larry didn’t kiss Nina. In our proposed analysis, consequently, the sentences in (4) and the corresponding sentences in (5) will be predicted to have exactly the same semantic content. In fact, in terms of our current definitions of direct answer and sub-question based on the notions *complete answer* and *partial answer* of Groenendijk and Stokhof (1984), (4c) is analyzed to be a direct answer to (4b), and (4b) is a sub-question of (4a), as is the case for (5c), (5b), and (5a); that is, there is no difference between (4) and (5) with respect to semantic content.

Does that mean that the proposed theory is no more adequate than that proposed by Kadmon (2001) in its analysis of the (in)congruence of discourses (4) and (5)? As far as semantic content is concerned, the current analysis indeed cannot tell (4) from (5). But remember that there is a pragmatic component to the current theory of CT, i.e. (37). Specifically relevant here is (37i), which specifies that (4b) and (4c) both assume (4a) as QUD while, although (5c) (= (4c)) assumes (5a) (= (4a)) as QUD, (5b) does not, as wh -(4b), wh -(4c), and wh -(5c) are (4a) (= (5a)) while wh -(5b) is (5b) itself as (5b) does not contain any CT or focused phrase. Our theory predicts differences between (4) and (5) with regard to the commonality of QUD between the second and third sentences. In (4), (4b) and (4c) share the same question, (4a), as their QUD while in (5), (5b) and (5c) do not share their QUDs.

I propose that given an indicative sentence and an interrogative sentence, it is necessary for them to share a question as QUD such that they can form a congruent discourse in such a way that the indicative answer is a direct answer to the interrogative sentence as a sub-question to the QUD. To the extent that it can characterize the difference in congruence between (4) and (5), the current analysis couched in terms of the partition semantics of questions and answers is superior to that of Kadmon (2001).

We have shown that our current analysis of CT can capture Roberts' original insights of CT as a discourse regulator as adequately as the Roberts-Büring-Kadmon approach can; in fact, our approach is superior in that it can deal with the "non-canonical" examples as well as the "canonical" ones. Next, we will see how the current analysis fares alongside the other existent approach to CT: specifically, we will examine how our analysis accounts for the implicational/presuppositional features surrounding CT. In Sect. 2.2, we reviewed existing analyses that take CT to be a focus-sensitive operator with some implicature or presupposition attached. For all of these, we have demonstrated that it is easy to find a counterexample to the alleged implicational/presuppositional contents, or that they are cancelable. Of course, this fact alone does not invalidate the approach per se, but we also have pointed out that "non-canonical" examples of CT sentences will be problematic for the approaches in question, as well, for they deal with sentences that have only one instance of contrastive topic, and their interpretational rules are not equipped to handle the "non-canonical" examples. I have demonstrated that, even if the interpretational rules are modified to accommodate the "non-canonical" examples according to reasonable assumptions, the resulting implicatures and presuppositions do not make sense empirically.

In the current approach we take the position that there is no implicational or presuppositional content that is hard-wired in the meaning of a CT sentence. Rather, we propose that what seem to be implicational or presuppositional features characteristic of CT are actually conversational implicatures arising from the use of a CT sentence instead of its corresponding non-CT version. Relevant here is (37)—specifically, (37ii)—which says that the use of a CT sentence indicates that instead of answering the QUD directly, the speaker opts to answer one of its sub-questions directly, for some reason. My contention is that what have been observed and claimed to be (conventional) implicatures and presuppositions of CT sentences are actually conversational implicatures that arise from the speaker's choice to answer a sub-question instead of the QUD itself. At this point, I don't know if there is any fixed number of reasons for the use of a CT sentence or that, if there is, how many of such there actually are. We will not attempt to resolve this issue, for it is not directly relevant to the point of the paper.

In the following I will put forward some, but enough, reasons to cover what has been proposed to be the implicational/presuppositional features of CT in the literature. For illustration, let us use the following CT sentence and interrogative sentences for γ , $wh\text{-}\gamma$, and $?-\gamma$ in (37).

- (40) γ : Jon-wa paatii-ni ki-mashi-ta.
 John-CT party-to come-Polite-Past
 ‘John_{CT} came to the party.’
- (41) *wh*- γ : Dare-ga paatii-ni ki-mashi-taka ka
 who-Nom party-to come-Polite-Past Q
 ‘Who came to the party?’; λx .came-to-the-party’(x)
- (42) γ ?: Jon-wa paatii-ni ki-mashi-taka ka
 John-CT party-to come-Polite-Past Q
 ‘Did John come to the party?’; came-to-the-party’(j)

According to the current theory, the utterance of (40) “presupposes” interrogative sentence (41), or the question denoted by it, as QUD; however, instead of directly answering the question, the speaker answers interrogative sentence (42), for some reason. As in Sect. 3.1, suppose that the relevant domain of discourse is {John, Mary} and assume the diagrammatic conventions for partitions adopted there. Then, the partition representing the context updated with (41) is C'' in (30), which is reproduced in (43).

(43)

$$C'' = \begin{array}{|c|c|} \hline \{John, Mary\} & \{John\} \\ \hline \{Mary\} & \emptyset \\ \hline \end{array}$$

On the other hand, the partition for the context updated with (42) is C' in (24), which is equivalently reproduced as in (44) to highlight its contrast with C'' . In C' , the upper block and the lower one represent the set of possible worlds where John came to the party and that where John didn’t, respectively, and both of the blocks are noncommittal about whether the other people, in this case, Mary, came to the party or not.

(44)

$$C' = \begin{array}{|c|c|} \hline \{John, Mary\} & \{John\} \\ \hline \{Mary\} & \emptyset \\ \hline \end{array}$$

The question here is why the speaker opts to resolve the issue represented by C' instead of that by C'' .

Possible Reason 1: Lack of Information

As for John, the speaker knows for sure that he came to the party, but as for the other people, in this case, Mary, the speaker doesn’t know if they came to the party. So she restricts her assertion only to the fact that John came, shying away from the issue as to whether the other people came to the party or not. This will nicely account for the continuation displayed in (45).

- (45) Jon-wa/#-ga paatii-ni kita ga,
 John-CT/-Nom party-to came but

 sonohokanohito nikanshitewa shira-nai.
 the-other-people about know-not
 ‘John_{CT} came to the party, but I don’t know about the other people.’

This feature of CT, i.e., that it can be used when the speaker doesn’t have enough information to resolve the original question under consideration, is what Oshima (2002) and Hara and van Rooij’s, (2007) took special notice of and tried to capture. If the answerer uttered (46) instead of (40) in the state of information described above, she would be taken by the hearer to imply that no other people came to the party due to the exhaustification mechanism (see van Rooij & Schulz 2006 for a formal formulation). Her response would violate the Grice’s Maxim of Quality.

- (46) Jon-ga paatii-ni ki-mashi-ta.
 John-Nom party-to come-Polite-Past
 ‘John came to the party.’

Possible Reason 2: Secrecy, or Confidentiality

Suppose that the question under discussion is who came to the party and furthermore, the answerer is willing to proffer only the information as to whether John came to the party or not, keeping secret the information about the other people. What she can do in terms of question and answer will be that instead of answering the question ‘Who came to the party?’ directly, she will answer a restricted version of the question in which ‘who’ is restricted to ‘John’—i.e., ‘Did John come to the party?’—directly. This is exactly what the current theory specifies a CT sentence can be used for. The proposed use of CT motivated by secrecy is validated by the natural continuation observed between the first and the second sentences in examples like (47).

- (47) Jon-wa/#-ga paatii-ni kita ga,
 John-CT/-Nom party-to came but

 sonohokanohito nikanshitewa ie-nai.
 the-other-people about can-say-not
 ‘John_{CT} came to the party, but I can’t say about the other people.’

The counterexample presented above against Hara and van Rooij’s theory, example (17), is just another example of the use of a CT sentence motivated by secrecy, or confidentiality.

Possible Reason 3: Extension Specification by Positive and Negative Instances

When the extension of a one-place predicate is queried by an interrogative sentence like (41), one way to specify the extension is to specify the positive

instances of the extension and let exhaustification (see again van Rooij and Schulz, 2006) imply that the rest of the domain is in the negative extension of the predicate. Another way is to specify both the positive and the negative instances of the extension separately (and not necessarily exhaustively). Specifically, for the positive instances of the predicate, the answerer specifies that it is true that they are in the extension of the predicate, and for the negative instances, she specifies that it is not true that they are in the extension of the predicate. This can be seen as an act of answering a WH-question by answering two Yes-No questions.

To use (40) as an example, in our current analysis, (40) can be seen as part of specifying the positive instances by answering the (implicit) question ‘Did John come to the party?’ in the two-part way of specifying the extension of the predicate under discussion. Then, (40) is expected to be followed by a sentence specifying some of the negative instances. For example, suppose that John, but not Mary came to the party. In terms of the partition of C'' in (48), the speaker could choose the shadowed block to be the case by uttering (46) plus exhaustification, ‘Only John came to the party’, or ‘John and nobody else came to the party’.

(48)

$$C'' = \begin{array}{|c|c|} \hline \{John, Mary\} & \{John\} \\ \hline \{Mary\} & \emptyset \\ \hline \end{array}$$

Alternatively, she can utter first (49a) and then (50a) to choose the shaded blocks in (49b) and (50b), respectively, which has the same effect as designating the shadowed block in (48) to be the case directly.

- (49) a. Jon-wa ki-ta.
John-CT come-Past
‘John_{CT} came.’

b.

$$C' = \begin{array}{|c|c|} \hline \{John, Mary\} & \{John\} \\ \hline \{Mary\} & \emptyset \\ \hline \end{array}$$

- (50) a. Mearii-wa ko-naka-tta.
Mary-CT come-not-Past
‘Mary_{CT} didn’t come.’

b.

$$C''' = \begin{array}{|c|c|} \hline \{John, Mary\} & \{John\} \\ \hline \{Mary\} & \emptyset \\ \hline \end{array}$$

This use of CT sentences—i.e., to specify positive instances, followed by a separate CT sentence to specify negative instances (or vice versa), in identifying the extension of a predicate, is considered to be a feature of CT sentences that was discussed as Reversed Polarity Implicature (RPI) in Sect. 2.2.1.

In the above, we have examined what the current theory of CT can say about the implicational/presuppositional features of CT that have been taken to be essential properties of CT in the approach that views CT as a focus-sensitive operator. We have demonstrated that these features can be seen as conversational implicatures, arising as the addressee infers the reason why, given a QUD, *wh*- γ , the speaker opts instead to answer one of *wh*- γ 's sub-questions, γ with sentence γ .

4 Conclusions

We have reviewed two representative existent approaches to CT, one that views CT as an information-structural discourse-regulating device—specifically, it characterizes a CT sentence as a direct answer to a sub-question of a QUD—and another that takes a CT to be a focus-sensitive operator with conventional implicatures or presuppositions. The former approach—or, strictly speaking, the particular analysis on this approach—we have demonstrated, is not general enough as a theory of CT because it cannot be extended to “non-canonical” examples of CT sentences that have more than one instance of CT phrase and/or no focused phrase; furthermore, it does not address the implicational/presuppositional features of CT. As for the latter approach, the alleged implicatures and the presuppositions for CT proposed in the literature have all been shown to be easy to find counterexamples to or to be cancellable, which strongly suggests that those are not hard-wired in the pragmatics of CT. Furthermore, the “non-canonical” examples have turned out to be problematic to the approach as well.

We have proposed a new analysis of CT couched in the partition semantics of question and answer presented in Groenendijk and Stokhof (1984) and Groenendijk (1999) and demonstrated that the new analysis can capture the insights of both of the above approaches and yet is free from the problems for them. That is, the new analysis can characterize a CT sentence as a direct answer to a sub-question of a QUD whether it is a “canonical” or a “non-canonical” example and will analyze the implicational/presuppositional features of CT as conversational implicatures arising as the addressee infers the reason why the speaker opts to answer the sub-question instead of the QUD. In this sense, the current analysis can be said to have the best of both worlds of the existent approaches, and more.

There are certainly many things about CT that have not been touched upon in this paper, among which is the fact that CTs can also occur in other types of sentences than declarative sentences: at least in Japanese, interrogative, imperative, exhortative, and performative sentences can contain CT elements, as was pointed out by Tomioka (2007). The issue of whether the current analysis can be extended to the occurrences of CT in non-declarative sentences is left for future research.

Acknowledgments I would like to thank two anonymous reviewers for their useful comments and suggestions, and one of them in particular, for rightly pointing out some critical loose ends in the previous version. I hope that they have been tied up in the current version, but of course, all the remaining errors are mine. And I am very grateful to the editor of the current volume, Professor Chungmin Lee, for his patience with my slow revision of the paper and for constantly encouraging me to finish the job. Without his encouragement, this paper might not be here. And I would like to thank the series editor, Professor Marcel Den Dikken for his finishing-touch suggestions and requests for clarifications. Last but not least, I would like to express my sincere gratitude to Kathy Hoyt for a very careful proofreading of the manuscript, which has resulted in a tremendous improvement in readability.

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Contrastiveness in Information Structure, Alternatives
and Scalar Implicatures

Lee, C.; Kiefer, F.; Krifka, M. (Eds.)

2017, XIX, 415 p. 45 illus., Hardcover

ISBN: 978-3-319-10105-7