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Association with Contrastive Topic: Farsi *ke* *

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Abstract This paper presents a semantic analysis of the Farsi discourse particle *ke*, which has previously been argued to function as a marker of focus (Oroji & Rezaei 2013) or contrastive topic (Okubo 2020). Building on the latter view, we argue that *ke* associates with contrastive topic in the sense that its semantics is sensitive to a set of subquestions (cf. Rooth 1992; Büring 2003; Roberts 2012), and additionally marks the Common Ground status of the prejacent proposition. Our analysis predicts several further semantic properties of *ke*, including its restriction to non-final contrastive topics, the activation of bias in polar questions, and the epistemic conflict effect in certain environments.

Keywords: contrastive topic, focus, QUD, discourse particles, Farsi

1 Introduction

Discourse particles form a heterogeneous class of expressions that organize discourse by marking the propositional content of the host sentence as (un)controversial, (ir)relevant, (un)certain, and so on (Zimmermann 2011; Grosz 2020). Such particles can be tied to phenomena like focus and topic, revealing how the host sentence fits into the hierarchy of discourse questions which structure conversation (Rooth 1992; Büring 2003; Roberts 2012). This paper presents a semantic analysis of the Farsi discourse particle *ke*, which serves a similar function. A prototypical use of *ke* is presented in (1), where ALL CAPS indicate prosodic prominence.[1]

(1) ALI ke bargate xune.
Ali KE returns home

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1 Discourse particles across languages typically have homonyms in other word classes (Grosz 2020), and Farsi *ke* is no exception. It can function as a complementizer corresponding to 'that' or 'so that' (Karimi 2005; Aghaei 2006), and it can also occur in [TP-*ke*-VP] constructions expressing indifference toward an established fact (Sadat-Tehrani 2004). These additional uses bear no obvious synchronic link to our targeted discourse particle use, so we will set them aside.

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'Ali returned home.' $(= p)$
ke $\rightsquigarrow$ The speaker thought that p was already known to the addressee.

Distributionally, discourse particle *ke* is always optional and its absence never results in unacceptability. When present, it follows a prosodically prominent constituent that typically occurs sentence-initially, as in (1).[2] Semantically, *ke* triggers an inference anchored to the speaker's doxastic state that the prejacent proposition is already common-grounded.

To the best of our knowledge, the doxastic inference associated with *ke* has not been previously investigated in the literature (but see Mohammadi & Koev 2025). As for its affinity to occur with prosodically prominent constituents, *ke* has been argued to function as a marker of focus (F) (Oroji & Rezaei 2013) or, alternatively, as a marker of contrastive topic (CT) (Okubo 2020). While both F and CT are information-structural notions that ensure discourse coherence, the key difference between them is that F signals exhaustivity while CT signals lack of exhaustivity (Jackendoff 1972; Rooth 1992; Büring 2003; Tomioka 2010; Constant 2014; Wagner 2012; Kamali & Krifka 2020).[3] The contrast in (2) provides an illustration, where F is associated with a "fall" contour (H* L-L%) and CT is associated with a "rise–fall–rise" contour (L+H* L-H%).

(2) Q: What food did the guests eat?
A: They ate [vegeTArian]$_F$ food. $\rightsquigarrow$ The guests only ate vegetarian food.
A$'$: [FRED]$_{CT}$ ate [the BEANS]$_F$. $\rightsquigarrow$ What about the other guests?

Building on Okubo (2020), we argue that *ke* is not merely a plain CT marker. Rather, it conventionally associates with CT in the sense that its semantics is sensitive to a set of questions (cf. Krifka 1998; Tonhauser 2012; Constant 2014; Ander-Bois 2016), similar to how exclusive and scalar particles conventionally associate with F and have a semantics sensitive to a set of propositions. In addition, *ke* describes (what the speaker takes to be) the Common Ground status of the scope proposition. In a nutshell, we claim that *ke* makes no contribution to the truth-conditional content of the sentence but conveys two felicity conditions, called Settleness and Openness, as stated informally in (3).[4]

(3) A sentence ϕ-*ke* is felicitous in a context c only if the following conditions hold:

2 *Ke* can also occur sentence-finally in a specific context that involves interaction with polarity focus. See sections 3.5 and 5.2 for details.

3 We use the term "focus" to label that part of the sentence which ensures congruence with Question Under Discussion structure by activating a set of alternatives (Beaver & Clark 2008).

4 See section 5 for a formal version of this definition. Potential refinements are discussed in section 6.

a. SETTLENESS: The speaker in c believes that the proposition denoted by ϕ is already entailed by the Common Ground in c.

b. OPENNESS: At least one CT-question alternative to the question expressed by the focus semantic value of ϕ remains unresolved in c.

Settleness directly captures the doxastic inference triggered by *ke*. In turn, Openness makes the semantics of *ke* sensitive to a set of questions, explaining its association with CT. Openness also requires the presence of further unresolved sub-question alternatives, thus deriving the observation that *ke* marks a non-final CT leaving the broader Question Under Discussion partially unresolved.[5]

Other than capturing its core semantic properties, our proposal has important implications for the general theory of focus. That is, the fact that languages may recruit discourse particles that conventionally associate with CT, in a way familiar from focus-sensitive particles like *only* and *even* in English, strongly suggests that the two phenomena are underlied by the same general mechanism. This provides fresh crosslinguistic evidence for the claim that CT is a subspecies of F (Krifka 1998; Tomioka 2010; Wagner 2012; Constant 2014).

The structure of the paper is as follows. Section 2 offers a brief description of how F and CT are marked in Farsi. Section 3 presents the main empirical properties of *ke* to be captured by our semantic analysis. Section 4 provides formal background on CT, which is then employed in the analysis of *ke* in section 5. Section 6 discusses some loose ends and section 7 concludes.

2 Focus and Contrastive Topic in Farsi

Farsi employs both prosodic prominence and syntactic movement to mark information-structural functions such as focus and topic. Prosodically, F is characterized by greater pitch excursion and longer duration. Sadat-Tehrani (2007) shows that the baseline realization of Farsi words involves a rising (L+H*) pitch accent, whereas F is associated with an extra high pitch peak. In addition, a focused constituent typically triggers deaccentuation of the following material (see also Abolhasanizadeh, Bijankhan & Gussenhoven 2012; Taheri-Ardali, Roessig, Pagel & Mücke 2025).

Although most previous work on Farsi has investigated the prosodic realization of F, the same prosodic realization has been assumed for CT (e.g., Sadat-Tehrani 2007: 153–154). Following the literature, we therefore assume the same basic prosodic representation for both F and CT. Our observations nevertheless suggest a potential distinction between the two: CT is more naturally realized with greater

5 This observation is discussed in section 3.2 and derived in section 5.2. It is qualified in section 6.2.

duration, whereas F may exhibit a higher pitch peak.[6] We leave a comprehensive study of the prosodic differences between CT and F in Farsi to future research.

Syntactically, Farsi is an SOV language that has been characterized as topic-prominent (Karimi 2005). This means that phrasal elements with certain information-structural functions preferably move to the left periphery, where they are interpreted as topics (e.g., (4)) or foci (e.g., (5)). Importantly, whether these elements remain in situ and preserve the canonical SOV word order, as in the (B) answers, or move to their designated projections, as in the (B′) answers, they are marked prosodically.[7]

(4) A: Who gave these books and magazines to Sara?

B: Ali [ketâbhâ]$_{CT}$ ro be Sara dâd. (CT in situ)
Ali books ACC to Sara gave

B′: [ketâbhâ]$_{CT}$ ro Ali be Sara dâd. (CT fronted)
books ACC Ali to Sara gave

'Ali gave the books to Sara.'

(5) A: What did Ali give to Sara?

B: Ali [ketâb-e]$_{F}$ ro be Sara dâd. (F in situ)
Ali book-his ACC to Sara gave

B′: [ketâb-e]$_{F}$ ro Ali be Sara dâd. (F fronted)
book-his ACC Ali to Sara gave

'Ali gave his book to Sara.'

Sentences with both CT and F indicate that the former occupy a structurally higher position than the latter (for further discussion, see Karimi 2005: ch. 4–5). This is demonstrated in (6), where the focus corresponds to the wh-phrase (the subject) in the question while the direct object is the topic of the question. The (B) answer represents the default (unmarked) form in comparison with (B′).

(6) A: What about the books and the magazines—who gave them to Sara?

B: [ketâbhâ]$_{CT}$ ro [Ali]$_{F}$ dâd, [majalehâ]$_{CT}$ ro [Omid]$_{F}$ dâd.
books ACC Ali gave magazines ACC Omid gave

B′: [Ali]$_{F}$ [ketâbhâ]$_{CT}$ ro dâd, [Omid]$_{F}$ [majalehâ]$_{CT}$ ro dâd.
Ali books ACC gave Omid magazines ACC gave

'The books, Ali gave (to Sara) and the magazines, Omid did.'

6 We emphasize that this distinction is tentative, based on our observations of native speakers of Tehrani Farsi, and requires systematic experimental investigation.

7 Here and below, we suppress the doxastic inference of *ke* unless it is relevant to the point at hand.

The fact that in Farsi TopP sits above FocP is particularly evident in contexts with a list of answers corresponding to a list of salient subquestions (for a similar pattern in Turkish, see Kamali & Krifka 2020).

(7) *A hands B a list of books and asks, "Do you know who has these books?"*

B: [1984]$_{CT}$ ro [man]$_{F}$ dâram, [dâe-vâniyâ]$_{CT}$ ro [Sara]$_{F}$ dâre,
1984 ACC I have, Uncle-Vanya ACC Sara has,
[moby-dik]$_{CT}$ ro [Ali]$_{F}$.
Moby-Dick ACC Ali

'I have *1984*, Sara has *Uncle Vanya*, and Ali has *Moby Dick*.'

B′: # [man]$_{F}$ [1984]$_{CT}$ ro dâram, [Sara]$_{F}$ [dâe-vâniyâ]$_{CT}$ ro dâre,
I 1984 ACC have, Sara Uncle-Vanya ACC has,
[Ali]$_{F}$ [moby-dik]$_{CT}$ ro.
Ali Moby-Dick ACC

Finally, note that movement to the left periphery appears to be more common with CTs than with Fs. We speculate that this asymmetry in fronting tendencies may reflect differences in prosodic salience. Specifically, as noted in the first paragraph of this section, F typically exhibits greater pitch excursion than CT when both are realized in situ. CTs may therefore tend to undergo fronting as an additional means of marking their information-structural status, whereas F may be sufficiently marked through prosodic prominence alone.

3 Core data on *ke*

3.1 Association with CT

Farsi *ke* always follows a prosodically prominent constituent. This prominence, however, cannot instantiate any of the major types of focus (contra Oroji & Rezaei 2013), but instead signals CT (Okubo 2020). Although subtle phonetic differences may arise, we do not rely on prosodic cues to distinguish between F and CT. Moreover, both F and CT may be similarly marked through syntactic fronting. We therefore distinguish F from CT primarily on pragmatic grounds: the former is identified through its relation to the wh-constituent in the current subquestion, whereas the latter is identified through its relation to the "sorting key" that breaks down the broader Question Under Discussion (QUD) into subquestions. For uniformity, in our examples F is realized in situ while CT is fronted.

Starting with pragmatic focus, *ke* is incompatible with constituents that are prosodically marked as introducing new information (e.g., (8)) as well as when it follows a constituent bearing contrastive focus (e.g., (9)).

(8) A: What did Ali give to Sara?
B: Ali [ketâb]$_F$ ro (#ke) be Sara dâd.
Ali book ACC KE to Sara gave
'Ali gave the book to Sara.'

(9) A: Omid gave the book to Sara.
B: Na, [Ali]$_F$ (#ke) ketâb ro be Sara dâd.
no Ali KE book ACC to Sara gave
'No, Ali gave the book to Sara.'

Polarity focus, which targets the truth or falsity of the proposition, yields similar results. In Farsi, propositional negation is morphologically realized by the negative verbal prefix *na-* (with *ne-* and *ni-* as allomorphs). Accordingly, polarity focus can be realized prosodically: VERUM focus is expressed through prominence on the main verb, thereby emphasizing the truth of the proposition, whereas FALSUM focus is realized through prominence on the negative morpheme, thereby emphasizing the falsity of the proposition (cf. Romero & Han 2004; Repp 2012; Gutzmann, Hartmann & Matthewson 2020; Goodhue 2022). Importantly, *ke* is infelicitous in both configurations, as illustrated in (10)–(11).

(10) A: Are you sure that Ali gave the book to Sara?
B: Motmaen-am, Ali ketâb ro be Sara [dâd]$_F$ (#ke).
sure-am Ali book ACC to Sara gave KE
'I'm sure, Ali DID give the book to Sara.'

(11) A: Are you sure that Ali didn't give the book to Sara?
B: Motmaen-am, Ali ketâb ro be Sara [na-dâd]$_F$ (#ke).
sure-am Ali book ACC to Sara NEG-gave KE
'I'm sure, Ali did NOT give the book to Sara.'

Turning to semantic focus, *ke* is also infelicitous after a constituent associated with a focus-sensitive particle, such as *faqat* 'only' (12) and *hatâ* 'even' (13).

(12) Ali faqat [Sara]$_F$ ro (#ke) did.
Ali only Sara ACC KE saw
'Ali only saw Sara.'

(13) Ali hatâ [soale 3]$_F$ ro ham (#ke) hal-kard.
Ali even question 3 ACC too KE solved
'Ali even solved Question 3.'

In contrast to its incompatibility with F-marked constituents, *ke* is licit when it follows a CT, as illustrated in (14).

(14) A: Who brought the vegetarian dishes?

B: [Pasta]$_{CT}$ ro ke [Ali]$_{F}$ âvorde.
pasta ACC KE Ali brought
'The pasta, Ali brought.'

We have established that *ke* is licensed only in the presence of a CT-marked constituent and that *ke* follows that constituent. We take this distribution to indicate that *ke* conventionally associates with CT, in the sense that its semantics is sensitive to a set of discourse questions, much as the semantics of focus-sensitive particles is sensitive to a set of propositions.

3.2 Non-finality

Particle *ke* cannot be associated with just any CT-marked constituent. Okubo (2020) observes that *ke* is infelicitous when the host sentence answers the final subquestion in a discourse structure, thereby closing the relevant topic set. This restriction is illustrated in (15), where the second assertion fully resolves the overarching discourse question and, consequently, *ke* is ruled out.[8]

(15) *The hearer wants to know what Mehrad and Nasim did yesterday.*

Mehrâd (ke) ketâb xund. Nasim (#ke) film did.
Mehrad KE book read Nasim KE movie saw
'Mehrad read a book. Nasim saw a movie.' (adopted from Okubo 2020: 318)

Notably, this generalization holds independently of whether or not the first sentence contains *ke*: the relevant restriction arises from the discourse status of the second assertion as the final subquestion that exhausts the CT set.

Okubo (2020) notes that the particle *hamke* would be felicitous in the second sentence of (15). He analyzes *hamke* as a distinct particle, arguing that it functions as a dedicated strategy-final (backward-looking) CT marker, unlike *ke*, which functions as a strategy-nonfinal (forward-looking) CT marker. We point out that *hamke* lexically consists of the additive particle *ham* 'too' and *ke*, and that discourse particles are known to be able to be combined (Grosz 2020). It may then be that the presence of additive *ham*, which must latch onto a preceding utterance, provides us with an independent explanation for why *ke* is compatible with a final CT. We will return to this issue in section 5.2, where we address the apparent tension between the non-finality requirement associated with *ke* and the possibility of *hamke* occurring with the final member of a CT set.

8 See section 6.2 for potential exceptions and possible responses.

3.3 Doxastic inference

In addition to its association with CT, *ke* marks information that is presented as already common-grounded. More specifically, *ke* triggers an inference concerning the speaker's doxastic state to the effect that the issue addressed by the utterance has already been settled in favor of the prejacent proposition (cf. AnderBois 2016). This inference is illustrated in (16).

(16) [Pasta]$_{CT}$ ro ke [Omid]$_F$ âvorde.
pasta ACC KE Omid brought
'The pasta, Ali brought.' ($= p$)
ke $\rightsquigarrow$ The speaker thought that p was already known to the addressee.

Crucially, the doxastic inference above is clearly due to *ke* itself rather than to the associated CT. In particular, CT alone does not give rise to the inference that the addressee is already familiar with the proposition expressed by the utterance, so this inference cannot be reduced to the discourse function of CT. Rather, it constitutes an additional meaning component of *ke*.

Two additional points are in order. First, the doxastic inference is non-cancelable. The speaker cannot felicitously precede a *ke*-marked utterance with an expression that explicitly presents the addressee as lacking the relevant information. That is, expressions like *ye xabar jadid!* 'I have news!', *supriz!* 'Surprise!', *xabar na-dary!* 'You don't know this!', or *Omran hads bezani!* 'Guess what!' are incompatible with a subsequent *ke*-marked assertion. This resistance to cancelation suggests that the doxastic inference is not merely a defeasible conversational implicature, but is conventionally associated with *ke*.

Second, this inference concerns the discourse status of the prejacent proposition p and does not form part of the truth-conditional content of the utterance. Accordingly, it is not straightforwardly available as an object of direct rejection. For example, an addressee cannot naturally respond to a *ke*-marked assertion of p simply by saying *No, I didn't know p*. At the same time, *ke* does not appear to straightforwardly presuppose p either. Instead, it introduces a weaker commitment concerning the speaker's epistemic stance toward p: by using *ke*, the speaker marks p as something they believe to be in the Common Ground, rather than as something that is unconditionally established in the Common Ground. This distinction is important because a simple presuppositional analysis would undermine the informative function of a *ke*-marked utterance and give rise to an illocutionary conflict: the speaker would simultaneously treat p as already established and present p as the content of their own potentially informative discourse move.

3.4 Question bias

Discourse particle *ke* is not restricted to declarative clauses but may also occur in polar interrogatives.[9] As shown in Mohammadi & Koev (2025), in polar interrogatives *ke* gives rise to a positive *original bias*, conveying the speaker's prior belief that the positive answer is true (Ladd 1981; Romero & Han 2004; a.o.). The resulting bias interpretation of a positive polar question with *ke* is illustrated in (17).

(17) Ali [keik]$_{CT}$ ro ke mixare?
Ali cake ACC KE buy
'Will Ali buy the cake?'
BIAS INFERENCE: The speaker thinks that Ali would buy a cake.

Mohammadi & Koev (2025) point out that the bias associated with *ke* is not merely epistemic in nature. Rather, it also has a bouletic component, conveying the speaker's hope or desire toward the positive answer. This property distinguishes *ke* from other discourse particles in Farsi, such as *dige*, whose bias effect in polar questions is more strictly anchored to the speaker's epistemic state. We will not further investigate the precise status of this bouletic component of the bias inference associated with *ke*. Here, we only speculate that it is best treated as a pragmatic effect of *ke*, derived from its lexical meaning and contextual parameters.

3.5 Sentence-final occurrence

So far we have presented the canonical case in which *ke* follows a CT-marked constituent moved to the left periphery. In addition to this sentence-internal position, which is always available, *ke* may also occur in sentence-final position under more restricted discourse conditions, as illustrated in (18B′). Specifically, sentence-final *ke* is licensed only in the presence of an epistemic conflict between the current utterance and a preceding discourse contribution (Bateni 1975). The presence of such a conflict in (18) is indicated by both the linguistic context and polarity focus, realized as prosodic prominence on the main verb. In the absence of an epistemic conflict, as in (19), sentence-final *ke* is out.

(18) A: No one gave their books to Sara.
B: [Ali]$_{CT}$ ke ketâbhâ-š ro be Sara [dâd]$_F$. (medial *ke*)
Ali KE books-his ACC to Sara gave
B′: [Ali]$_{CT}$ ketâbhâ-š ro be Sara [dâd]$_F$ ke. (final *ke*)
Ali books-his ACC to Sara gave KE

9 Nonetheless, *ke* turns out to be ruled out in wh-questions and imperatives. We leave its broader distribution across clause types for future work.

'(At least) Ali gave his books to Sara.'

(19) A: Some people gave their books to Sara (but I don't know who did).

B: $[\text{Ali}]_{CT}$ ke ketâbhâ-š ro be Sara dâd. (medial *ke*)
Ali KE books-his ACC to Sara gave

B′: # $[\text{Ali}]_{CT}$ ketâbhâ-š ro be Sara $[\text{dâd}]_{F}$ ke. (final *ke*)
Ali books-his ACC to Sara gave KE

'(At least) Ali gave his books to Sara.'

Further evidence for the licensing conditions of final *ke* comes from compound verbs such as *jiq-zadan* 'to scream' (lit. 'scream-hit'), *dar-raftan* 'to escape' (lit. 'in-go'), and *hers-xordan* 'to fume' (lit. 'greed-eat'), in which the first/non-verbal element can bear CT marking. As shown in (20)–(21), *ke* may occur either between the non-verbal and verbal elements of the compound or in sentence-final position. The availability of the latter variant is, however, subject to the same discourse restriction identified above: when *ke* occurs sentence-finally, the utterance must be embedded in an epistemic conflict environment.[10]

(20) A: When Sara saw the mouse, she didn't make a sound.

B: % $[\text{Jiq}]_{CT}$ ke $[\text{zad}]_{F}$. / $[\text{Jiq}]_{CT}$ $[\text{zad}]_{F}$ ke.
cry KE hit / cry hit KE

'(At a minimum) she screamed.'

(21) A: When Sara saw the mouse, did she scream, freeze, or even run away?

B: $[\text{Jiq}]_{CT}$ ke zad. / # $[\text{Jiq}]_{CT}$ zad ke.
cry KE hit / cry hit KE

'(At a minimum) she screamed.'

Taken together, these patterns suggest that final *ke* is not simply a positional variant of the canonical sentence-internal construction, but is subject to an additional pragmatic licensing. That is, final placement appears to interact systematically with the discourse relation between the current utterance and the preceding context, in particular by being keyed to the presence of an epistemic conflict.

10 We are unsure why judgments vary with respect to the first variant in (20), as indicated. One possibility is that the sentence-final variant, being the more marked option, blocks the more general sentence-internal variant. This explanation is not entirely satisfactory, however, since the same blocking effect does not appear to arise in (21).

3.6 Summary of empirical findings

The current section has established the five empirical properties of Farsi *ke* stated in (22).

(22)
i. *Ke* associates with CT.
ii. *Ke* associates with a non-final CT.
iii. *Ke* triggers an inference anchored to the speaker's doxastic state that attributes the prejacent proposition to the Common Ground.
iv. In polar questions, *ke* gives rise to positive original bias.
v. A sentence-final occurrence of *ke* requires an epistemic conflict between the current and a preceding utterance.

4 Formal background on CT

We adopt Büring (2003)'s theory of CT, which constitutes a conservative extension of Rooth (1985, 1992)'s alternative semantics for focus and Roberts (2012)'s question-based discourse framework. According to this theory, F and CT are syntactic features that mark novel constituents, resulting in prosodic prominence and triggering alternatives relevant to interpretation.[11] These features are invisible to ordinary interpretation but are visible to special-purpose interpretation functions. Specifically, Büring (2003) introduces three nested semantic values, for a given clause ϕ: an *ordinary* value $[\![\phi]\!]$ (a proposition), a *focus* value $[\![\phi]\!]^f$ (a set of propositions/a question, produced by varying the F in the ordinary value), and a *contrastive topic* value $[\![\phi]\!]^{ct}$ (a set of sets of propositions/a set of questions/a superquestion, produced by varying the CT in the focus value). The compositional procedure deriving regular semantic values is as usual. The compositional procedure deriving focus semantic values is familiar from Rooth's work: it produces a set of ordinary values by considering alternatives to F-marked constituents, and otherwise ignores the CT feature. Finally, the compositional procedure that derives contrastive topic values produces sets of focus values and involves rules for simple expressions as well as rules for higher-order function application that compose complex expressions. These two sets of rules are stated in (23) and (24), respectively.

(23) SIMPLE EXPRESSIONS, where $[\![x]\!] \in D_\sigma$
a. $[\![x]\!]^{ct} = \{\{[\![x]\!]\}\}$
b. $[\![x_F]\!]^{ct} = \{\{a \mid a \in D_\sigma\}\} = \{D_\sigma\}$

11 For ease of exposition, we use "F" and "CT" to refer both to the features themselves and to the constituents marked by these features.

c. $[\![x_{CT}]\!]^{ct} = \{\{a\} \mid a \in D_\sigma\}$

(24) FUNCTION APPLICATION, where $[\![\beta]\!] \in D_{\sigma\to\tau}$ and $[\![\alpha]\!] \in D_\sigma$

a. $[\![[\beta\ \alpha]]\!]^{ct} = [\![[\alpha\ \beta]]\!]^{ct} = \{B \times A \mid B \in [\![\beta]\!]^{ct}, A \in [\![\alpha]\!]^{ct}\}$

b. $B \times A = \{ba \mid b \in B, a \in A\}$

As an illustration, suppose that there are two individuals in the domain (i.e., Fred and Wilma), and two foods (i.e., beans and carrots). Then the structure *[Fred]$_{CT}$ ate [the beans]$_F$* yields the ordinary value 'Fred are the beans' and the focus value {'Fred ate the beans', 'Fred ate the carrots'}, the latter corresponding to the question 'What did Fred eat?'. Intuitively, this question is produced by varying the focus of the sentence. In turn, the contrastive topic value for the same structure is {{'Fred ate the beans', 'Fred ate the carrots'}, {'Wilma ate the beans', 'Wilma ate the carrots'}}, corresponding to the set of questions {'What did Fred eat?', 'What did Wilma eat?'}. Intuitively, this set of questions can be produced by varying the CT within the focus value of the sentence and corresponds to the superquestion 'Who ate what?', whose incremental answer is sorted by individuals rather than by foods.

The fact that both focus and contrastive topic semantic values correspond to questions is not a coincidence. Following Roberts's work, the basic idea is that focus and contrastive topic values should cohere with a hierarchy of (typically implicit) questions, which are partially ordered by entailment and guide the development of the discourse. That is, just as the focus value of an utterance must be congruent (structurally identical) with the current question, the contrastive topic value must be congruent with the superquestion that subsumes the set of (sub)questions currently under discussion. This is ensured by the following discourse congruence rule, here presented in a somewhat simplified form.

(25) CT-CONGRUENCE (after Büring 2003: 542)
An utterance u containing a CT can map onto a move within the discourse tree only if the contrastive topic value of u includes the question immediately dominating it and all of its sister questions.[12]

For our example *[Fred]$_{CT}$ ate [the beans]$_F$*, this rule mandates that the immediately dominating questions be of the form '(What about x,) what did x eat?'. If this congruence requirement is not met, the sentence cannot be mapped onto the dominating discourse tree and the utterance is rendered infelicitous.

12 Stated more abstractly, CT-Congruence requires that the set of subquestions constituting the current QUD be included in the contrastive topic value of the current utterance u: $\mathsf{QUD} \subseteq [\![u]\!]^{ct}$.

5 Proposal

5.1 Semantics for *ke*

In view of the data presented in section 3, the semantics of *ke* must meet several desiderata. First, since *ke* exerts no truth-conditional effect on the sentence, its semantic contribution must be not-at-issue. *Ke*'s semantic contribution is that, according to the speaker's beliefs, the prejacent proposition is already common-grounded. Nonetheless, *ke* is not a plain factive operator, as the inference it triggers is anchored to the speaker's doxastic state and is therefore uncertain (i.e., the speaker can be wrong about the discourse status of the prejacent proposition). Finally, we have established that *ke* is only licensed in the presence of CT and have interpreted this fact as indicating that *ke* conventionally associates with CT. This means that the semantics of *ke* makes crucial use of the contrastive topic value of the prejacent and must be sensitive to a set of questions.

To meet all these desiderata, we propose that *ke* denotes a propositional identity function that triggers two presuppositions, as shown in (26).[13]

(26) $[\![\phi\ ke]\!]_{c,w} = [\![\phi]\!]_{c,w}$, defined only if

a. SETTLENESS: $\forall w' \in \mathsf{Dox}_{\mathsf{sp}_c,w} : \bigcap \mathsf{CG}_{c,w'} \subseteq [\![\phi]\!]$

b. OPENNESS: $\exists Q \in ([\![\phi]\!]^{ct} \setminus \{[\![\phi]\!]^{f}\})\ \forall p \in Q : \bigcap \mathsf{CG}_{c,w} \not\subseteq p$

The *settleness* presupposition, stated in (26a), is straightforward. It simply says that the speaker takes it that the prejacent proposition is entailed by the Common Ground. More technically, every world in the speaker's doxastic state is such that the current Common Ground in that world contains some propositions that entail the prejacent proposition. Importantly, this inference is relativized to the speaker's doxastic state. Without it, *ke* would plainly presuppose its prejacent and would incorrectly render *ke*-marked utterances uninformative (in the case of statements) or rhetorical (in the case of polar questions).

The *openness* presupposition in (26b) is a bit more involved. To understand it, one should be reminded of the discourse significance of the various semantic values. That is, a focus semantic value amounts to a set of propositions congruent with the immediate subquestion, whereas a contrastive topic value amounts to a set of questions congruent with the superquestion that subsumes all current subquestions (including the immediate one). With that in mind, the openness presupposition

13 This semantics treats *ke* as a (truth-conditionally vacuous) propositional operator, implying that at LF *ke* appears at the edge of the clause and takes scope over it (cf. Zimmermann 2011). Yet we already saw in section 3 that *ke* exhibits a flexible surface distribution: while it typically follows a sentence-initial CT, it may also occur sentence-finally in contexts involving an epistemic conflict. We leave the detailed compositional analysis of sentences with *ke* to future research.

requires that there be a subquestion Q in the contrastive topic value of the prejacent that excludes the focus value of the prejacent, such that none of the possible answers of Q are entailed by the current state of the Common Ground (i.e., Q is not yet resolved). In other words, the openness presupposition requires that there be at least one further subquestion of the superquestion currently under discussion that is still unsettled, implying that the *ke*-marked sentence does not close that superquestion.

5.2 Capturing the data

We now demonstrate how the semantics in (26) captures the core properties of *ke* established in section 3 and summarized in (22). The settleness presupposition directly captures properties (iii) and (iv), namely the doxastic inference associated with *ke*. In declaratives, this inference has the effect of presenting the speaker as believing that the prejacent should be known to the addressee. In polar questions, on the other hand, the same inference reemerges in the form of original bias.

In turn, the openness presupposition captures properties (i) and (ii). Let us start with (i), which states that *ke* associates with CT. If no CT is present, then the contrastive topic value of the sentence is the singleton set consisting of its focus value. In this case, the existential quantification is over the empty set of questions $[\![\phi]\!]^{ct} \setminus \{[\![\phi]\!]^{f}\} = \{[\![\phi]\!]^{f}\} \setminus \{[\![\phi]\!]^{f}\} = \emptyset$, leading to presupposition failure. Regarding (ii), suppose that *ke* associates with a final CT that fully resolves the superquestion. Then clearly all non-final subquestions, congruent with $[\![\phi]\!]^{ct} \setminus \{[\![\phi]\!]^{f}\}$, would have already been resolved, resulting in presupposition failure once again.

To capture property (v), which establishes a correlation between final *ke* and the presence of an epistemic conflict, we make one stipulation regarding the licensing of final *ke*. That is, we assume that—for reasons to be further investigated—final *ke*, on top of associating with CT, forces the presence of polarity focus in its host clause. This restriction is stated in (27).

(27) RESTRICTION ON SENTENCE-FINAL *ke*
$[_{TP}$ ... *([V]$_F$ / [Neg]$_F$) ...] *ke*

With the above restriction in place, let us take another look at the contrast between the denial scenario in (18) and the agreement scenario in (19), repeated as (28)–(29) in a slightly shortened form.[14]

(28) A: No one gave their books to Sara.
B: [Ali]$_{CT}$ ketâbhâ-š ro be Sara [dâd]$_F$ ke.
Ali books-his ACC to Sara gave KE
'(At least) Ali gave his books to Sara.'

14 Recall from section 3.5 that both exchanges in (28)–(29) are fine with medial *ke*.

(29) A: Some people gave their books to Sara (but I don't know who did).

B: # $[\text{Ali}]_{CT}$ ketâbhâ-š ro be Sara $[\text{dâd}]_{F}$ ke.
Ali books-his ACC to Sara gave KE

In line with the restriction in (27), the two structures in (28B) and (29B) carry polarity focus and are equivalent in form. As it turns out, this correctly predicts that (28B)/(29B) coheres with the discourse question implied by the context in (28) but not with the discourse question implied by the context in (29). That is, the contrastive topic value of (28B)/(29B) generates the set {{'Ali gave his books to Sara', 'Ali didn't give his books to Sara'}, {'Omid gave his books to Sara', 'Omid didn't give his books to Sara'}, ... }, spelling out the set of alternative subquestions {'Did Ali give his books to Sara or not?', 'Did Omid give his books to Sara or not?', ... }.[15] This set is congruent with the *alternative* superquestion that both the initial utterance in (28A) and its correction in (28B) seek to answer, namely 'Did anyone give their books to Sara or not?'. Hence, the discourse in (28) is well formed. By contrast, in the non-denial scenario in (29) the initial utterance asserts that some people gave their books to Sara and further implies the *constituent* superquestion 'Who gave their books to Sara?', which must carry existential import. Since the contrastive topic value of (29B) (i.e., {'Did Ali give his books to Sara or not?', 'Did Omid give his books to Sara or not?', ... }) is not congruent with this last question, the discourse in this case is ill formed.

6 Two loose ends

6.1 Simplifying the semantics?

One potential issue for our proposed semantics in (26) is that *ke* introduces two seemingly unrelated presuppositions, namely the settleness and openness presuppositions. This raises the question of why a CT-sensitive discourse particle, like Farsi *ke*, should encode precisely these two presuppositions. Could the semantics be simplified?

A natural thought is to try to derive the settleness presupposition (i.e., the doxastic inference) from the openness presupposition (i.e., the information-structural restriction of association with non-final CTs) together with general pragmatic principles. After all, if *ke* already indicates that there are unresolved subtopics to which

15 We take contrastive topic values of the form $\{\{p, \neg p\}, \{q, \neg q\}, \ldots\}$, produced by structures with both polarity focus and CT, to spell out *alternative/bipolar* questions. This allows us to distinguish such values from contrastive topic values of the form $\{\{p\}, \{q\}, \ldots\}$, which are produced by CT-only sentences and spell out *(mono)polar* questions. See Biezma & Rawlins (2012) and Krifka (2015) for a similar view.

the discussion will pivot, it is plausible to infer that the current subtopic has already been settled and the prejacent proposition is already common-grounded. If this reasoning is valid, it would yield a leaner semantics with a single openness presupposition, as in (30).

(30) $[\![\phi\ ke]\!]_{c,w} = [\![\phi]\!]_{c,w}$,
defined only if $\exists Q \in ([\![\phi]\!]^{ct} \setminus \{[\![\phi]\!]^{f}\})\ \forall q \in Q : \bigcap \mathsf{CG}_{c,w} \not\subseteq q$

However, a comparison of minimal pairs with and without *ke* seems to argue against such a simplification. In particular, the doxastic inference vanishes in sentences containing CT alone, unlike in counterparts with both CT and *ke* (cf. (16)). Similarly, polar questions containing CT alone may receive a neutral interpretation, whereas their counterparts with both CT and *ke* are obligatorily biased (cf. (17)). Without assuming that *ke* encodes something akin to our settleness presupposition, it would be difficult to account for these facts.

6.2 Marking a final CT

Following Okubo (2020) and the data presented there, in section 3.2 we argued that *ke* must associate with a non-final CT, while a final CT can be accompanied by *hamke*. The empirical evidence for that claim was based on contrasts as in (31). Importantly, while Okubo (2020) treats *hamke* as a single independent particle, we pointed out that it can alternatively be viewed as a combination of our *ke* and the additive particle *ham* 'too'.

(31) *The hearer wants to know what Mehrad and Nasim did yesterday.*

a. Mehrâd (ke) ketâb xund. Nasim (#ke) film did.
Mehrad KE book read Nasim KE movie saw

b. Mehrâd (ke) ketâb xund. Nasim (ham ke) film did.
Mehrad KE book read. Nasim too KE movie saw

'Mehrad read a book. Nasim saw a movie (too).'

Krifka (1998) claims that additive particles associate with CT rather than with F, contra the standard assumption in the literature (e.g., Beaver & Clark 2008). Indeed, in (31), *ham* 'too' clearly does not associate with F (i.e., with the VP *film did* 'movie saw'). This would require the contextual entailment that yesterday Nasim also did something other than watching a movie, yet this presupposition is not satisfied in the context above. If, however, *ham* 'too' associates with CT (i.e., the subject *Nasim*), as predicted by Krifka's analysis, then things fall into place. That is, in this latter case the presupposition of *ham* 'too' would be that the context already entails one answer to the contrastive topic value of the host sentence (i.e., 'What did *x*

do yesterday?'). This presupposition is satisfied because it is entailed by the first sentence.

The above analysis explains why *ham* 'too' is licensed in (31b), but it does not yet explain why *ke* is also licensed when marking a final CT. Importantly though, even in this configuration some version of the openness presupposition is preserved. That is, the presence of *ke* conveys a sense of non-exhaustiveness, for example by suggesting an unresolved question along the lines of 'What about other interesting things that happened yesterday?'. Although this question is not congruent with the contrastive topic value of the host sentence, it is relevant to the broader discourse topic.

We can envisage two possible reactions to this data, although we will not stake out a position here. One option is to weaken the semantics of *ke* along the lines of (32), so as to allow the unresolved discourse question to be located somewhere "in the vicinity" of the portion of the discourse tree onto which the contrastive topic value of *ke*'s prejacent is mapped. Here we keep this relation vague and simply represent it by $\sim$.

(32) $[\![\phi\ ke]\!]_{c,w} = [\![\phi]\!]_{c,w}$, defined only if

a. SETTLENESS: $\forall w' \in \mathsf{Dox}_{\mathsf{sp}_c,w} : \bigcap \mathsf{CG}_{c,w'} \subseteq [\![\phi]\!]$

b. OPENNESS: $\exists Q \sim [\![\phi]\!]^{ct}\ \forall q \in Q : \bigcap \mathsf{CG}_{c,w} \not\subseteq q$

While this route would correctly rule in the felicitous sentence in (31b), it would still fail to capture the strong preference for non-final subquestions invoked by *ke* to match exactly the contrastive topic value of the prejacent.

Another possible reaction is to retain our stricter semantics in (26) and assume that (31b) involves presupposition accommodation triggered by invoking a broader unresolved discourse question. Indeed, cases of this kind have already been discussed in the literature. Büring (2016) distinguishes between different types of CTs depending on which portion of the discourse tree they relate to.[16] Most of the Farsi data presented thus far falls under the label of *partial topics*. These constitute the classical case and arise when a CT-marked sentence answers a subquestion of a broader explicit superquestion (e.g., (2)). The case that seems most similar to the CT-final example in (31b) is what Büring calls *purely implicational topics*. These arise when a CT-marked sentence fully resolves the immediate question while simultaneously implying additional open questions subsumed under a larger superquestion. One such case is provided in (33).

(33) Q: Where was the gardener at the time of the murder?

16 Notice that these types are just descriptive ways of referring to different uses of essentially the same theoretical concept of CT.

A: The [gardener]$_{CT}$ was in the [house]$_{F}$.
$\rightsquigarrow$ What about the other people around? (after Büring 2016: 70)

This second more conservative route would explain the preference for *ke* to invoke a CT-congruent question mentioned above. At the same time, we would expect the accommodation of a new discourse question to incur some processing cost, yet no difficulty or unacceptability is immediately apparent in (31b).

7 Conclusion

We have proposed a semantic analysis of Farsi *ke*, arguing that this discourse particle conventionally associates with contrastive topic (CT). The analysis identified two core conditions for the felicitous use of *ke*: (i) a settleness presupposition, according to which the speaker takes the prejacent proposition to be already part of the Common Ground, and (ii) an openness presupposition, whereby at least one CT-related subquestion remains unresolved. Together, these presuppositions account for the main empirical properties of *ke*, including its obligatory association with CT, its preference for non-final CTs, its doxastic inference in declaratives, and its original bias effect in polar questions. Coupled with one additional assumption about the obligatory presence of polarity focus, the analysis also captures the effect of the more restricted sentence-final occurrence of *ke*, which is limited to contexts of epistemic conflict.

We close the paper by emphasizing one important implication of our analysis of Farsi *ke*. The theory proposed in Büring (2003) and adopted here views F and CT as related phenomena. More specifically, this theory assumes that both F and CT mark new information relative to the broader Question Under Discussion (cf. the Givenness Condition in Büring 2003: 7). However, relative to the immediate discourse question, their status differs: F is still new, whereas CT is given. Put differently, F is both globally and locally new, whereas CT is globally new but locally given. This way of viewing CT helps to bridge the gap between the traditional understanding of topic (sometimes called *thematic topic*) as "given" information and focus as "new" information. More specifically, Büring's question-based alternative semantics for CT mirrors Rooth's proposition-based alternative semantics for F, suggesting that the two phenomena pertain to the same broad category. Alternative operator-based approaches to CT strengthen the parallel with F even further, proposing that CT is simply wide scope F (Tomioka 2010; Wagner 2012; Constant 2014). Our analysis of Farsi *ke* as conventionally associating with CT, similar to the way focus-sensitive particles like *only* and *even* associate with F, provides a fresh crosslinguistic argument for the claimed close relationship between CT and F. In doing so, we build on previous analyses that also posit an association with CT, including Krifka (1998)'s analysis of German *auch* 'also' and Okubo (2020)'s precursor analysis of Farsi *ke*.

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