

**EPISTEMIC IMPLICATURES AND INQUISITIVE BIAS:
A MULTIDIMENSIONAL SEMANTICS FOR POLAR
QUESTIONS**

by

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Abstract

This thesis motivates and develops a semantic distinction between two types of polar interrogatives available to natural languages, based on data from Persian and English. The first type, which I call an ‘impartial interrogative,’ has as its pragmatic source an *ignorant* information state, relative to an issue at a particular stage of the discourse. The second type, which I call a ‘partial interrogative’ arises from a destabilized information state, whereby the proposition supported by the information state conflicts with contextually available data. I show that the two types of interrogatives differ in their syntax, and can be distinguished semantically via the logic of Conventional Implicatures in Potts (2005). I develop the proposal within the framework of inquisitive semantics (Groenendijk and Roelofsen (2009)), extended with Potts (2005)’s multidimensional logic.

To my parents, my sisters, and Nancy.

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Chapter 1

Introduction

The goal of this thesis is to provide new empirical data from Persian to motivate a distinction between two types of polar interrogatives available to natural languages. Accordingly, I develop a slightly different picture for the semantics of polar questions than the one standardly assumed in the literature (e.g. Hamblin (1973), Karttunen (1977), Groenendijk and Stokhof (1984)). I implement my proposal within the framework of inquisitive semantics (Groenendijk and Roelofsen (2009)), extended with the multidimensional semantics of Potts (2005). I will show that the view advocated in this thesis can naturally be extended to several problems previously noted in the literature for the semantic account of polar questions in English. We will see that our new ‘multidimensional inquisitive system’ will allow us an empirically stronger, and intuitively simple picture of how the computation of interrogatives, as well as indicatives can be represented.

1.1 Summary of the central claims

The major claims defended in this thesis are as follows. There are two types of polar interrogatives available to natural languages that can be semantically distinguished: partial polar interrogatives and impartial polar interrogatives. I will argue for a semantic theory of sentence types using the Logic of Conventional Implicature, \mathcal{L}_{CI} , from Potts (2005), implemented within inquisitive semantics (Groenendijk and Roelofsen (2009)). Accordingly, I will propose to distinguish sentences of distinct syntactic types semantically via unique CI functions that determine for each syntactic type, a unique semantic interpretation. In this

initial proposal, I will only be concerned with partial and impartial interrogatives, as well as indicatives. Future research will need to extend this proposal to constituent interrogatives, imperatives, and sentences of other types.

As we will see, Persian has two interrogative morphemes, the impartial interrogative morpheme *āyā*, and the partial interrogative morpheme *magè*. I will show that the distinction in the meaning of these two morphemes can best be captured by Potts (2005)'s theory of Conventional Implicatures. I will then show that this distinction, which has a crisp morphological realization in Persian, is also available to English as the distinction between ordinary polar interrogatives and tag-questions, and in negative polar interrogatives, as the distinction between non-preposed and preposed negative polar questions. The peculiar property of tag-questions is that they seem to involve a merge between an indicative sentence, the *anchor*, and a reduced interrogative sentence, the *tag*. Curiously enough, tag-questions have not really attracted the attention that they deserve in the semantics literature, and are standardly assumed to share the same semantics as other polar interrogatives. If there is a general consensus regarding the contrast in the discourse behaviour of ordinary matrix polar questions and tag-questions, then it is thought to be a problem that falls exclusively within the confines of pragmatics (e.g. van Rooy and Safarova (2003), Reese and Asher (2007)). As for English negative polar questions with preposed negation, we find a semantic analysis in Romero and Han (2004), who identify preposed negative polar questions as a special object of study. The claim put forward in this thesis supports the semantic approach by identifying preposed negative questions as partial interrogatives. As I will try to make clear, much of the mystery that shrouds the semantic behaviour of this class of interrogative sentences will be dissolved, and better appreciated, if we accept that they require a distinct semantic analysis from their standard-looking 'impartial' cousins. I will further show that the semantic approach advocated in this thesis provides a very natural account for the distinction between positive and negative (impartial) polar questions. Accordingly, I suggest that the 'at-issue' content of positive and negative questions simply is the prejacent proposition.

We will see that a recourse to Potts (2005)'s multidimensional logic allows us a semantically richer, and albeit simpler picture of natural language interrogatives. Accordingly, many problems in the semantic literature of questions that are standardly assumed to fall within the domain of pragmatics, under the present treatment, will receive a semantic anal-

ysis.

Finally, as a testament to the strength of the present analysis, we will also see that our account provides an explanation for the unavailability of alternative question readings with partial interrogatives in both Persian and English. In fact, our semantics is going to predict that partial interrogatives in any language are going to be incompatible with alternative questions.

1.2 Preliminary data from English

While the primary data for this thesis will be mostly drawn from Persian, the current proposal is also designed to handle examples of the following sort from English. Consider the following examples as possible slogans for a social service program.

- (1) a. Are you in debt? Then we can help you!
- b. # Are you not in debt? Then we can help you!

- (2) a. Are you not happy? Then we can help you!
- b. # Are you happy? Then we can help you!

It appears that positive and negative polar questions contribute distinct *propositional content* to their discourse environment, a distinction which, under standard semantic accounts of questions (e.g. Hamblin (1973), Karttunen (1977), Groenendijk and Stokhof (1984)) remains poorly explained. This is because, according to the standard accounts, positive and negative polar questions have the same denotation, namely, their set of answers. For instance, both polar questions in (1a) and (1b) receive the set denotation {you are in debt, you are not in debt}. However, if we assign the same denotation to positive and negative polar questions, it is not clear how we can account for the discourse pattern in (1) and (2).

Furthermore, the semantics of tag-questions, such as (3), also remain poorly understood.

- (3) a. John loves the ballet, doesn't he?
- b. John doesn't love the ballet, does he?

Tag questions compound the problem for positive and negative questions, since, not only do the interrogative component of positive and negative questions face the same challenges as do the examples in (1) and (2), they also seem to have a ‘mitigated’ assertive component, whose semantic contribution remains equally as elusive.

While these observations have received a relatively fair degree of attention in the literature in one shape or another (e.g. Ladd (1981), Gunlogson and Büring (2000), van Rooy and Safarova (2003), Han and Romero (2004), Romero and Han (2004), Reese and Asher (2007), Roelofsen and van Gool (2010)), I address yet another, related problem, namely, that tag-questions cannot be interpreted as alternative questions. As an example of an alternative question, consider the positive and negative alternative questions in (4). Note that alternative questions are unlike polar questions, since they do not request a yes/no answer. Rather, an alternative question offers two propositional alternatives, and requests that the addressee choose one of the alternatives. I use CAPS to represent the focal stress pattern of alternative questions.

- (4) a. Does John like the BALLET or the OPERA?
 b. Does John not like the BALLET or the OPERA?

The problem with tag-questions is illustrated in (5). Notice that tag-questions do not have an alternative question reading.

- (5) a. # John likes the BALLET or the OPERA, doesn’t he?
 b. # John doesn’t like the BALLET or the OPERA, does he?

The reading that is impossible to get with the tag-questions in (5) is the one in which the questions query ‘which one of the *ballet* or *opera* does/doesn’t John like?’

This thesis will first introduce and investigate the meaning of two polar interrogative morphemes in Persian, and show that the standard semantic theories of questions cannot capture their contrast. I will then draw parallels between these polar interrogatives in Persian and a cluster of related phenomena in English. Accordingly, I develop a multidimensional inquisitive semantics that explains these contrasts in both languages in a uniform fashion, with consequences for the cross-linguistic semantics of interrogatives in general.

1.3 Outline of the proposal

The semantic picture that I want to develop in this thesis is as follows. As mentioned above, it extends the multidimensional semantics of Potts (2005) to inquisitive semantics (Groenendijk and Roelofsen (2009)), with several new innovations and assumptions which I motivate empirically. The logic I will work with borrows from the \mathcal{L}_{CI} of Potts (2005) two distinct types: at-issue types and CI types. These types distinguish the *dimension* where a proposition is interpreted. At-issue propositions, type *a*, can be thought of as ‘the main point’ of an utterance and receive a standard interpretation. CI propositions, type *c*, constitute *speaker-oriented entailments*, and provide comment on the at-issue content.

I will argue for a privileged *syntactic* domain of CI functions, which map the at-issue proposition expressed by every sentence to a CI proposition. While I will strive to preserve the core assumptions of inquisitive semantics in this multidimensional setting, I will employ the CI content of every sentence to distinguish indicatives from interrogatives, and ‘impartial interrogatives’ from ‘partial interrogatives’, which are distinctions that inquisitive semantics does not make (Groenendijk and Roelofsen (2009))¹. I will argue that such distinctions are necessary in order to account for the behaviour of the class of natural language interrogatives I will be concerned with.² I will call our multidimensional inquisitive language $\text{Inq-}\mathcal{L}_{CI}$.

1. Every sentence *S* of $\text{Inq-}\mathcal{L}_{CI}$ expresses (at least) a pair of propositions,³ $\langle p^a, q^c \rangle$, each of which propositions is interpreted relative to an information state σ .
2. An information state is a non-empty set of worlds.

¹Inquisitive semantics is syntactically hybrid, and therefore does not distinguish natural language sentences of different types

²In the present study, I focus exclusively on polar interrogatives and indicatives, and I say nothing about constituent interrogatives, imperatives, or sentences of other types. Ideally, we would want to extend the present system to include all kinds of sentences in natural language.

³I say *at least* a pair of propositions, since, as Potts (2005) argues, expressives and appositives (CI content) express saturated propositions over and beyond the at-issue content of a sentence. And since sentences can contain multiple appositives and expressives, a sentence can express multiple propositions. In this study, I will argue that every sentence has a CI content that is triggered by its syntactic form. As such, I will not be concerned with expressives and appositives, but will only concentrate on the class of CIs which I argue distinguish indicatives and interrogatives. At present, I call these CI meanings *epistemic implicatures*.

3. An information state σ *supports* a proposition p (written as $\sigma \models p$), if and only if $\forall v \in \sigma : p(v) = 1$, i.e. every world in σ is a p -world.
4. An information state σ is *compatible* with a proposition p (written as $\sigma \sim p$), if and only if $\exists \tau : \tau \subseteq \sigma$ and $\tau \models p$, i.e. at least one substate of σ supports p .
5. If p^a is accepted in a discourse D , then $\bigcap CG_D$ (the context set in D) is a state σ , such that $\sigma \models p^a$.
6. For every sentence S with the CI content q^c , uttering S by an agent A in D commits A to q^c in D . That is, the agent's information has to be such that it supports q^c . We will say that q^c is a *speaker-oriented entailment*.
7. An agent A *believes* a proposition p , if and only if $\sigma_A \models p$. That is, if A 's information state supports p .
8. A sentence S that expresses $\langle p^a, q^c \rangle$ is *indicative*, if and only if $\forall \sigma : \sigma \models q^c \rightarrow \sigma \models p^a$. That is, a sentence S is indicative *iff* for any state σ that supports the CI content of S , σ also supports the at-issue content of S . In other words, the agent's information state supports the at-issue content of S i.e. the agent believes p^a .
9. Aside from indicatives, $\text{Inq-}\mathcal{L}_{CI}$ also distinguishes two kinds of interrogatives, *partial* interrogatives and *impartial* interrogatives.
10. A sentence S that expresses $\langle p^a, q^c \rangle$ is a *partial* interrogative, if and only if $\forall \sigma : \sigma \models q^c \rightarrow \sigma \not\models p^a$. That is, the CI content of a partial interrogative is incompatible with its at-issue content. i.e. the agent believes $\neg p$.
11. A sentence S that expresses $\langle p^a, q^c \rangle$ is an *impartial* interrogative, if and only if $\forall \sigma : \sigma \models q^c \rightarrow (\sigma \sim p^a \wedge \sigma \sim \neg p^a)$. That is, any state that supports the CI content of S is compatible with both the at-issue content of S and its negation, i.e. the agent is ignorant with respect to *whether* p .

Let me provide a brief sketch of how assertions and questions are interpreted in $\text{Inq-}\mathcal{L}_{CI}$.

Every sentence in $\text{Inq-}\mathcal{L}_{CI}$ expresses a pair of propositions, an at-issue proposition, and a CI proposition. CI propositions are speaker-oriented entailments, which means that they

are supported by the speaker's information state. Assertions are expressed syntactically by indicatives. The CI content of an indicative sentence S is always such that any information state that supports it, will necessarily support the at-issue content of S also. This means that the use of an indicative sentence S by a speaker A , *commits* A to the at-issue content of S .

Questions are expressed syntactically by interrogatives. The at-issue content and CI content of interrogatives can never be supported by the same information state. There are two kinds of interrogatives that Inq- \mathcal{L}_{CI} distinguishes. 'Partial interrogatives' (morphosyntactically distinct from *impartial* interrogatives) are sentences whose CI content is the polar opposite of their at-issue content. A speaker who uses a partial interrogative with at-issue proposition p^a , is committed to $\neg p^a$. Partial interrogatives arise when a speaker comes into epistemic contact with evidence for a proposition that contradicts or destabilizes her belief. A partial interrogative is a linguistic strategy to address an epistemic conflict as a step towards a resolution. Such a conflict may or may not lead to belief revision.

Lastly, impartial interrogatives are sentences whose CI-content denotes an ignorant state. Speakers use an impartial interrogative with at-issue content p^a , if they have no prior commitment to p^a or $\neg p^a$. That is, an impartial interrogator considers both p^a and $\neg p^a$ a possibility.

I will call the CI content of the type advocated in this paper an *epistemic implicature*. I will also argue for what I will call *inquisitive bias*, which is the capacity for a sentence to 'highlight' a possibility (c.f. Roelofsen and van Gool (2010)). I will show that the present account of epistemic implicature and inquisitive bias is capable of capturing delicate mechanisms involved in the interpretation of natural language interrogatives, which I will discuss in this thesis.

1.4 Organization

This thesis is organized as follows. In Chapter 2, I introduce the two polar interrogative morphemes in Persian, *āyā* and *magè*, and show that they contrast in complementary fashion in their discourse properties. In Chapter 3, I discuss several prominent approaches to the semantics of questions, and show that none of the existing accounts predicts the contrast noted for these two interrogative morphemes. In Chapter 4, I examine certain pragmatic

principles as potential candidates for explaining the noted contrast between *āyā* and *magè*, and will conclude that Potts (2005)'s theory of CIs best characterizes this contrast. However, before settling the issue conclusively, I raise several issues with the semantic picture we have been assuming, and investigate the problem at more length by looking beyond the Persian data at the behaviour of polar interrogatives in English.

In Chapter 5, I provide a critical review of several proposals that attempt to account for the contrast between positive and negative polar questions in English. I discuss negative polar questions in English and the distinction between preposed and low negation. I suggest that the contrast between *āyā* and *magè* questions is also present in English, namely in tag-questions and negative polar questions with preposed negation.

Chapter 6 introduces inquisitive semantics (Groenendijk and Roelofsen (2009)) and implements the collection of observations noted above in a multidimensional framework. We will see that the new proposal can capture all the observations made above with an empirically motivated and intuitively simple formalism.

In Chapter 7, I show that partial interrogatives cannot grammatically receive an alternative-question reading, and illustrate that our new proposal actually predicts this unavailability. In Chapter 8, I discuss 'inquisitive bias', which is largely an explication of the contrast between positive and negative questions within the new framework. Chapter 8 concludes the thesis and includes a discussion for future research.

Chapter 2

Two Polar Interrogative Morphemes in Persian

2.1 Surface syntax and prosody

In this chapter, I briefly describe the general syntactic and prosodic behaviour of polar questions in modern colloquial Persian. The discussion will remain fairly descriptive, and I will keep my theoretical assumptions to a minimum. The goal of this chapter is to introduce the data as neutrally as possible, with a view to contributing to the empirical base of linguistic research in general, and the semantics of questions in particular, since, to my knowledge, the behaviour of Persian interrogative morphemes described in this study have not yet been investigated.¹

āyā vs. *magè*

There are two interrogative morphemes in Persian that occur sentence-initially on polar questions, *āyā* and *magè*. Throughout this thesis, I will gloss *āyā* as ‘Q’ and *magè* as ‘!Q’ simply to keep the two morphemes distinct. I make no theoretical assumptions by following this notation. While the main purpose of this section is to establish the difference in their meaning, for the time being, I will assign the same translation to both, as in (6). In (7)

¹The data is drawn from my own native speaker intuitions, and verified by several relatives and friends living in Vancouver, Canada and Tehran, Iran.

we see that both morphemes can also occur with negated predicates to produce negative questions.

- (6) a. **āyā** milād raft?
Q Milād left
- b. **magè** milād raft?
!Q Milād left
- ≈ ‘Did Milād leave?’
- (7) a. **āyā** milād na-raft?
Q Milād NEG-left
- b. **magè** milād na-raft?
!Q Milād NEG-left
- ≈ ‘Did Milād not leave?’

Both morphemes are optional in speech and generally occur with a final rise (↑). While a falling intonation (↓) is also possible with *magè*-questions, the morpheme would have to occur overtly, or else the utterance can only be interpreted as an assertion. These observations are illustrated in (8) and (9).

- (8) a. (**āyā**) milād raft? ↑
Q Milād left
- b. (**magè**) milād raft? ↑
!Q Milād left
- ≈ ‘Did Milād leave?’
- (9) a. # **āyā** milād raft? ↓
Q Milād left
- b. **magè** milād raft? ↓
!Q Milād left
≈ ‘Did Milād leave?’
- c. milād raft. ↓
Milād left
‘Milād left.’

Throughout this thesis, I will concern myself only with examples where both morphemes occur overtly. As I try to make clear below, the felicity of the use either morpheme is contextually constrained.

A notable syntactic difference between the two morphemes is that, unlike *magè*, which may occur sentence medially or finally, *āyā* can only occur sentence-initially.

- (10) a. milād raft **magè**?
Milād left !Q
- b. milād **magè** raft?
Milād !Q left
- c. * milād raft **āyā**?
Milād left !Q
- d. ?? milād **āyā** raft?
Milād !Q left
- ≈ ‘Did Milād leave?’

Furthermore, only *āyā*-questions can be embedded under question embedding verbs, such as *know* or *doubt*.

- (11) a. sārā mi-dun-e **āyā** bārun mi-ā-d.
Sara DUR-know-3SG Q rain DUR-come-3SG
- b. * sārā mi-dun-e **magè** bārun mi-ā-d.
Sara DUR-know-3SG !Q rain DUR-come-3SG
- ‘Sara knows whether it’s raining.’
- (12) a. sārā shak mi-kon-e **āyā** bārun bi-ā-d.
Sara doubt DUR-do-3SG Q rain IRR-come-3SG
- b. * sārā shak mi-kon-e **magè** bārun bi-ā-d.
Sara doubt DUR-do-3SG Q rain IRR-come-3SG
- ‘Sara doubts whether it is going to rain.’

Lastly, the two morphemes cannot co-occur².

²This observation may actually prove to be inaccurate, mainly because while many speakers reject (13c) outright, they report that (13b) ‘doesn’t sound right’. However, some speakers seem to feel that (13b) is

- (13) a. * **āyā** milād raft magè?
Q Milād left !Q
- b. ?? **āyā** magè milād raft?
Q !Q Milād left
- c. * **magè āyā** milād raft?
!Q Q Milād left

The above observations are summarized in table (2.1).

Condition	āyā	magè
↑	✓	✓
↓	✗	✓
Sentence-initial	✓	✓
Sentence-medial/final	✗	✓
Embed under <i>know/doubt</i>	✓	✗
Co-occur		✗

Table 2.1: Constraints on the syntax and prosody of *āyā* and *magè*

For the remainder of this study, I will restrict myself to examining the contrast between the two morphemes in parallel structures only. That is, sentence-initially, and with rising intonation. I believe that the analysis that I develop will be quite compatible with the observations noted thus far. Future research into the syntactic and prosodic constraints of these morphemes should only enhance the proposal advanced here, since I believe that the heart of the contrast between these two morphemes lies in their semantics. I would also suggest that the behaviour of these morphemes provides a rich environment for the study of possible, although dispreferred. However, there are several complications that issue from this fact. The first one is that while *magè* is generally free to occur sentence-medially or sentence-finally, if preceded by *āyā*, as in (13b), then it cannot move. For example, (13a) is judged ungrammatical by my informants. Secondly, while the meaning of *āyā*-questions are demonstrably distinct from the meaning of *magè*-questions, in marginal cases such as (13b), the question is strictly interpreted as a *magè*-question. While one may want to maintain the hypothesis that every *magè*-question contains a covert *āyā* morpheme, it would be difficult to explain, i. why (13b)'s acceptability is degraded, and ii. why *magè*'s movement is restricted when preceded by *āyā*. I will therefore reject this hypothesis for the remainder of this study.

prosody, syntax and semantics at the interface. But first things first. Let us first understand why a language would want to have two polar interrogative morphemes to begin with.

2.2 Discourse constraints

In this section, I illustrate the complementary distribution of the two morphemes in discourse, with a view to capturing the difference in their meaning. But before I do, we should first establish whether both morphemes do indeed form genuine questions³. That is, we must ensure that the interrogativity of either morpheme is inherent to its lexical meaning, and not merely a contextual effect of its use.

2.2.1 Relaxing our doubts

To test whether both morphemes are in fact interrogative, we need a discourse environment that selects questions only, and precludes sentences of other types, e.g. assertions and commands. Such a discourse environment can be obtained by the use of the expression ‘let

³This question is not trivial, in light of the fact that *magè* (followed by the complementizer *inkè*) can occur in non-interrogative sentences in exceptive constructions, meaning of ‘only if not’, as in (i).

- i. milād mi-a-d magè inkè bārun bi-ād.
 Milād DUR-come-3SG !Q COMP rain IRR-come-3SG
 ‘Milād will come only if it doesn’t rain.’

One could object that sentences such (i) are counter-examples to *magè* as an interrogative morpheme, since (i) is technically not a question. I believe, however, that such an objection is ultimately not warranted, if we view question particles as morphemes that operate over a proposition to yield more than one possibility (an ‘inquisitive’ proposition for Groenendijk and Roelofsen (2009)). Truth-conditionally, (i) describes two possibilities, one in which it rains, and another in which it doesn’t rain. The sentence then says, ‘Milād comes if it doesn’t rain, and Milād doesn’t come if it rains.’

Note also that in (i), the verbal element in the scope of *magè* is necessarily marked irrealis, and does not commit the speaker to either possibility obtaining. Furthermore, maintaining the thesis that *magè* is non-interrogative introduces a host of complications that cannot be maintained consistently. For example, it will be almost impossible to explain why plain-vanilla declaratives are necessarily interpreted as questions in the presence of *magè*.

me ask you a question,’ illustrated in (14) for English (see Gunlogson (2003) for a battery of similar tests).

- (14) [Let me ask you a question, ...]
- a. ... Did John leave?
 - b. # ... John left.
 - c. # ... Leave!

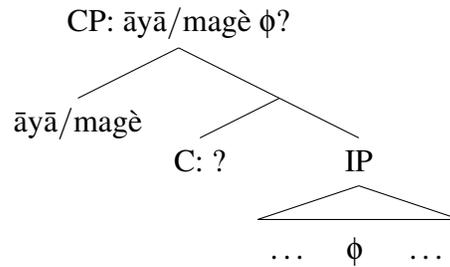
Example (14) provides us with exactly the right environment for identifying questions. In (15) we see that Persian allows sentences starting with *āyā* and *magè* in this environment, while prohibiting assertions and commands.

- (15) [az-at ye so?āl be-pors-am, ...]
 from-2SG a question SUBJ-ask-1SG
 ‘Let me ask you a question,’
- a. ... **āyā** milād raft?
 Q Milād left
 - b. ... **magè** milād raft?
 !Q Milād left
 ≈ ‘... did Milād leave?’
 - c. # ... milād raft.
 Milād left
 ‘... Milād left’
 - d. # ... bo-ro!
 IMP-leave
 ‘... Leave!’

We can therefore conclude that *āyā* and *magè* are indeed both genuine interrogative morphemes. For the present, I will assume the syntactic structure in (16) for both *āyā* and *magè* questions.⁴

⁴The IP is the functional category of a tensed sentence, and the CP is the functional category of a clause that adds a complementizer and pre-complementizer material.

(16)



2.2.2 Neutrality and contrary commitment

Neutrality vs. bias

There are two criteria which constrain the use of *āyā* and *magè* in a given discourse. The first criterion is *neutrality*. The second one is what I will call *contrary commitment*. Example (17) shows that only *āyā*-questions can be felicitously uttered in a neutral context, in this case a medical questionnaire. In this respect, the *magè*-interrogative in (17b) patterns with the declarative (17c), which is also infelicitous in this context.

(17) [On a medical questionnaire]

- a. **āyā** shomā sigār mi-kesh-id?
Q you cigarette DUR-draw-2.PL
- b. # **magè** shomā sigār mi-kesh-id?
!Q you cigarette DUR-draw-2.PL
≈ ‘Do you smoke?’
- c. # shomā sigār mi-kesh-id.
you cigarette DUR-draw-2.PL
‘You smoke.’

Another example in which *magè*-questions pattern with assertions is illustrated in (18). Here, the discourse particle *āxè* can occur on both a declarative as well as a *magè*-interrogative, whereas with an *āyā*-interrogative, the sentence is ungrammatical.

- (18) a. **āxè** sārā mi-ā-d.
PART Sara DUR-come-3SG
‘(≈ After all), Sara is coming.’
- b. **āxè magè** sārā mi-ā-d?
PART !Q Sara DUR-come-3SG

‘(≈ After all), is Sara is coming.’ [?? English]

- c. * **āxè āyā** sārā mi-ā-d?
 PART Q Sara DUR-come-3SG

Lacking a better term, I have loosely translated *āxè* with the English ‘after all’ after Sadock (1974), who similarly argues that ‘after all’ can only occur with assertions (although a rhetorical reading for polar questions with ‘after all’ seems possible, albeit marginal, given an appropriate context)⁵. From a descriptive standpoint, the observation here is that *āyā*-questions are more *neutral*, in the sense that they seem to lack the ‘assertive’ component of *magè*-questions. But how exactly are *magè*-questions ‘assertive,’ if at all? That brings us to our second criterion which marks a contrast between the two morphemes, namely, *contrary commitment*.

Contrary commitment vs. ignorance

The real contrast between *āyā* and *magè* comes into sharp relief when we consider their behaviour in questions that follow expressions of ignorance, or contrary commitment (by the same speaker). In fact, this distinction subsumes and explains the neutrality contrast illustrated above. The generalization is stated in (19).

- (19) a. Only *āyā*-questions may follow expressions of ignorance.
 b. Only *magè*-questions may follow expressions of contrary commitment.

Regarding (19a), this generalization explains why only *āyā*-questions can occur in neutral environments, since neutral environments require that the interrogator remain impartial to the likelihood of a positive or a negative answer. By contrast, *magè*-questions do not have this property, as illustrated in (20).

- (20) [ne-mi-dun-am agè sārā bi-ā-d...]
 NEG-DUR-know-1SG if Sara IRR-come-3SG
 ‘I don’t know if Sara is coming.’

⁵Polar questions with pre-posed negation may also follow *after all*, a topic which I will pursue at length in chapter 5.

- a. ... **āyā** mi-ā-d?
Q DUR-come-3SG
'... Is she coming?'
- b. ... **āyā** ne-mi-ā-d?
Q NEG-DUR-come-3SG
'... Is she not coming?'
- c. # ... **magè** mi-ā-d?
!Q DUR-come-3SG
'... Is she coming?'
- d. # ... **magè** ne-mi-ā-d?
!Q NEG-DUR-come-3SG
'... Is she not coming?'

(20) illustrates that unlike *āyā*-questions, *magè*-questions cannot follow expressions of ignorance by the same speaker. Conversely, we see in (21) and (22) that *āyā*-questions cannot felicitously follow expressions that commit the speaker to a proposition that answers the question.

- (21) [sārā mi-ā-d...]
Sara DUR-come-3SG
'Sara is coming.'
- a. # ... **āyā** mi-ā-d?
Q DUR-come-3SG
'Is she coming?'
- b. # ... **āyā** ne-mi-ā-d?
Q NE-DUR-come-3SG
'Is she not coming?'
- (22) [sārā ne-mi-ā-d...]
Sara NEG-DUR-come-3SG
'Sara is not coming.'
- a. # ... **āyā** mi-ā-d?
Q DUR-come-3SG
'Is she coming?'

- b. # ... **āyā** ne-mi-ā-d?
 Q NE-DUR-come-3SG
 ‘Is she not coming?’

This is exactly where *magè*-questions differ, as stated in the generalization in (19b). This behaviour is illustrated in (23) and (24).

(23) [sārā mi-ā-d...]
 Sara DUR-come-3SG
 ‘Sara is coming.’

- a. ... **magè** ne-mi-ā-d?
 !Q NEG-DUR-come-3SG
 ‘Is she not coming?’
- b. # ... **magè** mi-ā-d?
 !Q DUR-come-3SG
 ‘Is she coming?’

(24) [sārā ne-mi-ā-d...]
 Sara NEG-DUR-come-3SG
 ‘Sara is not coming.’

- a. ... **magè** mi-ā-d?
 !Q DUR-come-3SG
 ‘Is she coming?’
- b. # ... **magè** ne-mi-ā-d?
 !Q NE-DUR-come-3SG
 ‘Is she not coming?’

What (23) and (24) show is that a *magè*-question !Q whose only answers are members of $\{p, \neg p\}$, may only occur in the positive if following an assertion $\neg p$, and in the negative, if following an assertion p . This is what I mean by ‘contrary commitment’. In summary, the polarity of the prejacent of *magè*-questions is sensitive to the polarity of the prior assertion, such that the propositional content of the assertion must always be the opposite of the polarity of the question.

I must note that either question type may very well occur without an explicit expression of ignorance or contrary commitment. In such cases, the epistemic attitude of the

interrogator is, to use a neutral term, *implied*.⁶

2.3 Summary

In this chapter, I tried to motivate the existence of two interrogative morphemes in Persian, *āyā* and *magè*, whose occurrence in discourse are in complementary distribution: while the use of *āyā* is felicitous only in contexts where the interrogator is epistemically impartial, or ignorant, with respect to the question's answer, *magè*-questions are only felicitous if the interrogator is committed to the proposition that is the polar opposite of the question's prejacent. In the next chapter, I consider the consequence of these observations for existing semantic frameworks for questions.

⁶In fact, the purpose of chapter 4 is to establish just how such an 'implication' comes about.

Chapter 3

The Semantics of *āyā* and *magè*

In the previous chapter, we saw that Persian has two distinct interrogative morphemes for polar questions that occur in complementary distribution in discourse. I argued that the constraint placed on the use of either morpheme depends on the epistemic attitude of the interrogator with respect to the propositional content of the question's prejacent. In this chapter, I explore the consequence of this observation for several prominent semantic theories of questions, namely, Hamblin (1973), Karttunen (1977), and Groenendijk and Stokhof (1984). I will conclude that none of these theories predicts a semantic distinction between *āyā* and *magè*, but would rather require pragmatic principles to explain the contrast. Accordingly, in chapter 4 I will explore what such a pragmatic explanation would have to be.

3.1 Sets of answers, true answers and partitions

3.1.1 The Hamblin-set and the Karttunen-denotation

Hamblin (1973) argues that questions denote a set of propositions that answer the question. Pragmatically, posing a question 'sets up a choice situation' among possible answers to the question. So, for example, the polar question in (25a) denotes the set in (25b), since each one of the propositions in this set counts as answers to (25a). In a particular context, the addressee *chooses* one answer over the other.

(25) a. Does John smoke?

- b. {John smokes, John doesn't smoke }

More generally, under the standard view that propositions denote sets of worlds, the Hamblin denotation for a polar question $?p$ is a set of sets of worlds, namely, the set consisting of a set of worlds where p is true, and the set of worlds where p is false. Furthermore, this denotation remains constant across worlds.

$$(26) \quad \llbracket ?p \rrbracket = \{ \lambda w. p(w)=1, \lambda w. p(w)=0 \}$$

On the basis of embedded questions such as (27), Karttunen (1977) argues that a question only denotes the set of propositions that ‘constitute [its] true and complete answer.’ This is so, since in examples such as (27), the sentence *entails* that John told Mary the true answer to the question ‘did Tim pass the test?’. That is, given (27) and (28a) as premises, we can conclude that John told Mary *that* Tim passed the test. And conversely, given (27) and (28b) as premises, we can conclude that John told Mary that Tim did *not* pass the test. Accordingly, the denotation for the embedded question in (27) varies from world to world, since Tim’s success at passing the test is not uniform across worlds.

(27) John told Mary whether Tim passed the test.

- (28) a. Tim passed the test.
b. Tim did not pass the test.

Pragmatically, embedded questions do not leave a *choice* to the addressee, since embedded questions are not directed to anyone as a request for information, and therefore do not require a response. More generally, Karttunen (1977) is only concerned with the semantic object a question makes reference to. That is, Karttunen’s definition of a question is independent of pragmatics. I must add that Karttunen (1977) maintains that matrix questions and embedded questions are semantically equivalent.

Karttunen (1977) proposes that questions be defined as functions from worlds to sets of *true* propositions. The Karttunen intension for a polar question $?p$ is as in (29), which builds on the Hamblin-set illustrated in (26).

$$(29) \quad \llbracket ?p \rrbracket^w = \lambda v_s. \lambda p_{\langle s,t \rangle}. [p(v)=1 \ \& \ p \in \{ \lambda w. p(w)=1, \lambda w. p(w)=0 \}]$$

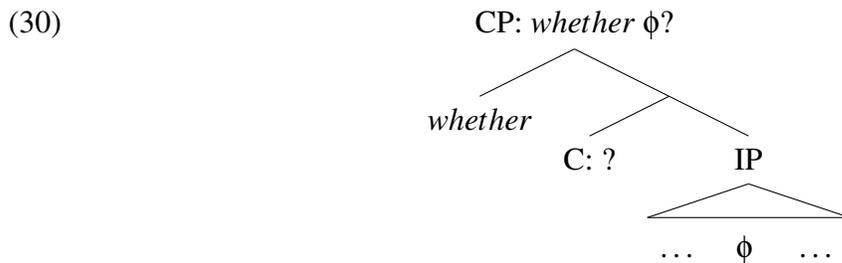
(29) says that the denotation of a polar question $?\phi$ at each world v is the set containing the true proposition p at v , if p is an answer to $?\phi$. So for instance, the polar question in (25a) denotes the singleton set $\{p : \text{that John smokes}\}$ at v' , if $\text{John-smokes}(v') = 1$; otherwise, at v' , (25a) denotes $\{\neg p : \text{that John does not smoke}\}$.

It follows that the intension type of a question in this theory will be a function from worlds to sets of true propositions: $\langle s, \langle \langle s, t \rangle, t \rangle \rangle$.

3.1.2 Applying the Karttunen-denotation to āyā

In this section I show how the Karttunen-denotation of questions applies to āyā. Presumably, under this view, this denotation is just going to have to work the same for magè, since questions denote their (true) answers. And since āyā-questions and magè-questions share the same set of answers, they must denote the same semantic object.

In order to demonstrate how Karttunen questions compose, we need one additional rule, what Karttunen (1977) calls *the Proto-Question Rule*. In fact, this rule defines an abstract level of representation which I already presupposed in the previous chapter without comment, reproduced in (30) for English, where *whether* has replaced the Persian āyā/magè.



The abstract level of representation in question is the $?\text{-operator}$ in C^0 . Karttunen (1977)'s insight is that *whether* composes not with propositions, but sets of (true) propositions.¹ Therefore, at the level of composition, *whether* does not combine with objects of type $\langle s, t \rangle$, functions from worlds to truth-values, i.e. propositions, rather with objects of

¹Since I am only concerned with polar questions, I only discuss Karttunen (1977)'s *Yes/No Question Rule*. Karttunen also proposes a *Wh-Quantification Rule*, where the *wh*-phrase is essentially treated as an existential quantifier which combines with an open proposition (a proposition with an unsaturated argument) and binds its free variable. Karttunen also proposes an *Alternative-Question Rule*, which he treats as two disjoined yes/no questions.

type $\langle\langle s, t \rangle, t \rangle$, functions from propositions to truth values, i.e., sets of propositions. At the syntactic level, an IP (the category of a sentence) has as its extension a truth value, type t , and as its intension a proposition, type $\langle s, t \rangle$. Now, since *whether* looks for semantic objects of type $\langle\langle s, t \rangle, t \rangle$, what we need is a function that takes us from the intension of a sentence to a set of propositions. And this is where the $?$ -operator comes in, whose application, Karttunen (1977) calls the *Proto-Question Rule*.²

The *Proto-Question Rule* is the application of a function of type $\langle\langle s, t \rangle, \langle\langle s, t \rangle, t \rangle\rangle$ (the $?$ -operator) to a proposition. The output of the rule is the unit-set $\{p\}_{\langle\langle s, t \rangle, t \rangle}$, which is then fed as an argument to *whether*.

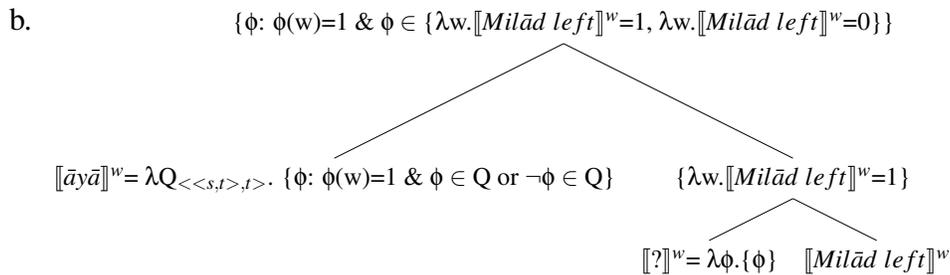
If we assume, as I do, that *āyā* is syntactically and semantically equivalent to *whether*, then (31) is the Karttunen semantics for *āyā* (adapted from Guerzoni (2003) and Heim (1994)).

$$(31) \quad \llbracket \bar{a}y\bar{a} \rrbracket^w = \lambda Q_{\langle\langle s, t \rangle, t \rangle}. \{p: p(w)=1 \ \& \ p \in Q \text{ or } \neg p \in Q\}$$

According to (31) *āyā* takes as an argument a singleton proposition set, and returns the set consisting of either the same proposition, or its complement, depending on the world of evaluation. At each world v , $?\bar{a}y\bar{a}-\phi$ will denote the the set containing the true proposition at v from the set $\{\phi, \neg\phi\}$.

Let's see how this works on an example.

- (32) a. *āyā milād raft?*
 Q *Milād left*
 'Did Milād leave?'



²I must note here that the Proto-Question Rule is rather inconsequential for polar questions, but is intended to derive the correct meaning for *wh*-questions via the WH-Quantification Rule (Karttunen (1977), §2.7).

(32b) shows the step-wise composition for (32a), where $\llbracket Mil\bar{a}d\ left \rrbracket^w$ denotes the intension of the prejacent proposition. The $?$ -operator then takes the prejacent as an argument and returns the proto-question, which subsequently serves as an argument to $\bar{a}y\bar{a}$. The top-most set, which is the output of the application of $\bar{a}y\bar{a}$ to the proto-question, is the set containing the proposition in the proto-question set and its complement. The Karttunen denotation of this set, at each world, is its singleton subset that contains the true proposition at that world.

3.1.3 Karttunen-denotation for $mag\bar{e}$

As alluded to above, since the Hamblin/Karttunen theory views a question as the set consisting of its (true) answers, this theory predicts the same denotation for $mag\bar{e}$ as it does for $\bar{a}y\bar{a}$. This is so because the set of possible answers to both $\bar{a}y\bar{a}$ -questions and $mag\bar{e}$ -questions are always identical, as illustrated in (33).

- (33) a. $\bar{a}y\bar{a}$ $s\bar{a}r\bar{a}$ $mi\text{-}\bar{a}\text{-}d?$
 Q Sara DUR-come-3SG
- b. $mag\bar{e}$ $s\bar{a}r\bar{a}$ $mi\text{-}\bar{a}\text{-}d?$
 !Q Sara DUR-come-3SG
- ≈ ‘Is Sara is coming?’
- c. $\bar{a}r\bar{e}$ $s\bar{a}r\bar{a}$ $mi\text{-}\bar{a}\text{-}d$.
 yes Sara DUR-come-3SG
 ‘Yes, Sara is coming.’
- d. na $s\bar{a}r\bar{a}$ $ne\text{-}mi\text{-}\bar{a}\text{-}d$.
 yes Sara NEG-DUR-come-3SG
 ‘No, Sara is not coming.’

Both answers in (33c)-(33d) are (the only) possible answers to the questions in (33a) and (33b). Accordingly, both questions are semantically equivalent. This predication is stated in (34).

$$(34) \llbracket \bar{a}y\bar{a} \rrbracket^w = \llbracket mag\bar{e} \rrbracket^w$$

If we wish to maintain the Hamblin/Karttunen picture, we must look to pragmatics to explain the contrast between $\bar{a}y\bar{a}$ and $mag\bar{e}$. That is, we must explain the difference in

their *use* independently of the difference in their *meaning*. But before we do, let's have a look at another prominent semantic theory for questions, namely, the partition theory of Groenendijk and Stokhof (1984). We will see that according to the partition theory also, the contrast between $\bar{a}y\bar{a}$ and *magè* will have to be explained in terms of use and not meaning.

3.2 Questions as partitions

According to Groenendijk and Stokhof (1984), questions denote a partition over a set of indices A , as non-empty, non-overlapping subsets of A , such that the union of those subsets equals A . This is captured formally in (35). (35a) says that every member of the partition is non-empty, whose union equals A . (35b) says that no members of A overlap.

- (35) Π is a partition of A iff
- a. $\forall X \in \Pi : X \neq \emptyset, \bigcup_{X \in \Pi} X = A$
 - b. $\forall X, Y \in \Pi : X \cap Y = \emptyset \vee X = Y$

For the partition theory, a polar question Q partitions the set of indices (world-time pairs) A into two disjoint subsets α and ω , such that α and ω denote propositions that count as answers to Q , and the union of α and ω equals A . This means that α and ω represent complementary propositions. Therefore, for every world v , if $\alpha(v) = 1$, then $\omega(v) = 0$. Furthermore, for any two worlds v_1 and v_2 , v_1 and v_2 are Q -equivalent, if $\alpha(v_1) = \alpha(v_2)$.

For the partition theory, the *intension* of a question is a function from worlds to propositions, $\langle s, \langle s, t \rangle \rangle$. For every world v , a question Q maps any other world w to 1 if v is Q -equivalent to w . That is, if they belong to the same cell of the partition. The *extension* of Q at v is the true proposition at v that counts as an answer to Q (the proposition denoted by the set of worlds that belong to a cell in the partition).

It follows that the partition theory makes the same prediction regarding the *meaning* of $\bar{a}y\bar{a}$ and *magè* as the Hamblin/Karttunen theory prediction discussed above. That is, since the partition theory views the denotation of questions as the partitions they induce, any two questions Q_1 and Q_2 that induce the same partition are predicted to have the same denotation. And since each member of the partition is the proposition that answers Q , if a true answer to Q_1 at v = a true answer to Q_2 at v , then Q_1 and Q_2 have the same extension. It follows that since the true answer to an $\bar{a}y\bar{a}$ -question is Q -equivalent to a *magè*-question,

they must denote identical partitions. Therefore, according to the partition theory also, $[[\bar{a}y\bar{a}]]^w = [[mag\acute{e}]]^w$.

In conclusion, the partition theory would also have to locate the contrast between $\bar{a}y\bar{a}$ and $mag\acute{e}$ in their pragmatics.

3.3 Summary

This chapter discussed three approaches to the semantics of (polar) questions with the intention to determine whether any of the theories offer a flexible approach to capture the distinction between $\bar{a}y\bar{a}$ and $mag\acute{e}$ questions. We saw that none of the theories predicts a semantic contrast between these two types of questions, since they define the denotation of questions solely in terms of their answers. In the next chapter, I will explore how the contrast between these two polar interrogative morphemes might be accounted for by pragmatic principles. We will see that the task of forging a pragmatic explanation for the contrast between $\bar{a}y\bar{a}$ and $mag\acute{e}$ will prove not to be so trivial, and that we will have to return to the outskirts of semantics to set up the requisite machinery for an adequate analysis.

Chapter 4

Ignorance and Contrary Commitment

In this chapter I draw the contrast between *at-issue* meaning (Potts (2005)) and *projective* meaning (Roberts et al. (2009)), and argue that $\bar{a}y\bar{a}$ and *magè* contribute identical at-issue meaning (captured by the semantics discussed in the previous chapter), but contrast in their not-at-issue (i.e. projective) meaning. We will also see that this projective meaning is best characterized by what Potts (2005) calls CI-content, which rallies us back onto ‘semantic turf’. Concretely, I will show that the ‘ignorance implication’ of $\bar{a}y\bar{a}$ and the ‘contrary commitment’ of *magè* are conventional implicatures (CI-content) that contrast from the ‘at-issue’ content of $\bar{a}y\bar{a}$ and *magè* questions. As a preliminary approximation, I will assume that the at-issue meaning of both types of questions is the set of alternatives which constitute their answers, though I will revise this assumption later.

4.1 Projective meaning

Roberts et al. (2009) and Beaver et al. (2009) are recent studies that provide a compendium of properties and tests for the class of ‘meanings’ which the authors call *projective*. This class defines the behaviour of the use of sentences which express meanings beyond the simple conditions that would make that sentence ‘true’. The term ‘projection’ goes back to the early literature on presuppositions (e.g. Karttunen (1973); Stalnaker (1974), Heim (1983)), where a number of authors attempted to systematically characterize the behaviour of expressions whose use in a sentence entails a ‘meaning’ (a proposition) that does not disappear under the scope of certain operators, e.g. negation, but rather ‘projects’ past

them.

While traditionally projection was understood to be a property of presuppositions, Roberts et al. (2009) argue that the source of projection is whether or not the meaning is *at-issue*: A meaning is *at-issue* if and only if it answers the question under discussion (Roberts (1996), see below). Accordingly, the authors formulate the *General Projection Hypothesis*, which states that ‘all and only the not at-issue content of a constituent projects, given an appropriate context of utterance.’ By way of simple illustration, let us first see just how presuppositions are not at issue.

- (36) a. Has John stopped smoking?
 b. John has stopped smoking.
 c. John has not stopped smoking.
 d. John used to smoke.

It is by now widely accepted that sentences (36a)-(36c) all *presuppose* the proposition in (36d). The presupposition *trigger* in these examples is the verb *stop*, which encodes its presupposition lexically: something of the form, ‘if x stopped ϕ , then x *used to* ϕ .’ Under the standard account of semantic presupposition, e.g. Heim and Kratzer (1998), given a particular context *c*, just in case (36d) is false in *c*, then the denotation of the sentences (36a)-(36c) are ‘undefined’ (they cannot be computed). More generally, presupposition triggers denote partial functions, such that they are defined if and only if their presupposition is true. The upshot of this is that if (36d) is false in *c*, then (36a) is a vacuous inquiry in *c*, since neither (36b) nor (36c) are true or false in *c*.

Now on to the projection behaviour of *stop*’s presupposition in (36). In (36a), we see that the presupposition of ‘stop’ *survives* under the syntactic scope of a question (i.e. it is semantically interpreted outside the scope of the question: it is not ‘called into’ question), and in (36c) we see that the presupposition survives under the syntactic scope of negation (i.e. the presupposition is unaffected by negation). What Roberts et al. (2009) argue is that this projection behaviour is a consequence of the fact that the projective (presupposed) meaning of (36a)-(36c), namely (36d) is *not at-issue*. That is, given some context, what will be at-issue in that context with respect to (36a) is *the contrast* between (36b) and (36c), since this contrast is what the question in (36a) cares about. The presupposed meaning in

(36d) does not answer the question—it is *presupposed* by the question—and is hence *not* at-issue.

Let us now look at another example, where something other than a standard presupposition projects. Consider the appositive clause in (37), from Potts (2005).

(37) Lance Armstrong, an Arkansan, has won the 2003 Tour de France!

Potts (2005) argues that appositives, unlike presuppositions, do not make an utterance semantically ‘undefined’ if they are false. In fact, he argues that the falsity of the nominal appositive in (37) does not even make (37) false. That is, as an answer to the question ‘who won the 2003 Tour de France?’ (37) is *true*. For example, by responding ‘that’s not true!’ to the assertion in (37) (also (38a)), one could not be denying the truth of the appositive (38c), but would only deny the truth of the assertion in the main clause (38b). In order to deny the appositive, one would adopt a response strategy such as ‘Well, yes, but he’s not an Arkansan’, or ‘Wait, I agree, but he’s a Texan’, ... ‘True, but ...’, etc. (Potts (2005) following Karttunen and Peters (1979)).

- (38) a. Lance Armstrong, an Arkansan, has won the 2003 Tour de France!
 b. Lance Armstrong has won the 2003 Tour de France!
 c. Lance Armstrong is an Arkansan
 d. That’s not true! \Rightarrow L.A. did not win the 2003 T de F.
 \nRightarrow L.A. is not an Arkansan.

For Potts (2005), appositives such as in (37) belong to a class of meanings which he calls *Conventional Implicature*.¹ I will henceforth call the content of a conventional implicature its ‘CI-content’ following Potts (2005). Now, to return to our projection-talk, Potts (2005) shows that conventional implicatures, much like presuppositions, always project.

- (39) a. Lance Armstrong, an Arkansan, has won the 2003 Tour de France.
 b. Lance Armstrong, an Arkansan, has not won the 2003 Tour de France.
 c. If Lance Armstrong, an Arkansan, has won the 2003 Tour de France, then I’ve won the bet.

¹Potts (2005) divides CIs into two categories: supplemental expression (appositives and parentheticals) and expressives (e.g. epithets, honorifics).

- d. Maybe Lance Armstrong, an Arkansan, has won the 2003 Tour de France.
- e. ? Has Lance Armstrong, an Arkansan, won the 2003 Tour de France?
- f. CI-content (a-e): Lance Armstrong is an Arkansan.

(39) illustrates that the CI-content of (39a) passes ‘the family of sentences’ test (Chierchia and McConnell-Ginet (2000)), which is a test for projection. Accordingly, the CI-content of (39f) projects through negation (39b), an if-clause (39c), a possibility modal (39d), and, if acceptable, a question (39e). Following up on the *General Projection Hypothesis* of Roberts et al. (2009), we would have to conclude that the CI-content of (39) is *not at-issue*, a conclusion which Potts (2005) in fact endorses.²

4.2 Whether *āyā* and *magè* project

Before we begin to investigate whether *āyā* and *magè* contribute projective meaning, we need to be clear about one thing: what exactly is the at-issue content of a polar question? According to Roberts (1996), questions ‘proffer’ a set of alternatives, namely, the set of possible answers to the question. *Proffered content* for Roberts (1996) is ‘what is asserted in an assertion’ and ‘the non-presupposed content of questions and commands.’ Roberts et al. (2009) employ the term ‘proffered content’ to refer to the conventionally encoded at-issue content of an expression. If ‘proffered content’ in both senses picks out the same component of an expression’s meaning, then the at-issue content of a question is arguably its set of alternative answers. Similarly, Groenendijk (2007) characterizes questions as semantic objects which *raise issues* in such a way that they pragmatically constrain the direction of the discourse. That is, the issue that a question raises constrains the set of sentences that can appropriately follow it. Accordingly, we may assume for the time being (with some reservation) that the at-issue content of a question is the set of its possible answers.³

With this assumption, we can examine whether *āyā* and *magè* questions contribute projective meaning besides raising issues.

²I am assuming that the sense of ‘at-issue’ for Potts (2005) and Roberts et al. (2009) is similar enough for our present purposes. At least it seems to be, in so far as both sources employ the term to refer to the ‘main point’ of an utterance.

³I will be revising this view later on.

4.2.1 Contrary commitment and ignorance

In order to address the question of whether *āyā*-questions and *magè*-questions contrast in their not-at-issue/projective meaning, we might ask what such meanings should be. Following up on the discussion in §2.2, I am going to assume that if *āyā* and *magè* differ in their projective meaning, then such a meaning would have to encode some version of what I have called an ‘ignorance’ implication for *āyā*-questions and a ‘contrary commitment’ implication for *magè*-questions. This generalization was made in (19), repeated below in (40).

- (40) a. Only *āyā*-questions may follow expressions of ignorance.
 b. Only *magè*-questions may follow expressions of contrary commitment.

4.2.2 Testing for projection

Now we are ready to test whether the *ignorance* implication for *āyā* and the *contrary commitment* implication for *magè* project. So far, the only tests I alluded to above for projection were ‘the family of sentences’ test. This would require that we embed *āyā* and *magè* under (i) negation, (ii) a modal, (iii) in the antecedent of a conditional, and (iv) under a question. We will see that none of these environments are going to be of any help to us, since either the construction is ungrammatical, or both interrogative morphemes will take wide-scope. That is, neither *āyā*, nor *magè* can take scope *under* any of these operators. I illustrate this in (41).

- (41) a. **āyā/magè** sārā mi-ā-d?
 Q/Q! Sara DUR-come-3SG
 ‘Is Sara coming?’
- b. **āyā/magè** sārā ne-mi-ā-d?
 Q/Q! Sara NEG-DUR-come-3SG
 ‘Is Sara not coming?’ [only Q/Q! > NEG reading is possible]
- c. **āyā/magè** shāyad sārā bi-ā-d?
 Q/Q! might Sara IRR-come-3SG
 ‘Is it possible that Sara is coming?’ [only Q/Q! > MOD reading is possible]
- d. * shāyad **āyā/magè** sārā bi-ā-d?
 might Q/Q! Sara IRR-come-3SG

- e. * agè **āyā**/**magè** sārā bi-ā-d, milād ham m-iā-d
 if Q/Q! Sara IRR-come-3SG Milād also DUR-come-3SG
 *‘If whether Sara is coming, Milād is also coming.’
- f. * āyā/magè **āyā**/**magè** sārā mi-ā-d?
 Q/Q! Q/Q! Sara DUR-come-3SG
 *‘Is whether Sara coming?’

In (41b) we see that negation cannot take scope over either *āyā* or *magè*.⁴ (41c) shows that a modal occurring in an interrogative can only be interpreted within the semantic scope of the interrogative, and (41d) shows that the modal cannot precede the interrogative morpheme. (41e) shows that an interrogative cannot occur in the antecedent of a conditional, and (41f) shows that an interrogative cannot be embedded inside another interrogative.

One thing that we could try is to see whether we can trap what we suspect is the projective meaning of the interrogative morphemes under the scope of speech act adverbials (Krifka (2009)). Since these meanings are not in themselves ‘interrogative’ (i.e. the ignorance or the contrary commitment implications do not in themselves constitute questions), we might ask, for example, whether a sentence-initial adverb like ‘obviously’, which cannot modify questions, might modify what we suspect are projective meanings. In (42) we see that while the speech act adverbial *vāzehan*, ‘obviously,’ can modify assertions, it cannot co-occur on either *āyā* or *magè* questions. As a result, (42) shows that the meanings under investigation cannot be trapped under the scope of a speech act modifier.⁵

⁴This is also true for cases where *magè* moves to a lower position. For example, in (i), *magè* would still take wide-scope over negation, i.e. there is no reading available where negation takes scope over *magè*.

- (i) sārā ne-mi-ā-d magè?
 Sara NEG-DUR-come-3SG Q!
 ‘Is Sara is not coming?’ [only Q! > NEG reading is possible]

⁵Of course there are speech act modifiers that readily apply to questions, e.g. *jeddi*, ‘seriously’. However, it is not clear to me how I could test this construction for projection.

- (ii) a. jeddi, **āyā** sārā mi-ā-d?
 seriously Q Sara DUR-come-3SG
 ‘Seriously, is Sara is coming?’
- b. jeddi, **magè** sārā mi-ā-d?
 seriously Q! Sara DUR-come-3SG

- (42) a. vāzehan, sārā mi-ā-d.
obviously Sara DUR-come-3SG
'Obviously, Sara is coming.'
- b. # vāzehan, **āyā** sārā mi-ā-d?
obviously Q Sara DUR-come-3SG
'Obviously, is Sara is coming?'
- c. # vāzehan, **magè** sārā mi-ā-d?
Obviously Q! Sara DUR-come-3SG
'Obviously, is Sara is coming?'

In §2, I noted that *magè* cannot be embedded. However, we saw that *āyā* can be embedded. Interestingly, when embedded under *dānestan*, 'to know', *āyā* cannot felicitously embed if the matrix subject is in first person. *āyā* can however be embedded if the matrix predicate is negated. This observation is critical to our understanding of the behaviour of *āyā*'s ignorance implication, since it shows that the ignorance implication projects.

- (43) a. # mi-dun-am **āyā** (ke) bārūn mi-ā-d.
DUR-know-1SG Q COMP rain DUR-come-3SG
'I know whether it is raining.'
- b. ne-mi-dun-am **āyā** (ke) bārūn mi-ā-d yā na.
NEG-DUR-know-1SG Q COMP rain DUR-come-3SG
'I don't know whether it is raining.'

(43) shows that the ignorance implication of *āyā* projects.⁶ Assuming the General Projection Hypothesis, we can verify that *āyā* does not contribute at-issue meaning. One way to test for at-issue meaning would be to test conversational responses that would reject

'Seriously, is Sara is coming?'

⁶I should note here that the ignorance implicature of *āyā* does not always project globally, but may be locally satisfied. For example, (i) can felicitously follow the assertion 'I know it is raining.' In such a context, *āyā* will only attribute ignorance to Sara, and not to the speaker.

- (i) sārā mixād be-dun-e **āyā** bārūn mi-ād.
Sara wants SUB-know-3SG Q rain comes
'Sara wants to know whether it is raining.'

Similar examples are discussed in Potts (2007) under the rubric of *perspective dependence*.

its content (Potts (2005)). For example, by responding ‘that’s not true’ or ‘I don’t believe you’, or by a response expressing surprise, such as ‘I didn’t know that’, we can test whether the ignorance implication is directly accessible to such reactive moves. (44) shows that neither of these moves is a felicitous response to the *āyā*-question. Had the ignorance implication of the question been at-issue, then any response that served to challenge that implication should be possible. We can therefore conclude that the ignorance implication of *āyā* is not at-issue, which confirms the General Projection Hypothesis.

- (44) a. A: **āyā** milād raft?
 Q Milād left
 ‘Did Milād leave?’
- b. # B: dūrūq na-gu!
 lie NEG-tell.IMP
 ‘Don’t lie!’
- c. # B: bāvar=et ne-mi-kon-am!
 believe=2SG-CL NEG-DUR-do-1SG
 ‘I don’t believe you!’
- d. # B: eh man ne-mi-dun-est-am!
 oh I NEG-DUR-know-PAST-1SG
 ‘Oh, I didn’t know that!’

In (45), we see the same pattern for *magè*-questions. That is, (45) shows that the contrary commitment implication of *magè* cannot be at-issue. While we have not been able to determine whether *magè* really projects, given the General Projection Hypothesis, on analogy with *āyā*, we might speculate that contrary commitment is projective. Importantly, we can conclude that contrary commitment cannot be at-issue.

- (45) a. A: **magè** milād raft?
 !Q Milād left
 ‘Did Milād leave?’
- b. # B: dūrūq na-gu!
 lie NEG-tell.IMP
 ‘Don’t lie!’
- c. # B: bāvar=et ne-mi-kon-am!
 believe=2SG-CL NEG-DUR-do-1SG

‘I don’t believe you!’

- d. # B: eh man ne-mi-dun-est-am!
 oh I NEG-DUR-know-PAST-1SG
 ‘Oh, I didn’t know that!’

4.2.3 At-issue entailment

We have already seen that the at-issue content of questions are the issues that they raise. Since *āyā* and *magè* questions seem to raise identical issues, we have concluded that they contrast in their not-at-issue meaning. We can verify this conclusion in slightly different terms. Since at-issue meanings really are at-issue *entailments* (Potts (2005)), let us verify that ‘ignorance’ and ‘contrary commitment’ are independent of at-issue entailments of interrogative *sentences* of the form *āyā* ϕ and *magè* ϕ .⁷

To test whether the ignorance and contrary commitment implications for *āyā* and *magè* are at-issue *entailments* of the interrogative sentences, we would want to see whether any sentence of the form *āyā* ϕ or *magè* ϕ also *includes* the respective meanings. This task, while perhaps puzzling in some respect, is very much the critical question at the heart of this paper. Of course, should we decide that these meanings are entailments proper of the *sentences*, then we would want to encode this meaning in our semantics. But as we saw in §3, the semantic denotation of a question simply *is* its answers. So it is not really obvious if the question of whether ignorance and contrary commitment are entailments of our interrogative sentences even makes any sense.

I am going to argue that we can make sense of this question if we make the following two assumptions. The first assumption is that interrogative entailments can be formalized in terms of inclusion of meaning. Following Groenendijk and Stokhof (1984), we can say that a question Q_1 *entails* another question Q_2 , if and only if every complete answer to Q_1 is also a complete answer to Q_2 . For example, the question in (46a) entails the question in (46b), since every proposition that counts as a complete answer to (46a) (any proposition from the set in (46c)) also counts as a complete answer to (46b) (entails one of the members

⁷I will argue below that ‘ignorance’ and ‘contrary commitment’ are *speaker-oriented entailments*. The point I want to emphasize here is that the interrogative sentences *per se* do not entail these meanings, but any speaker who uses these sentences commits to their respective speaker-oriented meanings.

of the set in (46d)), but not vice versa.⁸

- (46) a. Which country is John from?
 b. Is John from Canada?
 c. {w: John is from x in w | x is a country}
 d. {John is from Canada, John is not from Canada}

The second assumption is that beside *primary* at-issue entailments, certain lexical items also trigger *ancillary* at-issue entailments, as for example, argued for ‘but’ in Potts (2005), following Bach (1999). Potts (2005) argues that besides its primary entailment (= and), ‘but’ also has an ancillary entailment, roughly a generic (G) contrastive property between the conjuncts. The example from Bach (1999) and Potts (2005) is in (47).

- (47) a. Shaq is huge *but* he is agile.
 b. Primary entailment: **huge**(Shaq) & **agile**(Shaq)
 c. Ancillary entailment: **G** x [**huge**(x) \rightarrow \neg **agile**(x)]

Potts hesitates to call the ‘ancillary entailment of but’ a CI, since it is not necessarily speaker-oriented. Concretely, Potts (2005), argues that unlike CI expressions (discussed at greater length below), the ancillary entailment of ‘but’ embeds under propositional attitude predicates. For example, (48) does not commit Chuck to the belief that being huge is somehow in conflict with agility, though it does commit Marv to such belief. That is, given (48), Chuck could, and Marv could not believe that being huge is a good indicator of agility.

- (48) Chuck says that Marv believes that Shaq is huge but agile.

We may also inquire whether ‘ignorance’ and ‘contrary commitment’ should be thought of as ancillary at-issue entailments of *āyā* and *magè*. I would like to keep this question open for future investigation. However, given the seemingly speaker-oriented meanings of *āyā* and *magè*, I will argue below that ‘ignorance’ and ‘contrary commitment’ are part of the CI-content of these morphemes, respectively. Of course, should we decide to think of CIs as ancillary entailments, then we would lose the mutual entailment of *āyā* and *magè* questions, which, to my mind, raises interesting issues for interrogative logics.

⁸The reader will verify that, for example, as an answer to (46b), ‘John is from China’ is a felicitous answer which picks out ‘John is not from Canada’.

4.3 Characterizing the meaning of *āyā* and *magè*

As already indicated, I will argue below that Conventional Implicature (CI), in the sense of Potts (2005), is the best candidate for the class of meanings that characterize the not-at-issue meaning of *āyā* and *magè*. I will first rule out conversational implicatures and presuppositions as live options for this task, before proceeding to investigate how *āyā* and *magè* fit into the language of \mathcal{L}_{CI} (Potts (2005)).

4.3.1 Conversational implicature

Conversational implicatures are post-compositional inferences that language users draw based on cooperative norms of conversation, as famously studied by Grice (1975) and many scholars since. Crucially, these inferences are regarded to be independent of the proper, compositional meaning of utterances, but are rather meanings that highly depend either on the context, or the manner in which a linguistic utterance is constructed. As a result, conversational implicatures are said to be defeasible, since negating the implicature of an utterance does not necessarily contradict the propositional content of that utterance. That is, if a sentence S gives rise to an implicature m , then $S + \neg m$ does not lead to contradiction.

One might ask whether the option of having two particles for polar question formation in one language leads to the convention of using one particle by default in ordinary circumstances, and reserving the use of the other for particular ‘marked’ circumstances. Under this view, for example, *āyā* could be said to be the default question particle that is ordinarily used, whereas *magè* is used only if the interrogator faces a contextual conflict between what she believes to be the case, and some contextual evidence to the contrary. Therefore, one could argue, that the use of *āyā* conversationally implicates that the speaker is ignorant, since the speaker did not use the ‘stronger’ form, *magè*. While this view is for the most part very sensible, it is not supported by the data. As we have already seen *āyā* and *magè* are simply incompatible with those contexts that admit one and not the other. Had *āyā* been the default form, we would then expect *magè* only to occur in a subset of contexts that *āyā* did. But this is not the case. The two particles really just are complementary. Note also that given that conversational implicatures are defeasible inferences, had the contrast between *āyā* and *magè* been due to the choice of their use, we would expect

their not-at-issue meaning not to arise in contexts that contradicted that meaning. However, our earlier examples have already shown that *āyā*-questions are incompatible with expressions of contrary commitment, and that *magè*-questions are incompatible with expressions of ignorance. This fact alone indicates that the contrast between *āyā* and *magè* cannot be explained as a conversational implicature.

We can also show that the implication of both particles is not cancelable. That is, we need to show that neither question can be followed by the negation of its not-at-issue meaning without losing the coherence of discourse, or a sense of contradiction. This task is somewhat challenging, as it requires that the question be immediately followed by an assertion that is incompatible with the target meaning. Such a conversational move is usually unexpected with matrix polar questions. This is why a better test for conversational implicatures of questions is implicature prevention, i.e. the assertion of something that is incompatible with the target meaning prior to the question, thereby preventing it from arising. We have already seen this test in our previous examples, which militates against a conversational implicature account of ignorance and contrary commitment. However, just to show that the not-at-issue meaning of *āyā* and *magè* are not cancelable, (49) and (50) serve to illustrate this fact.

- (49) # *āyā* milād raft? (mi-dun-am ke) na-raft.
 Q Milād left dur-know-1SG COMP NEG-left
 ‘Did Milād leave? (I know that) he didn’t leave.
- (50) a. # *magè* milād na-raft? na-raft.
 !Q Milād NEG-left NEG-left
 ‘Did Milād not leave? He didn’t leave.
- b. # *magè* milād na-raft? fekr=esh-o na-kard-e būd-am age
 !Q Milād NEG-left think=3SG.CL-OBJ NEG-did-IMPERF was-1SG if
 raft.
 left
 ‘Did Milād not leave? I hadn’t thought about whether he had left.

I will return to the topic of conversational implicature in the following chapter, when we examine the contrast between positive and negative questions. For now, we should be confident that the contrast between *āyā* and *magè* cannot adequately be explained in terms

of post-compositional inferences about norms of language use, since the usual ingredients for conversational implicatures in this case seem to be hopelessly absent.

4.3.2 Presupposition

So far, I have argued that both *āyā* and *magè* contribute not-at-issue content, which, in the case of *āyā* we were able to verify is projective. We must therefore consider whether the not-at-issue content of *āyā* and *magè* should be characterized as presuppositions. While I do not have a knock-down argument that ‘ignorance’ or ‘contrary commitment’ are not presuppositions, I do not want to call these meanings presuppositions, since it is not clear to me what exactly that would mean. For example, as we saw above, presuppositions generally pass the ‘family of sentences’ test. We might then expect that if *āyā* and *magè* are presuppositional, then perhaps they should belong to a family of sentences that share their presuppositions, which seems not to be the case. Furthermore, both ignorance and contrary commitment can be informative, and need not be entailed by the Common Ground, as is generally the case with presuppositions (barring accommodation). Lastly, should the ‘presupposition’ of *āyā* and *magè* be false in a certain context, would we want to say that their denotation is ‘undefined’? As this seems to me an unpromising avenue, especially in light of the speaker-oriented meaning of *āyā* and *magè*, classifying their not-at issue content as CI’s is overwhelmingly a better fit. Therefore, I will not call ‘ignorance’ and ‘contrary commitment’ presuppositions.

4.4 CI

Potts (2005) offers two sets of criteria for identifying CIs. The first set of criteria, in (51), are based on Grice (1975), which Potts (2005) takes to be definitional.⁹

- (51) a. CIs are part of the conventional meaning of words.
 b. CIs are commitments, and thus give rise to entailments.
 c. These commitments are made by *the speaker of the utterance* ‘by virtue of the meaning of’ the words he chooses.

⁹In fact, based on this set of criteria, Potts (2005) advances the argument that Grice’s own examples of CI’s, e.g. ‘but’ and ‘therefore’, do not really qualify as CIs, since the speaker-oriented property is missing.

- d. CIs are logically and compositionally independent of what is ‘said’, i.e. independent of the at-issue entailments.

It is fairly evident from our discussion of $\bar{a}y\bar{a}$ and *magè* so far that they meet all the four requirements laid out in (51). Potts (2005) also offers a second set of identificational properties for CIs, which I reproduce in (52).

- (52)
- a. CIs are scopeless (always have widest scope).
 - b. CIs result in multidimensional content.
 - c. CIs are subject to an antibackgrounding requirement.
 - d. CIs comment upon an at-issue core.

The properties stated in (52) require some discussion. I turn to these now.

With respect to (52a), we saw that *magè* can never be embedded, and therefore always takes wide-scope. We also saw that while $\bar{a}y\bar{a}$ can embed, its meaning necessarily projects. That is, the use of $\bar{a}y\bar{a}$ necessarily commits the speaker to ignorance with respect to the proposition in its scope.

As for (52b), this clause pertains to the speaker-oriented ‘dimension’ of the CI. It essentially captures the independence of truth-conditions that sets at-issue content apart from CI-content. I will discuss below how this multidimensionality of meaning is implemented in \mathcal{L}_{CI} . Essentially, \mathcal{L}_{CI} provides two distinct logical types of propositions, at-issue content of type *a* and CI-content of type *c*. While CI-content always takes at-issue content within its scope, the meanings live in different dimensions and influence the discourse in distinct fashion.

The clause in (52c) essentially boils down to informativity. It requires that the CI-content of an utterance add something new to the discourse context. It is not clear to me that the antibackgrounding condition necessarily constrains the use of $\bar{a}y\bar{a}$ and *magè*. For example, as we have seen, a speaker can explicitly express ignorance prior to asking an $\bar{a}y\bar{a}$ -question, or precede a *magè*-question with by asserting a proposition contrary to the prejacent of the question. I will not comment on the antibackgrounding clause any further, though I acknowledge that it is a weakness for the current proposal. However, as it is not clear to me that the antibackgrounding requirement is indeed a necessary ingredient for

Potts (2005), I suppress further reference to it.¹⁰

The final clause in (52d) is essential to our analysis, as it involves the composition of the CI-trigger with the at-issue content. Crucially, CI-content is always interpreted relative to the at-issue content of the proposition the CI composes with. To repeat our example from above from Potts (2005), the nominal appositive in (53) constitutes a CI-dimension that is a comment on the at-issue content of the sentence, namely, that (falsely) ‘Lance Armstrong is an Arkansan.’ Accordingly, (53) *per se* is not a false sentence, since Lance Armstrong *has* won the 2003 Tour de France. Nevertheless, (53) commits A to the false belief that Lance is an Arkansan.

(53) A: Lance Armstrong, an Arkansan, has won the 2003 Tour de France!

As for *āyā* and *magè* questions, I am going to assume the following for the remainder of the paper. *āyā* carries the CI-content of ignorance and *magè* carries the CI-content of contrary commitment, both of which I take to be speaker commitments (i.e. speaker-oriented entailments). This is illustrated in the following examples.

- (54) a. A: **āyā** milād raft?
 Q Milād left
 ‘Did Milād leave?’
- b. At-issue content: {Milād left, Milād did not leave}
- c. CI-content: For all A knows, Milād may have left or not.
- (55) a. A: **magè** milād raft?
 Q Milād left
 ‘Did Milād leave?’
- b. At-issue content: {Milād left, Milād did not leave}
- c. CI-content: A believes Milād has not left.

For Potts (2005) CIs are part of compositional semantics. It is clear that at least for *magè*, the CI-content requires direct access to the propositional content of the question’s prejacent, *prior to* deriving the question set. This is so since *magè* reverses the polarity

¹⁰In fact, Potts (2007) argues that expressives do not have to be informative either.

of the prejacent proposition. Had this process been post-compositional, the application of *magè*'s CI-content to the question set would evidently be vacuous. Below, we inquire how CI-composition works for \mathcal{L}_{CI} .

4.4.1 CI composition: at-issue type and CI-type

I now turn to CI implementation. The language we will work with is \mathcal{L}_{CI} , which has a multidimensional semantics that distinguishes at-issue types from CI types. These types are defined in (56). The superscripts distinguish types: σ^a is an at-issue type, and τ^c is a CI type (Potts (2005), p. 55).

- (56)
- a. e^a , t^a , and s^a are basic at-issue types for \mathcal{L}_{CI} .
 - b. e^c , t^c , and s^c are basic CI type for \mathcal{L}_{CI} .
 - c. If σ and τ are at-issue types for \mathcal{L}_{CI} , then $\langle \sigma, \tau \rangle$ is an at-issue type for \mathcal{L}_{CI} .
 - d. If σ is an at-issue type for \mathcal{L}_{CI} and τ is a CI-type for \mathcal{L}_{CI} , then $\langle \sigma, \tau \rangle$ is a CI type for \mathcal{L}_{CI} .

According to (56a), at-issue types comprise entities, truth-values, and worlds. According to (56b), the basic CI type also comprise entities, truth-values and worlds. However, Potts (2005) only employs t^c as a basic type. This means that CIs are always propositional meanings. As we will see below, I will be concerned with CI functions that map at-issue propositions to CI propositions.

(56c) defines a functional at-issue type $\langle \sigma, \tau \rangle^a$ from σ^a and τ^a . (56d) defines a functional CI type $\langle \sigma, \tau \rangle^c$ from σ^a and τ^c . CIs always apply asymmetrically to at-issue meanings to produce CI meanings (at-issue meanings never apply to CI meanings). This reflects the claim that CIs are always comments upon the at-issue core. Furthermore, CI types never apply to other CI types.¹¹

(57) illustrates the general composition rule for CI application.

¹¹If more than one CI trigger is present in a sentence, each CI meaning is interpreted within its own private dimension. However, this property need not concern us for our present purposes.

$$(57) \quad \alpha^a \bullet (\beta^c(\alpha^a))^c$$

(57) shows that the at-issue interpretation of α passes up the tree to a higher node and is interpreted in the at-issue dimension. The CI-content of β applies to the at-issue interpretation of α and gets interpreted in the CI-dimension.

Our mode of composition is standard function application. The bullet \bullet is a metalogical symbol that separates independent formulae, resulting in n -ary truth values. For our present purposes, we will only look at truth-value pairs, comprising an at-issue type truth-value and a CI type truth-value. As a result, the at-issue content and CI-content are interpreted independently. This is illustrated in (58).

$$(58) \quad \llbracket \alpha^a \bullet \beta^c \rrbracket^{\mathcal{M}_{i,g}} = \langle \llbracket \alpha^a \rrbracket^{\mathcal{M}_{i,g}}, \llbracket \beta^c \rrbracket^{\mathcal{M}_{i,g}} \rangle$$

Since I will only be concerned with propositional meaning, (58) would mean that the interpretation of an at-issue proposition with a CI proposition corresponds to a truth-value pair. For example, in (58), either one of α^a or β^c could be true or false independently. As a result, the formula as a whole may result in any one of the truth-value pairs in (59).

$$(59) \quad \langle 1, 1 \rangle, \langle 1, 0 \rangle, \langle 0, 1 \rangle, \langle 0, 0 \rangle$$

With these basic tools, we can now evaluate whether we are prepared to implement our proposal.

4.4.2 The CI content of $\bar{a}y\bar{a}$ and *magè*

In (60) and (61), I tentatively propose the following at-issue and the CI-content of $\bar{a}y\bar{a}$ and *magè*, where sp is a free variable whose value is contextually identified with the speaker (adapted from Romero and Han (2004)).

$$(60) \quad \text{a. at-issue: } \llbracket \bar{a}y\bar{a} \rrbracket^w = \lambda Q_{\langle \langle s, t \rangle, t \rangle}. \{ \phi: \phi(w)=1 \ \& \ \phi \in Q \text{ or } \neg\phi \in Q \}$$

$$\text{b. CI: } \llbracket \bar{a}y\bar{a}^c \rrbracket^w = \lambda \phi_{\langle s, t \rangle} \lambda w. \exists v, v' [v, v' \in \text{Epist}_{sp}(w) \ \& \ \phi(v)=1 \ \& \ \phi(v')=0]$$

- (61) a. at-issue: $\llbracket magè^a \rrbracket^w = \lambda Q_{\langle\langle s,t \rangle, t \rangle}. \{ \phi: \phi(w)=1 \ \& \ \phi \in Q \text{ or } \neg\phi \in Q \}$
- b. CI: $\llbracket magè^c \rrbracket^w = \lambda \phi_{\langle s,t \rangle} \lambda w. \forall v \in \text{Epist}_{s,p}(w) [\phi(v)=0]$

(60a) says that the at-issue content of $\bar{a}y\bar{a}$ is that function which takes a set of propositions as its argument (i.e. the ‘proto-question’ unit-set), and returns the set containing the proposition’s true polar alternative at each world (in the spirit of Karttunen (1977)). (60b) says that the CI content of $\bar{a}y\bar{a}$ is a function that takes a proposition ϕ , and maps it onto a proposition that says that for at least one world that is epistemically accessible to the speaker, ϕ is true, and for at least one world that is epistemically accessible to the speaker ϕ is false. In other words, both ϕ -worlds and $\neg\phi$ -worlds are epistemically accessible to the speaker, i.e. the speaker does not know whether ϕ is true.

(61a) provides the identical at-issue content for $magè$ as for $\bar{a}y\bar{a}$. However, (61b) says that the CI content of $magè$ is a function that takes a proposition ϕ and returns the proposition that says for every world epistemically accessible to the speaker ϕ is false.

A last-minute hesitation

I will replace the proposal in (60) and (61) for a superior account in Chapter 6. My motivation for abandoning the proposal above is mostly driven by the weakness of the Karttunen theory to explain what I will call ‘inquisitive bias’ in Chapter 7. I must also note here that the proposal above violates Potts (2005)’s requirement that no lexical item contribute both an at-issue meaning and a CI meaning (p. 48). We will see that within the new proposal, $\bar{a}y\bar{a}$ and $magè$ will only contribute CI meaning.

I will briefly note here why I find the Karttunen theory ultimately untenable. Consider the following sentences.

- (62) a. Is John in Africa? If so, you can visit him there.
- b. # Is John not in Africa? If so, you can visit him there.

As I will argue in Chapter 7, positive and negative questions seem to contribute different propositions to the discourse record. Positive polar questions contribute a positive proposition (which serves as an antecedent to the anaphoric *so*), whereas negative polar questions contribute a negative proposition. We can verify this intuition with further examples.

- (63) a. Is Jane going? Then I'm going too.
 b. Is Mary not going? Then I'm not going either.

In (63a), *too* introduces the presupposition that someone else is going, which, in this case is Jane. In (63b), *either* introduces the presupposition that someone else is not going, which in this case is Mary. Note that both of these presuppositions are locally satisfied in these examples via the prejacent of the preceding polar question. If we assume, as Karttunen does, that the denotation of the question is the set containing the true answer to the question, then it is not clear why positive polar questions furnish a positive proposition, whereas negative polar questions furnish the negative proposition. That is, if a question denotes its true answer, then just how is it that polar questions can restrict the interpretation of a following assertion with their prejacent alone? We could counter this argument by saying that the speaker in (63a) or (63b) knows, or is at least assuming that the answer to the question is 'yes'. Accordingly, since the speaker knows the true answer to the question, the presupposition of the following assertion is accommodated. However, this argument does not hold for the examples in (64), where, there speaker could very well assume, or know that the true answer to the questions is 'no'. By the logic of the counter-argument above, we should expect the accommodation of the negative proposition also. But this is not possible. That is, positive polar questions cannot furnish a negative proposition, and (non-preposed) negative polar questions cannot furnish a positive proposition.

- (64) a. # Is Jane going? Then I'm not going either.
 b. # Is Mary not going? Then I'm going too.

The semantic account that I develop in Chapter 6 will circumvent this problem by taking the surface syntax of interrogatives much more seriously. I will argue that the at-issue content of a polar question simply *is* its prejacent. What will set questions apart from assertions will be shown to reside in their CI content. My contention will mostly be that, given our independent motivation to assume a multidimensional semantics for *āyā* and *magè* questions (and likewise for tag-questions in English), we can treat indicatives and interrogatives semantically on par, without assigning a more complex semantics to interrogatives than to indicatives. In fact, as we will see, this attitude to the semantics of indicatives and interrogatives is not new, but is already in full swing in inquisitive semantics (Groenendijk and Roelofsen (2009)).

4.5 Summary

In this chapter, I investigated the pragmatic properties of ignorance and contrary commitment, which I had shown to be part of the meaning of *āyā* and *magè* respectively. I concluded that ignorance and contrary commitment are best characterized as Conventional Implicatures, in the sense of Potts (2005). However, rather than implementing the multi-dimensional semantics of CIs within Karttunen's framework, I have deferred the complete implementation of the proposal to Chapter 6, where I will adopt the inquisitive semantics of Groenendijk and Roelofsen (2009), which I believe is better suited to the task. In the next chapter, I will take a detour through some related problems already noted for polar interrogatives in English for a deeper appreciation of the breadth of the object of our study.

Chapter 5

Negative Polar Interrogatives and Tag-Questions

The problem discussed so far for Persian is reminiscent of a cluster of related phenomena in the semantic literature on polar questions in English, some of which have attracted a fair amount of attention (negative polar questions), and others which have not received enough (tag-questions). The notable studies on the topic I will be concerned with are Ladd (1981), Gunlogson and Büring (2000), van Rooy and Safarova (2003), Romero and Han (2004), Romero (2005), and Reese and Asher (2007).

My main concern in this chapter is to introduce the English data and compare the relevant facts between polar questions in English and Persian. I will also assess each approach for its capacity to capture the cross-linguistic generalizations that the present study attempts to showcase.

5.1 Positive and negative polar questions

It is by now a common place observation that the standard approaches for the semantics of questions (e.g. Hamblin (1973), Karttunen (1977), Groenendijk and Stokhof (1984)) have nothing to say about syntactically distinct questions, if they share the same answer-set. For example, the set of questions in (65) all receive the same denotation,¹ namely, the set of

¹Let us assume that people can either be right or left handed with no possibilities for ambidexterity.

propositions in (66).²

- (65) a. Was Tchaikovsky right-handed?
 b. Was Tchaikovsky left-handed?
 c. Was Tchaikovsky not right-handed?
 d. Wasn't Tchaikovsky left-handed?
 e. Tchaikovsky was left-handed, wasn't he?
- (66) $\{\lambda w.Tchaikovsky \text{ was right-handed in } w,$
 $\lambda w.Tchaikovsky \text{ was not right-handed in } w\}$

Intuitively, however, the set of questions in (65) differ in their discourse-pragmatic behaviour, something that the semantic denotation in (66) does not capture. So long as we accept that the set of questions in (65) are semantically equivalent, the challenge is to specify as accurately as possible just how the sentences differ in their range of use. In this chapter, I will review several proposals in the literature that have attempted mostly to account for the difference between positive and negative polar questions in English, both semantically, and pragmatically. I will try to make clear that none of the existing proposals is entirely satisfactory in the sense of allowing us the appropriate generalization to understand the English data and the Persian data uniformly. As I will argue in the remainder of this thesis, we can build an appropriate *semantic* theory that assigns different meanings to the sentences in (65), and consequently, explains the behaviour of syntactically diverse interrogatives across languages. We will see that our new semantic system also makes favourable predictions that provide a solution to the problem of positive and negative polar questions discussed in this chapter.

5.1.1 Positive polar questions

Pretheoretically, and at the most basic intuitive level, positive polar questions are more neutral than negative polar questions. As an example, consider the questions in (67) as they would appear on an application form. It is evident that only the positive question in (67a) is felicitous in this environment.

²The difference in the implementation of the cited theories is immaterial at this stage, as they each endorse the interpretation in (66) in one way or another.

- (67) [On an application form]
- a. Are you married?
 - b. # Are you not married?

In Gunlogson and Büring (2000), the contrast between positive and negative polar questions is cashed out in terms of their *felicity conditions*, whereby a context is taken to impose constraints on the use of a positive or negative question. Gunlogson and Büring (2000) suggest that the felicity conditions for a positive or negative polar question are determined by the available evidence for the positive or negative *answer* in that context. Accordingly, they claim that a positive polar question $?p$ is felicitous only in contexts where there is no compelling evidence against p . They further note that while positive polar questions may occur in *neutral* contexts, the question itself is not entirely neutral.³ So for example, while a neutral context such as (68) permits either of the two polar questions in (68a) and (68b), Gunlogson and Büring (2000) show that by manipulating the context, only one of the questions can be felicitous, as illustrated in (69).

- (68) [A and B are talking long-distance on the telephone (neutral-context)]
- a. A: What's the weather like out there? Is it raining?
 - b. A: What's the weather like out there? Is it sunny?
- (69) [A enters B's windowless computer room. A is wearing a dripping wet rain-coat. (evidence for p = it is raining)]
- a. A: What's the weather like out there? Is it raining?
 - b. # A: What's the weather like out there? Is it sunny?

Gunlogson and Büring (2000) make the valuable observation that positive polar questions are not entirely neutral, although they can be used as a neutral request for information given a neutral context. However, they do not offer any explanation why this must be so. That is, what is the exact property of positive polar questions that makes them infelicitous in certain environments and not others? And how exactly do positive and negative polar questions differ, if they share the same semantics? The literature seems to be largely indifferent towards the first question, as the consensus appears to be that positive polar questions just

³A *neutral* context relative to a question $?p$ is one in which there is no evidence for or against p .

are neutral. Accordingly, the intellectual labour of accounting for the discourse behaviour of polar questions has placed its exclusive focus on negative questions, to which I now turn.

5.1.2 Negative polar questions

Negative polar questions, at least in English, are fairly complex. I will try to tease apart their complexity by showing that their behaviour is very systematic, and can be understood fairly clearly in light of our Persian data. I will briefly summarize the source for this complexity below.

Negation

The first source for the complexity of negative questions is due to negation itself. Generally speaking, negative sentences are more complex than their positive counterpart. Syntactically, this is because negative sentences involve an extra sentential operator, namely negation. Pragmatically, negative sentences are less informative than their positive counterpart, and accordingly have a more restricted range of use. Consequently, negative assertions are generally restricted to contexts where their complement has in one shape or another been anticipated, since, otherwise, they are under-informative. So, for example, as an answer to (70a), (70b) is not an informative answer, unless the addressee held the belief, or the expectation that (70c) is true, or at least highly probable. Alternatively, (70b) is informative if the only relevant piece of information in this context is whether or not, say, John is South African.

- (70) a. Where is John from?
 b. John is not from South Africa.
 c. John is from South Africa.

Horn (1989) (especially pages 45-79) outlines the rich history of the philosophical and linguistic debate respective to the exact nature of the conditions that restrict the use of negative sentences to contexts where its positive counterpart has been expected. Most notably for linguists, Horn (1989) cites Givón (1979) who went as far as to say that negative sentences *presuppose* their affirmative counterpart. I will sidestep this debate, but follow Horn (1989)'s own argument (192-203) that the positive expectation associated with the

interpretation of negative statements is a quantity implicature that arises from the under-informativity of negative statements. This is so, since negative statements eliminate the possibility of their affirmative counterpart, but do not add otherwise new information to the common ground. As a consequence, negative statements are only informative if the possibility of their positive counterpart has already been anticipated.

Negative polar questions are no exception. The general intuition regarding negative polar questions such as (71) seems to be that they are normally used in contexts where the interrogator had believed, or at least expected the likelihood of the positive response.

(71) Is John not South African?

However, speakers may use a negative question as in (72) in contexts where they held no prior expectation regarding the likelihood of the affirmative possibility. That is, the negative question in (71) may just as well be prefaced by an expression of ignorance, illustrated in (72).

(72) I don't think that any of our guests tonight are from South Africa. I am not too sure where John is from, but I think that he might be German. Though just to be sure, I'm going to ask you, **is John not South African?**

I am going to maintain that the intuition that negative questions (with low negation—i.e. not preposed) convey the sense that the interrogator had an earlier expectation of the affirmative possibility is induced in the same manner as discussed above for negative statements. That is, if the interrogator is interested in the negative possibility, and highlights this possibility with her question, then there is reason to believe that she had anticipated the affirmative possibility. However, there is nothing inherent to the grammar of low negation negative questions that requires that the interrogator hold such expectation. Therefore, so long as the negative proposition under discussion is relevant in the discourse context, a negative polar question may be used.⁴ However, as we will see below, negative questions with *preposed* (or high) negation do not behave this way. While preposed negative polar questions also give rise to the interrogator's prior belief/expectation for the affirmative possibility, this 'positive epistemic implicature' is much stronger with polar questions

⁴This explanation still leaves us in the dark why low negation negative questions are infelicitous on application forms. I defer the discussion to Chapter 7.

with preposed negation than it is for polar questions with low negation (Romero and Han (2004)). But before turning to the difference between polar questions with preposed and low negation, let us note that in Persian, negative questions with *āyā* share the same pragmatic properties as polar questions with low negation in English.

So my first generalization is going to be that negative polar questions in English with low negation behave like negative *āyā* questions in Persian. For example, as in English, negative *āyā* questions are infelicitous on application forms.

(73) [On an application form.]

a. *āyā shomā ezdevāj kardid?*

Q you marry did

‘Are you married?’

b. # *āyā shomā ezdevāj na-kardid?*

Q you marry NEG-did

‘Are you not married?’

As established above, *āyā* questions require speaker ignorance. However, just as in English, negative *āyā* questions are not quite as neutral as their positive counterpart, as illustrated in (73). Just as in English, negative *āyā* questions suggest (conversationally implicate) that the interrogator had anticipated the affirmative possibility. Concretely, any context that freely admits the negative statement in (74b) will also admit (74a).

(74) a. *āyā milād na-raft?*

Q Milād NEG-left

‘Did Milād not leave?’

b. *milād na-raft.*

Milād NEG-left

‘Milād did not leave.’

Let me reiterate the difference between *āyā* and *magè* questions on the one hand, and positive and negative *āyā* questions on the other. A felicitous use of a *magè* question requires that the interrogator hold an established belief that is the polar opposite of the question’s prejacent. That is, the interrogator asking a *magè* question is not ignorant. Rather, the interrogator holds a propositional belief that is contextually challenged and requires

confirmation of its complement. *āyā* questions by contrast, are markedly different. A felicitous use of an *āyā* question requires that the speaker be ignorant with respect to the question's prejacent. However, positive and negative *āyā* questions are not equivalent, despite speaker ignorance. Positive *āyā* questions highlight the positive possibility, whereas negative *āyā* questions highlight the negative possibility. Furthermore, given the general markedness of negation (Horn (1989)), highlighting a negative possibility is only felicitous in contexts where the positive possibility had already been anticipated. Accordingly, negative *āyā* questions, just like negative polar questions in English with low negation, suggest that the positive possibility had already been anticipated, an inference that can be explained as a conversational implicature.

Preposed negation and the inner/outer ambiguity

The second complication with negative polar questions comes from the behaviour of negative questions with preposed negation in English. Recall that in (72) above, we saw that negative questions with low negation may be used by an ignorant interrogator. In (75) below, we see that negative questions with preposed negation are incompatible with expressions of ignorance.

- (75) I don't think that any of our guests tonight are from South Africa. I am not too sure where John is from, but I think that he might be German. Though just to be sure, I'm going to ask you, # **isn't John South African?**⁵

Unlike (72), the negative question with preposed negation in (75) is impossible. I tried to argue above that the affirmative expectation associated with negative questions is a conversational implicature, which, in a context such as (72) simply does not arise. However, as we see in (75), this explanation is not possible for negative polar questions with preposed negation. There is a strong intuition that the question in (75) suggests that the speaker

⁵The judgment that negative questions with preposed negation and low negation differ strongly in their interpretation is sometimes not immediately obvious to native speakers. But the contrast is markedly distinct. To aid your judgment, note that as alternative questions, only low negation is possible. I will return to alternative questions in Chapter 7.

i. Does John not want *coffee* or *tea*? ii. *Doesn't John want *coffee* or *tea*?

believes John is South African. This intuition, however, is in conflict with the speaker's earlier remark that she suspects John is German. Hence, the infelicity of (75).

Below, I will review Romero and Han (2004), who study the problem of preposed negative polar questions in detail. As observed in Romero and Han (2004), negative polar question with preposed negation *necessarily* give rise to a non-cancelable 'positive epistemic implicature.' As such, preposed negative polar questions in English are not unlike negative *magè* questions, which also give rise to a non-cancelable positive epistemic implicature. However, before we turn to the analysis proposed in Romero and Han (2004), there is yet another twist that complicates the study of negative polar questions even further. This is the problem of so-called 'inner/outer negation reading' for preposed negative questions, first noted in Ladd (1981).

The following examples from Ladd (1981) illustrate this ambiguity. In (76), the negative question 'isn't there a vegetarian restaurant around here?' is an example of what Ladd calls 'outer negation'. Accordingly, Kathleen uses an outer negation question to confirm a positive proposition *p*: *there is a vegetarian restaurant around here*, which she believes to be true.

(76) [Kathleen and Jeff have just come from Chicago on the Greyhound bus to visit Bob in Ithaca]

Bob: You guys must be starving. You want to go get something to eat?

Kathleen: Yeah, **isn't there a vegetarian restaurant around here?** ... Moosewood, or something like that?

Bob: Gee, you've heard of Moosewood all the way out in Chicago, huh? OK, let's go there.

In (77), by contrast, Bob uses the same negative question as Kathleen's question in (76) above, with a different reading. Bob uses the question to confirm the negative proposition $\neg p$: *there isn't a vegetarian restaurant around here*, which he has inferred must be true, following Kathleen's utterance.

(77) [Bob is visiting Kathleen and Jeff in Chicago while attending CLS.]

Bob: I'd like to take you guys out to dinner while I'm here—we'd have time to go somewhere around here before the evening session tonight, don't you think?

Kathleen: I guess, but there's not really any place to go in Hyde Park.

Bob: Oh, really, **isn't there a vegetarian restaurant around here?**

Kathleen: No, about all we can get is hamburgers and souvlaki.

Ladd (1981) proposes that the difference between the ‘outer’ and the ‘inner’ negation be thought of as a matter of the scope of negation relative to some operator, the use of which must meet certain appropriateness conditions in the context. Romero and Han (2004) is the most complete study of this phenomenon, in which they flesh out Ladd (1981)’s scope approach. They argue that VERUM is the operator whose relative scope to negation derives the intended readings. I now turn to Romero and Han (2004).

5.2 The verum approach

We have already seen that positive and negative polar questions behave differently. Romero and Han (2004) show that negative polar questions with preposed negation are not equivalent to their non-preposed counterpart either. Let us review why.

- (78) [A and B are talking long-distance on the telephone. A knows nothing about the weather where B is staying. B mentions that the weather recently has been ‘co-operative.’]
- a. A: So what’s the weather like out there? Is it not raining?
 - b. # A: So what’s the weather like out there? Isn’t it raining?

In (78), we see that a preposed negative question is infelicitous, while its non-preposed counterpart is ok in the same context. The intuition that Romero and Han (2004) pursue is that preposed negative polar questions *necessarily* carry a positive epistemic implicature, whereas non-preposed negative polar questions do not. They propose that preposed negation gives rise to an epistemic operator, VERUM FOCUS, which they argue is the source of the epistemic implicature. VERUM FOCUS is a polarity focus, for which Romero and Han (2004) provide the following semantics, where x serves as a contextual variable for the speaker.

- (79) $\llbracket \text{VERUM} \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w. \forall w' \in \text{Epi}_x(w) [\forall w'' \in \text{Conv}_w(w') [p \in \text{CG}_{w''}]] =$
FOR-SURE-CG_x

According to (79), VERUM is a function that takes a propositional argument p , and at each world w , VERUM says that with respect to all the worlds conforming to the speaker's knowledge in w , her conversational goals will be met if p is added to the common ground (CG). In other words, the speaker is certain that p is true, and wants the addressee to believe it too. According to Romero and Han (2004), the semantics of VERUM is identical to the semantics for *really*. They note that VERUM also arises from focal stress on a sentence's polarity, i.e. stressed auxiliary. These observations are illustrated in (80).

- (80) a. John really drinks.
b. John DOES drink.

Thus, both sentences in (80) say that the speaker is certain that the proposition John drinks should be added to CG.

In polar questions, Romero and Han (2004) argue that VERUM can arise either by preposed negation, or, in the case of positive polar questions, by a stressed auxiliary. They note that VERUM always gives rise to an epistemic implicature of opposite polarity. These examples are in (81).

- (81) a. Doesn't John drink?
→ Positive epistemic implicature: The speaker believed or at least expected that John drinks.
b. DOES John drink? (= does John really drink?)
→ Negative epistemic implicature: The speaker believed or at least expected that John does not drink.

Using the partition theory of Groenendijk and Stokhof (1984), Romero and Han (2004) argue that polar questions with VERUM return an unbalanced partition over degrees of certainties with which a proposition should be added to CG. Concretely, a polar question with VERUM partitions worlds into those in which ϕ should be added to CG with only the highest degree of certainty in one cell, and all the worlds with lower degrees of certainty regarding ϕ in the other cell. This is shown in (82).

- (82) $\{\lambda w[\text{FOR-SURE-CG}_x \phi \text{ in } w], \lambda w[\neg\text{FOR-SURE-CG}_x \phi \text{ in } w]\}$

When VERUM operates on negation, its semantics is as in (83). Accordingly, (84) says that given what the speaker knows, her conversational goals will be met if John does not drink is added to CG.

$$(83) \quad \llbracket \text{NOT} \rrbracket = \lambda p_{\langle s,t \rangle} \lambda w. \forall w' \in \text{Epi}_x(w) [\forall w'' \in \text{Conv}_w(w') [\neg p \in \text{CG}_{w''}]] = \text{FOR-SURE-CG-NOT}_x$$

(84) John does NOT drink.

Romero and Han (2004) draw on this proposal to explain Ladd's $p/\neg p$ ambiguity in negative polar questions with preposed negation, which they argue is a scopal ambiguity that arises from the scope interaction between negation and VERUM. The outline of the argument is as follows. The 'p-reading' (Ladd's outer negation) arises when negation takes scope *over* VERUM, and the ' $\neg p$ -reading' (Ladd's inner negation) arises when negation takes scope *under* VERUM. Let us look at examples.

(85) [Kathleen is visiting Bob in Ithaca. On her last trip, Kathleen had a vegetarian lunch at Moosewood.]

Bob: Where would you like to have lunch?

Kathleen: Isn't there a vegetarian restaurant around here? Moosewood, or something? Let's go there! (p-reading: NEG \prec VERUM)

(86) [Bob is visiting Kathleen in Chicago.]

Kathleen: I wish I could match our Moosewood experience for you here in Chicago, but all we have around here is meat and souvlaki.

Bob: Oh no! Isn't there a vegetarian restaurant around here? ($\neg p$ -reading: VERUM \prec NEG)

The two readings are indeed distinct. If Bob is vegetarian, he will be fed in situation (85), but starve in (86).

The VERUM approach of Romero and Han (2004) makes a counter-intuitive prediction. Since Romero and Han (2004) use the partition theory, their analysis predicts, for example, that an affirmative response to Kathleen's question in (85) verifies that *It is certain that there is a vegetarian restaurant around here*, while a negative response only rejects that *It is certain that there is a vegetarian restaurant around here*. Intuitively, however, this is not

what an affirmative or a negative response would seem to mean. I illustrate the effect of a negative response to Kathleen's question in (85), in (87).

- (87) a. Isn't there a vegetarian restaurant around here?
 b. No, there isn't a vegetarian restaurant around here.
 c. # No, it isn't certain that there is a vegetarian restaurant around here.

Recognizing this problem, Romero (2005) suggests that VERUM should perhaps be thought of as an expressive, in the sense of e.g. Kratzer (1999). However, Romero (2005) does not sketch how the analysis might be implemented. While there is good reason to believe that preposed negative polar questions give rise to *some* form of expressive meaning, it is far from clear that the VERUM approach is fit for the task. This is so, because at its very core, the proposal rests on the the assumption that VERUM and negation engage in scope interaction. However, at least for analyses that view expressives as *speaker commitments*, such expressions are expected to take wide-scope, and by and large show extremely limited scope interactions (Kratzer (1999), Potts (2005), Potts (2007)). While the approach I will be defending in this thesis is congruent with analyzing preposed negative polar questions as contributing an 'expressive'-like component (i.e. CI content), I maintain that we will not require VERUM to complete our analysis. Furthermore, as I hope to make clear, the 'p/ \neg p ambiguity' can easily be accommodated under our new analysis, without recourse to a scopal argument.

5.3 The game-theoretic and speech-theoretic approaches

In this section, I will briefly discuss two other approaches from the literature that have attempted to explain the contrast between positive and negative questions. The first is the approach of van Rooy and Safarova (2003), who attempt to explain the contrast between positive and negative questions using game theory. As we will see, the problem with the game-theoretic approach of van Rooy and Safarova (2003) is their incorrect assumption that the grammatical distinction between preposed and low negation in polar questions is spurious. Consequently, their account fails to have anything interesting to say about *āyā* and *magè* questions.

The second approach is that of Reese and Asher (2007), who attempt to explain the contrast between preposed and non-preposed negative questions, as well as tag-questions using speech acts. As I will argue, the speech-theoretic account of Reese and Asher (2007) also faces several disadvantages in its failure to *explain* the contrast between syntactically diverse interrogatives, or make the necessary predictions about the discourse behaviour of preposed negative interrogatives or tag questions with respect to alternative questions.

5.3.1 The utility value of negative information

van Rooy and Safarova (2003) provide a game-theoretic analysis of the use of positive and negative questions, whereby they explain the difference between positive and negative polar questions in terms of the *utility value* of learning p or $\neg p$ in a particular context. They argue that the utility value of a proposition depends on its information value given a context, or the speaker's preferences or goals in that context. Accordingly, the utility value of a proposition q will be greater than that of a proposition p , $UV(q) > UV(p)$, if either one of following is true: i. the probability of q is lower than the probability of p , $P(q) < P(p)$; or ii. the speaker *prefers* q over p . That is, $UV(q/g) > UV(p/g)$, which says that the utility value of q as the goal proposition is greater than the utility value of p as the goal proposition.

van Rooy and Safarova (2003) argue that the informativity of a proposition is inversely proportional to its probability. They suggest that since for most sentences of natural language the probability of an affirmative proposition p is likely to be lower than than its negation, $\neg p$, polar questions occur by default in the positive, since the utility value of learning p will be greater than learning $\neg p$. However, since the utility value of a proposition also increases relative to a speaker's goals or preferences, in a context in which the speaker's goals are met by the negative proposition, the speaker will ask a negative question.

van Rooy and Safarova (2003) make a valuable contribution to the pragmatics of positive and negative polar questions, but they oversimplify the problem by overlooking the grammatical difference between preposed and low negation negative questions. They argue that negative questions occur in discourses where $UV(\neg q) > UV(q)$, period. However, given that the utility value of a proposition may increase either by its increased information value or else by the speaker's preference for the negative answer, their attempt at explaining

the contrast between low negation and preposed negation runs as follows. In the case of polar questions with low negation, such as (88), van Rooy and Safarova (2003) argue that the utility value of $\neg p$ is greater than that of p , since the interrogator's goals (in this case an advertisement for an investment group) will be met only if the answer is $\neg p$.

(88) Does your bank not support your investment?

For examples with preposed negation, van Rooy and Safarova (2003) argue that the utility value of the negative proposition is higher due to its 'surprisal value'. That is, the speaker already believes the positive proposition, as a consequence of which the information value of learning the negative proposition increases. Consider the example below.

(89) A: Ok, now that we're all here, let's begin to eat.

B: Let's wait for Jane. **Isn't she coming?**

Under van Rooy and Safarova (2003)'s analysis, B's question has a greater utility value in the negative, since B already believed that Jane was coming to dinner, and hence assigns a greater probability to Jane coming. Given B's belief, the utility value of learning $\neg p$, that Jane is *not* coming, is greater than p , since B would not gain any new information by learning p . Therefore, B asks the negative question in (89).

Note, however, that van Rooy and Safarova (2003)'s argument does not distinguish low negation from preposed negation entirely, since B's question in (89) works just as well with low negation, i.e. Is Jane not coming? While the decision-theoretic observations in van Rooy and Safarova (2003) contribute valuable insight to explaining the pragmatics of positive and negative polar questions, their analysis is not sufficient to explain the contrast between low negation and preposed negative polar questions at the level of grammar. It is not clear, for example, how the decision-theoretic solution sketched out in van Rooy and Safarova (2003) can explain the unavailability of alternative questions with preposed negation.

(90) * Isn't JANE coming or JOHN?

Furthermore, while van Rooy and Safarova (2003)'s approach can explain the contrast between positive and negative $\bar{a}y\bar{a}$ questions alluded to above, the approach has nothing interesting to say about the difference between $\bar{a}y\bar{a}$ and *magè* questions.

5.3.2 Two speech acts in one

Reese and Asher (2007) provide a speech-theoretic account of tag-questions and negative polar questions with preposed negation. They do so by resorting to a ‘complex speech act type,’ which they call *assertion • question*. That is, according to Reese and Asher (2007), aside from the speech act of assertion and question, there exists an intermediary, or hybrid speech act, which exhibits the properties of both speech act types. Let me point out at the outset that Reese and Asher (2007)’s observations essentially put us on the right track, in so far as they identify a class of interrogatives that pattern with both assertions and questions in their discourse behaviour. In fact, their classification also extends well to *magè* questions in Persian. However, as I hope to make clear, the analysis advocated in Reese and Asher (2007) does not go far enough, as it offers little to no explanatory power for the behaviour of sentences that fall into this classification of complex speech acts.

Sadock (1974) offers several diagnostics for distinguishing assertions and questions. One such test is the sentence-initial discourse marker, *after all*, which can only occur with assertions. Consider the following example from Reese and Asher (2007).

- (91) It’s fine if you don’t finish the article today.
- a. After all, your adviser is out of the country.
 - b. # After all, is your adviser (not) out of the country?

However, Reese and Asher (2007) note that unlike positive polar questions, tag-questions, as well as preposed negative polar questions can co-occur with *after all*.

- (92) It’s fine if you don’t finish the article today.
- a. After all, your adviser is out of the country, isn’t he?
 - b. After all, isn’t your adviser out of the country?

Before concluding that tag-questions and preposed negative polar questions are assertions, Reese and Asher (2007) also note that, unlike assertions, this class of interrogatives also pass Sadock (1974)’s diagnostics for questions. One such diagnostic is the sentence-initial imperative, *tell me*.

- (93) a. # Tell me, your advisor is out of the country.
b. Tell me, your advisor is out of the country, isn’t he?

- c. Tell me, isn't your advisor out of the country?

Based on the evidence in (92) and (93), and other similar examples, Reese and Asher (2007) conclude that tag-questions and preposed negative polar questions carry a hybrid illocutionary force.

As I noted in chapter 2, Persian *magè* questions exhibit similar properties. That is, they pattern with questions, since they can be preceded by *let me ask you a question*; but they can also pattern with assertions, as they can co-occur with the discourse particle *āxè*, which assertions can, whereas *āyā* questions cannot co-occur with. Under the analysis of Reese and Asher (2007), then, *magè* questions simply involve a complex speech act. But is this enough?

I wish to argue that while Reese and Asher (2007)'s account correctly identifies a subclass of interrogatives that have a distinct character in their discourse behaviour, their analysis offers very little explanatory power of the noted behaviour. First, it seems terribly inaccurate to say that preposed negative questions *assert* anything at all. In fact, I also wish to argue that tag-questions do not assert anything either. Secondly, it is not clear under the speech-theoretic account, why the 'assertive' content of this class of interrogatives is the polar opposite of their interrogative content. And lastly, it is also not clear, as the authors do not address this point, why this class of complex speech acts grammatically fail as alternative questions. I discuss each one of these points separately below.

According to Reese and Asher (2007), the preposed negative polar interrogative in (94a) involves the complex speech act *assert • question*, whereby the sentence *asserts p*, that Jane is coming, and questions $?¬p$, whether Jane is not coming. They assign the same complex speech act to the tag-question in (94b).

- (94) a. Isn't Jane coming?
b. Jane is coming, isn't she?

I contend, however, that neither (94a) nor (94b) *assert* anything. For example, while (96) is a felicitous objection to the assertion in (95), it would be infelicitous to object to the utterance of either sentence in (94) with (96).

- (95) Jane is coming.
(96) Don't lie! Jane isn't coming!

Conclusively, it would be a mistake to assume that either of the two sentences in (94) can be used to update the Common Ground. While both sentences *raise an issue* for a particular context, they do not *resolve* anything. Tag-questions seem to be peculiar in this sense. Syntactically, they seem to be made up of two components, an indicative-like sentence, the *anchor*, and a reduced interrogative sentence, the *tag*. Note, however, that a tag question is really just one sentence. That is, (94b) differs in both meaning and its discourse behaviour from (97).

(97) Jane is coming. Isn't she?

Intuitively, what (94b) does in a discourse is suggest the speaker's belief in the anchor, without *asserting* it. In this sense, (94b) is really just a question. On the other hand, a felicitous use of (97) at best communicates that the speaker has attempted to update the common ground with the proposition that Jane is coming, but consequently *retracts* the claim by calling it into question. Of course, Reese and Asher (2007) are aware of this. They do not claim that tag-questions involve an assertion *plus* a question. But whatever their complex speech act of simultaneous assertion and question means, we should not conclude that tag-questions assert anything. And as I argued above, the same is true for *magè* questions in Persian. They do seem to occupy an intermediate position between assertions and questions. However, *magè* questions, much like *āyā* questions, do not update CG with their content. Whatever is happening here is a delicate matter, and should be analyzed with due care.

My second objection to Reese and Asher (2007)'s analysis is that analyzing preposed negative questions and tag-questions as a complex speech act offers us no insight into why each component of the speech act should involve a proposition of opposite polarity to the other. That is, why must the assertive proposition be positive, if the interrogative proposition is negative? In so far as preposed negative questions assert anything at all, it is presumably the positive proposition that is asserted. For example, in (92b), we have a strong intuition that the speaker is communicating her expectation that the addressee's adviser is out of the country. In fact, if preceded by *after all*, (92b) cannot be used to confirm that the addressee's adviser is not out of the country. I show this in (98b).

(98) [A saw B's adviser at a nearby café in the morning. Later in the day, A says to B.]

- a. A: You have to finish your article today. After all, your adviser is not out of the country, is he?
- b. A: You have to finish your article today. # After all, isn't your adviser out of the country?

Indeed, this is another property that the sentences in Reese and Asher (2007)'s complex speech act class have in common with *magè* questions. As I have argued above, *magè* questions carry the CI content of opposite polarity to the question's prejacent. This is a serious puzzle with cross-linguistic import that requires a systematic analysis.

Lastly, I will note that the speech-theoretic analysis of Reese and Asher (2007) makes no real prediction as to why preposed negative polar questions or tag questions grammatically fail as alternative questions. This last fact is again true for both English and Persian. I will return to this issue in Chapter 7. For now, I merely illustrate the claim by example.

- (99) * John went to the BALLEt or the OPERA, didn't he?
- (100) * Didn't John go the the BALLEt or the OPERA?
- (101) * *magè* john raft BĀLLĒ yā OPERĀ?
!Q John went ballet or opera
'Did John go to the BALLEt or the OPERA?'

Under Reese and Asher (2007)'s speech-theoretic analysis, the grammatical facts in (99)-(101) remain an utter mystery. As I will show in Chapter 7, the ungrammaticality of the examples above falls out from the new analysis proposed in the next chapter.

5.3.3 Taking stock

Let us take stock of how we can relate our observations for English polar questions to *āyā* and *magè* questions in Persian. First, given that ordinary matrix polar interrogatives in English, e.g. *Is John South African, Is Jane not eating?* can occur neutrally, that is, since they are compatible with speaker ignorance, I am going to assume that they form a natural class with *āyā* questions, which I will call 'impartial' interrogatives.

On the other hand, I propose that English opposite polarity tag-questions,⁶ and preposed negative polar questions belong to the same class of interrogatives as Persian *magè* questions, which I will call ‘partial’ interrogatives. As we have already seen, neither tag-questions in English nor *magè* questions in Persian are felicitous in neutral contexts, as they unequivocally commit the speaker to a specific possibility. For English tag-questions, this possibility is overtly expressed by the anchor. In *magè* questions, this possibility is implied as a conventional implicature. Moreover, in both tag-questions and *magè* questions, the speaker commitment is the polar opposite of the content of the interrogative clause. Following my argument for *magè* questions, I propose that the anchor of tag-questions also express CI content, while the ‘at-issue’ content of the sentence is expressed by the tag. That is, since tag-questions do not *assert* their anchor, they behave very much like the appositives and parentheticals of Potts (2005). The anchor expresses a speaker-oriented entailment, without requiring that the common ground be updated with its content.

I illustrate this in (102) and (103).

- (102) a. John loves the ballet, doesn’t he?
 b. CI content: p = John loves the ballet.
 c. At-issue content: $?¬p$
- (103) a. John doesn’t love the ballet, does he?
 b. CI content: $¬p$ = John doesn’t love the ballet.
 c. At-issue content: $?p$

According to (102) and (103), tag-questions are interrogatives with the CI content of contrary commitment. That is, they raise an issue by presenting one possibility via the tag, while committing the interrogator to the opposite possibility via the anchor. In the next chapter, I will show this property of partial interrogatives is what makes their semantics *inquisitive*, as they suggest more than one possibility for updating CG.

While opposite polarity tag-questions correspond very clearly to *magè* questions, this is not as obvious for preposed negative polar questions. However, given the similarity in

⁶In English, we also find same-polarity tag-questions, e.g. John is coming, is he? which I will not be concerned with in this study. Same-polarity tag-questions are indeed distinct from opposite polarity tag-questions both in their discourse behaviour and in their intonation. Presently, I have nothing to say about same-polarity tag-questions.

the meaning and discourse behaviour of preposed negative polar questions, I am going to assume that they too belong to the class of partial interrogatives and share the same semantics as tag-questions. In this thesis, I will have nothing to say about the pragmatic contrast between tag-questions and preposed negative polar questions, since a proper treatment of this distinction cannot be investigated without a detailed examination of their prosody.

5.3.4 Summary

In this chapter, I illustrated that the contrast between the Persian interrogative morphemes *āyā* and *magè* are also pervasive in English. First I distinguished the semantic/pragmatic problem of positive and negative questions from the problem of the epistemic implicature (speaker commitment) associated with preposed negative polar questions and tag-questions. I argued that negative polar questions with low negation involve a conversational implicature of positive expectation that is triggered by the use of negation. Furthermore, I have argued that the implicature of positive expectation triggered by the use of negation in both assertions and questions should be kept distinct from the much stronger, conventionalized epistemic implicature of preposed negation in negative questions. I suggested that this behaviour of low negation negative questions is also common to negative *āyā* questions in Persian.

I also reviewed several proposals that have previously tackled these issues in the literature for English, and suggested that none of the existing accounts have identified the grammatical source of the phenomenon accurately. In the next chapter, I will propose an analysis that distinguishes ‘impartial’ interrogatives as a separate grammatical class than ‘partial’ interrogatives with distinct semantics.

Chapter 6

Multidimensional Inquisitive Semantics

In this section I propose a multidimensional inquisitive semantics that captures the distinction between ‘partial’ and ‘impartial’ polar questions as a function of their CI content (epistemic implicature). In inquisitive semantics, interrogatives and indicatives receive the same semantic type: sets of possibilities, $\langle\langle s, t \rangle, t \rangle$, called *propositions*. Our new system places a heavy load on the CI dimension, as it not only distinguishes both indicatives and interrogatives in that dimension, but also partial and impartial interrogatives.

In order to set the scene for our multidimensional inquisitive semantics, we must take a little tour through information states.

6.1 Information States

I use the term ‘information state’ to refer to the intersection of a set of propositions that represent a body of data. An information state then is a non-empty set of worlds. I employ information states to represent data that can contain as little information as an atomic proposition, or as much information as the collection of the beliefs of an individual agent. Since we will be working with Potts (2005)’s multidimensional semantics, it is helpful to superscript our information states to correspond to the type of proposition we are evaluating relative to that information state. That is, for each dimension in our semantics, namely, the at-issue dimension and the CI dimension, we evaluate each proposition relative to the available information in that dimension. Accordingly, we will say that an information state σ^a is an at-issue type, if we use σ^a to interpret an at-issue proposition of type a . And we

will call an information state σ^c a CI type, if we use σ^c to evaluate a CI proposition of type c . This distinction is only necessary to help us keep track of the dimension where we interpret a proposition. Information states themselves are not typed.

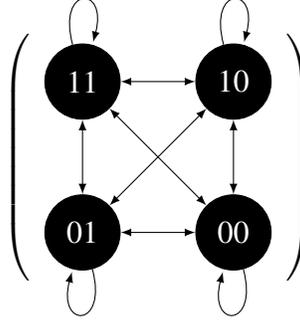
Information states are sets of worlds that concern the interpretation of a proposition in a particular discourse. As we will see, since CI propositions are speaker-oriented commitments, CI states represent the information state of the speaker. Aside from the multidimensional component, my use of an information state corresponds directly to information states used in inquisitive semantics, where they are used as models to represent the content of the common ground (Groenendijk and Roelofsen (2009), Mascarenhas (2009)). In this study, I will assume that the common ground can be derived as a subset of the union of the information states of the conversational participants, though I will leave the exact formulation of this idea for another occasion.

The state ζ_A represents agent A's information state. It is best not to think of ζ_A as A's 'knowledge state', since knowledge states require reference to a separate privileged matrix of 'facts' (the set of all true propositions). Rather, it would be better to think of ζ_A as A's *belief state*. That is, if $\zeta_A \subseteq \varphi$, then A believes φ . This would mean that for A to believe φ , it should be the case that every world epistemically accessible to A is a φ -world.¹

Let us say that if A's information state includes at least one φ -world, then, for all A knows, φ could be true. Furthermore, if A's information state also includes at least one $\neg\varphi$ -world, then, for all A knows, $\neg\varphi$ may be true. If A's information state includes both φ and $\neg\varphi$ worlds, then A is ignorant with respect to *whether* φ . Now, if φ is not an *issue*—if A does not care *whether* φ —then A's information state is *indifferent* and *ignorant*. This state is represented in figure (6.1) (from Mascarenhas (2009)).

The matrix in figure (6.1) represents a model, which is a structured state of a set of worlds plus an indistinguishability relation over them. Each node in the matrix represents a world that is a binary valuation relative to two propositional variables, φ and ψ . The arrows define an indistinguishability relation between the worlds in the state, which is symmetric and reflexive, but not necessarily transitive. Figure (6.1) represents an agent's state of indifference and ignorance with respect to φ and ψ . That is, A cannot identify the actual

¹Once we get down to it, the information states modelled here represent worlds that the agent believes to be highly plausible (and need not believe entirely). At present, I ignore these distinctions, and leave the refinement of such states for a future occasion.

Figure 6.1: An indifferent and ignorant state for $P = \{p, q\}$

world among any one of the worlds where φ or ψ is true or false. We will say that A's information state does not *support* φ or $\neg\varphi$, and nor does it support ψ or $\neg\psi$. *Support*, represented by \models , is a relation between states and propositions, defined in Groenendijk and Roelofsen (2009) as follows.

- (104) a. $\sigma \models p$ *iff* $\forall v \in \sigma : p(v) = 1$
 b. $\sigma \models \neg\varphi$ *iff* $\forall \tau \subseteq \sigma : \tau \not\models \varphi$
 c. $\sigma \models \varphi \vee \psi$ *iff* $\sigma \models \varphi$ *or* $\sigma \models \psi$
 d. $\sigma \models \varphi \wedge \psi$ *iff* $\sigma \models \varphi$ *and* $\sigma \models \psi$
 e. $\sigma \models \varphi \rightarrow \psi$ *iff* $\forall \tau \subseteq \sigma : \text{if } \tau \models \varphi \text{ then } \tau \models \psi$

If A's information state is as in figure (6.1), then while A could distinguish the worlds from each other, since he would know the conditions under which φ and ψ are true, for all he knows and all he cares about, any one of these worlds could be the actual world. So long as two worlds w and v are connected, the difference between them is not at-issue (the agent does not care about their difference). The difference between w and v becomes an issue once they are disconnected.

Now contrast the information state in figure (6.1) with the one in figure (6.2). In figure (6.2), A has not gained any new information, but φ has become an *issue*. That is, A's information state, while still ignorant, is no longer indifferent. We represent this by disconnecting the arrows that connect the φ -worlds to the $\neg\varphi$ -worlds.

Figure (6.3) represents A's information state updated with φ . Accordingly, the state ζ_A in figure (6.3), now *supports* φ , since every world in ζ_A makes φ true.

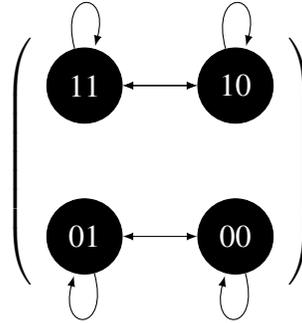


Figure 6.2: φ is an issue

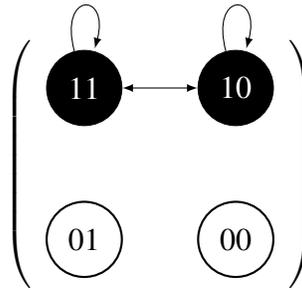


Figure 6.3: $\zeta_A[\varphi]$

This is how A’s information state gets updated upon learning φ : every world in which φ is false is disconnected and eliminated. Note also that A’s information state in figure (6.3) remains ignorant towards ψ , since the ‘live’ worlds in ζ_A are compatible with both ψ but also $\neg\psi$.

Figure (6.4) represents A’s information states updated with $\varphi \vee \psi$ and $\varphi \wedge \psi$.

Lastly, figure (6.5) shows A’s state for the disjunction between two mutually exclusive propositions, φ and ψ .

For the remainder of the paper, I will suppress the arrows, and will instead use dotted lines to circumscribe worlds that are connected to each other. The latter approach has the advantage of illustrating ‘overlapping possibilities,’ which we will employ.

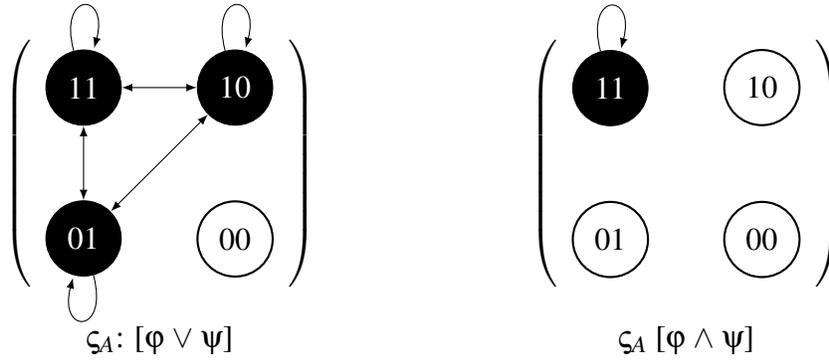


Figure 6.4: Update with disjunction and conjunction.

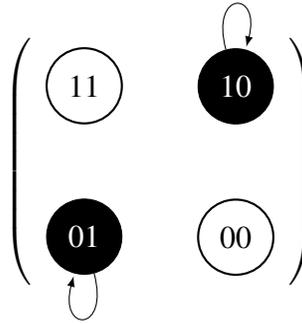


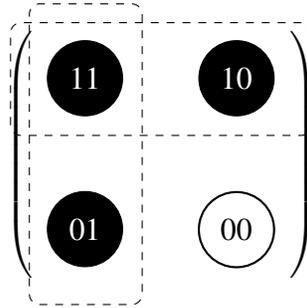
Figure 6.5: $\zeta_A [\varphi \vee \psi]$

6.1.1 Possibilities and compatibility

In inquisitive semantics, a *possibility* for φ is a maximal state that supports φ . That is, given a state σ , a possibility for φ in σ will be the largest substate ζ , such that $\zeta \subseteq \sigma$ and $\zeta \models \varphi$. The proposition φ is the set consisting of alternative possibilities for φ . That is, each possibility for φ is a state that supports φ . Figure (6.6) illustrates the possibilities for $\varphi \vee \psi$.

Let σ be the set $\{w_{11}, w_{10}, w_{01}\}$, represented in figure (6.6). We can see that $\sigma \not\models \varphi \vee \psi$, since for σ to support the disjunction, every world in σ would have to support at least one of the disjuncts. However, there are two substates of σ that do support $\varphi \vee \psi$, namely, $\zeta = \{w_{11}, w_{10}\}$, and $\tau = \{w_{11}, w_{01}\}$. σ and τ each constitute a *possibility* for $\varphi \vee \psi$ in σ .

Lastly, the *proposition* $\varphi \vee \psi$, relative to σ , is the set containing ζ and τ as members, i.e. $\varphi \vee \psi = \{\{w_{11}, w_{10}\}, \{w_{11}, w_{01}\}\}$.

Figure 6.6: Possibilities for $\varphi \vee \psi$

I introduce one more notion to inquisitive semantics, that of *compatibility*. We will say that a state σ is *compatible* with a proposition φ , written as $\sigma \sim \varphi$, if and only if at least one world in σ is a φ -world. In other words, a state σ is compatible with a proposition φ if and only if at least one substate τ of σ supports φ .

$$(105) \quad \sigma \sim \varphi \text{ iff } \exists \tau: \tau \subseteq \sigma \text{ and } \tau \models \varphi.$$

Compatibility allows us to define the \diamond -operator. We will say that a state σ supports $\diamond p$, if and only if sigma is compatible with p .

$$(106) \quad \sigma \models \diamond p \text{ iff } \sigma \sim p$$

6.2 Questions as proposals

In this section I discuss inquisitive semantics within the narrow confines of the problem of capturing the contrast between *āyā* and *magè*. I will mainly draw upon Groenendijk and Roelofsen (2009) for exposition, although I must note that inquisitive semantics is a vast and rapidly growing research program whose scope far exceeds the cursory treatment addressed here.²

The primary goal of inquisitive semantics is to capture the ‘interactive’ use of language in exchanging information in a dynamic setting. As such, inquisitive semantics views conversations as the process of raising and resolving issues. This process is collaborative in the sense that propositions represent *proposals* to update the common ground, which at

²I refer the ‘inquisitive’ reader to <http://sites.google.com/site/inquisitivesemantics/Home>.

each turn may denote more than one possibility for update. At each proposal turn, the addressee is given a choice to assent to one possibility among a set of alternatives to update the common ground. The update process is essentially Stalnakerian in the sense that updating the common ground involves eliminating worlds that are incompatible with the proposed proposition (Stalnaker (1978)). A proposition is *inquisitive* if and only if it consists of more than one possibility to update the common ground, and it is *informative* if it eliminates at least one world from the common ground.³

I will emphasize that in inquisitive semantics, a *proposition* refers to a set of *possibilities*, which are sets of worlds that make the proposition true. Accordingly, a possibility for φ is semantically of type $\langle s, t \rangle$, and the *proposition* φ , the set of possibilities for φ , is semantically of type $\langle \langle s, t \rangle, t \rangle$. Questions and assertions express propositions of the same type.

- (107) a. A *possibility* for φ : $\lambda w. \varphi(w) = 1$
 b. The *proposition* φ : $\{ \lambda w. \varphi(w) = 1 \}$

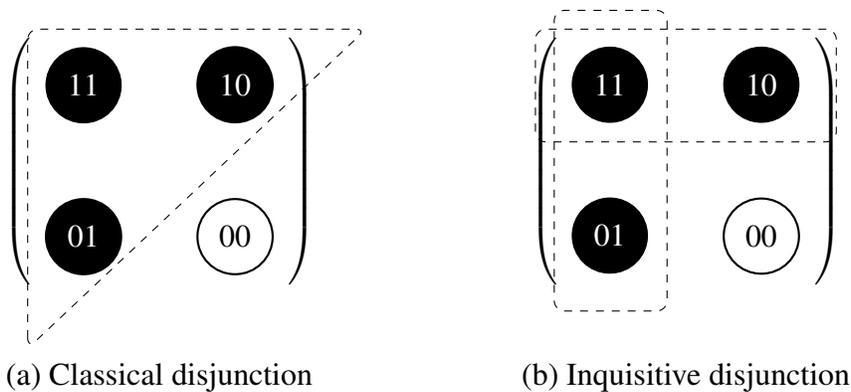


Figure 6.7: Classical and inquisitive pictures for $p \vee q$

The core innovation of inquisitive semantics is its interpretation for disjunction, represented in figure (6.7). Whereas classically a disjunctive formula of the form $p \vee q$ updates the common ground by eliminating worlds where both p and q are false, in inquisitive semantics a disjunctive formula is an inquisitive proposal with overlapping possibilities.

³For a treatment of modal *attentive* propositions, see Ciardelli et al. (2009).

Figure (6.7) represents two possibilities made up of those worlds where p is true, and those where q is true, and thereby, also proposes to eliminate worlds where p and q are both false.

As such, $p \vee q$ is a hybrid proposition that is at once inquisitive and informative. Pragmatically, disjunction offers a choice of one possibility among alternatives.

Let us note at the outset how inquisitive semantics deals with polar questions. Figure (6.8) represents the possibilities for the polar question $?\phi$, which, in inquisitive terms, is a short-hand for $\phi \vee \neg\phi$.

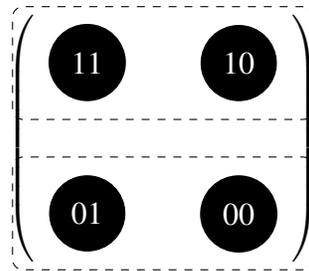


Figure 6.8: Inquisitive picture of $\phi \vee \neg\phi$

The crucial thing to notice in figure (6.8) is that polar questions do not propose to eliminate any worlds. Rather, they raise two non-overlapping possibilities for those worlds where ϕ is true, and those worlds where ϕ is false. What is striking about the syntax of inquisitive semantics is that it does not distinguish interrogatives and indicatives as separate categories. And what's more, as we saw already, inquisitive semantics is *semantically hybrid*, which means that a formula can be at once inquisitive *and* informative. This is why inquisitive semantics does not distinguish $?\phi$ from $\phi \vee \neg\phi$, since their inquisitive and informative content are equivalent: namely the two non-overlapping possibilities for ϕ and $\neg\phi$.⁴

While inquisitive semantics offers multiple avenues to expand our inquiry into the semantics of questions, let us note for the time being that at its present stage, inquisitive semantics predicts the same semantics for $\bar{a}y\bar{a}$ and $mag\grave{e}$, for the simple reason that $\bar{a}y\bar{a}$ and $mag\grave{e}$ questions both propose the same possibilities, namely, $\phi \vee \neg\phi$.

⁴In the present proposal, I will distinguish indicatives from interrogatives in their CI content without upsetting the hybrid semantics of the framework.

6.3 A multidimensional approach

In this section, I introduce a mechanism for distinguishing indicatives and interrogatives, and impartial and partial interrogatives within inquisitive semantics. As we saw above, inquisitive semantics is semantically and syntactically hybrid, which means that the framework does not distinguish the natural class of indicatives and interrogatives. As I will show below, we can maintain the hybrid semantics of the inquisitive system, without committing to a hybrid syntax, since the distinction between indicatives and interrogatives on the one hand, and impartial and partial interrogatives on the other, is a necessary ingredient of the syntax and semantics of natural languages. I implement this proposal by adopting the Logic of Conventional Implicature, \mathcal{L}_{CI} from Potts (2005), applied to inquisitive semantics. I call this new multidimensional inquisitive system, $\text{Inq-}\mathcal{L}_{CI}$.

6.3.1 An informal introduction

An informal account of the proposal is as follows. Consider the following examples from Persian.

- (108) a. *milād raft.*
 Milād left
 ‘Milād left.’
- b. *āyā milād raft?*
 Q Milād left
 ‘Did Milād leave?’
- c. *magè milād raft?*
 !Q Milād left
 ‘Did Milād leave?’ \approx ‘Milād didn’t leave, did he?’

All sentences in (108) contain the proposition p : that Milād left. According to the present proposal, every sentence of $\text{Inq-}\mathcal{L}_{CI}$ expresses two propositions, an at-issue proposition, and a CI proposition. We are going to say that p is the at-issue proposition in every sentence in (108). This does not make the sentences in (108) equivalent, however, since all the sentences in (108) differ in the CI content. Under the present account, it is enough to distinguish (108a)-(108c), solely based on their CI content. It is superfluous, and indeed

undesirable to assign different at-issue content to the sentences in (108). Accordingly, the sentences in (108) differ in their at-issue content from the sentences in (109).

- (109) a. *milād na-raft.*
 Milād NEG-left
 ‘Milād did not leave.’
- b. *āyā milād na-raft?*
 Q Milād NEG-left
 ‘Did Milād not leave?’
- c. *magè milād na-raft?*
 !Q Milād NEG-left
 ‘Didn’t Milād leave?’ \approx ‘Milād left, didn’t he?’

The at-issue content of the sentences in (109) is the negative proposition $\neg p$: that Milād did not leave.

The CI content of every sentence of $\text{Inq-}\mathcal{L}_{CI}$ is determined syntactically. Accordingly, every sentence carries a CI trigger that is semantically treated as a function from the at-issue proposition of the sentence to its CI content. In the case of indicatives, the CI content is assigned by default, in the absence of any overt trigger. In the case of impartial interrogatives, in Persian, the CI content is determined by *āyā*, whereas in English, it is determined by the syntax of the auxiliary (subject-auxiliary inversion). The CI content for partial interrogatives in Persian is determined by *magè*, and in English by preposing negation, or else the overt realization of the tag’s anchor.⁵

So just how do the CI content of indicatives, impartial and partial interrogatives differ? Here is the simple answer. Indicatives commit the speaker to their at-issue content. That is, the CI content of an indicative will always be a subset of its at-issue content. Intuitively, we want the CI content of an indicative sentence to say that the speaker believes the at-issue content of the sentence. However, given that sentences may carry multiple CI triggers, it should be sufficient to say that indicatives require that their CI content be a subset of their at-issue content. For example, consider the following sentence from Potts (2005).

- (110) I have to mow the damn lawn.

⁵I leave a more sophisticated syntactic analysis of the English processes for future research.

Potts (2005) argues that the at-issue content of (110) is just the proposition p : I have to mow the lawn. The CI content of (110), according to Potts (2005), is something like ‘the speaker feels negatively towards having to mow the lawn.’ Under the present account then, it is not sufficient to say that the CI content of indicatives is just identical to its at-issue content, since the CI content of a sentence can involve more information than the at-issue content alone. That is, the CI content of (110) is the conjunction of the proposition that the speaker has to mow the lawn, and that the speaker feels negatively towards having to mow the lawn. I will say then that any state that supports the CI content (or the conjunction thereof) of an indicative sentence is also going to support its at-issue content. This means that the speaker’s information state is going to support the at-issue content of the sentence. Accordingly, asserting an indicative commits the speaker to its at-issue content. In fact, this approach offers a way of explaining Moore paradoxical sentences, such as (111).

(111) # It is raining, but I don’t believe it.

Under the current proposal, asserting the the first conjunct of (111) commits the speaker to an information state where all the worlds in that information state are p -worlds, for p : it is raining. This is due to the default CI content for indicatives. The second conjunct of the assertion, however, contradicts the CI content of the first conjunct and commits the speaker to an information state in which all the worlds are $\neg p$ -worlds. And hence the oddness of (111).

Impartial interrogatives carry the CI content of ignorance. What this means is that the CI content for an impartial interrogative sentence S with the at-issue content p will be supported by a state that supports all the presuppositions of p , but it neither supports p nor $\neg p$. As a result, the CI content of an impartial interrogative with at-issue proposition p will be $\diamond p \ \& \ \diamond \neg p$. That is, the speaker’s information state is such that it has both p -worlds and $\neg p$ -worlds in it. This is how we will model ignorance. Note that the semantics for an impartial interrogative will be *inquisitive*, since it involves more than one possibility for updating CG. That is, even though an impartial interrogative presents the at-issue proposition p , the proposition is not supported by the speaker’s information state. In this manner, impartial interrogatives raise the issue of whether p should be added to CG. And likewise for negative impartial interrogatives. While the at-issue proposition for a negative impartial interrogative sentence S will be $\neg p$, its CI content will be $\diamond p \ \& \ \diamond \neg p$. If the speaker is

ignorant about the truth of $\neg p$, she is presenting an inquisitive proposal that will require a resolution by the addressee.

Inq- \mathcal{L}_{CI} also recognizes partial interrogatives. A partial interrogative sentence S with the at-issue proposition p , carries the CI content $\neg p$. That is, the speaker is committed to $\neg p$, but rather than asserting $\neg p$, raises the issue for whether p . Pragmatically, partial interrogatives arise from a destabilized information state, whereby the agent encounters contextual evidence that challenges her belief.⁶ It should be evident that the semantics of partial interrogatives is also inquisitive, since partial interrogatives offer more than one possibility for updating CG, namely, the at-issue content or the CI content, which are polar opposites.

6.3.2 Towards a formal account

Every sentence S of Inq- \mathcal{L}_{CI} expresses a pair of propositions $\langle p^a, q^c \rangle$, where p^a is the at-issue content of S , and q^c is the CI content of S . Syntactically, sentences of Inq- \mathcal{L}_{CI} can be indicative or interrogative, while the interrogative sentences of Inq- \mathcal{L}_{CI} will either be an impartial interrogative or a partial interrogative. Semantically, indicatives and interrogatives differ in their CI content, which is determined by a CI function $F^{CI}_{\langle stt, stt \rangle}$ determined by the syntax of the sentence. $F^{CI}_{\langle stt, stt \rangle}$ is a function that maps the at-issue proposition of the sentence to a CI proposition.

Every sentence of Inq- \mathcal{L}_{CI} is interpreted relative to a pair of states $\langle \sigma^a, \sigma^c \rangle$, where σ^a is a state that supports p^a and σ^c is a state that supports q^c . For a discourse D , if the at-issue proposition p^a of a sentence S is accepted in D , then $\bigcap CG_D$ (the context set in D) is a state σ^a , such that $\sigma^a \models p$. Furthermore, the use of every sentence S requires that the CI content of S be supported by the speaker's information state. In this sense, the CI content of every sentence S is a *speaker-oriented entailment*, since by using S , the speaker commits to its CI content. As we will see, the distinction between sentences of different types can be illustrated as the distinction between the relation of the two states σ^a and σ^c that support the pair of propositions denoted by S .

There are two types of interrogatives, 'partial' interrogatives (*magè*-questions) and 'im-

⁶Partial interrogatives are also used to make polite suggestions, reminders, etc. I leave the pragmatic analysis of partial interrogatives for another occasion.

partial' interrogatives ($\bar{a}y\bar{a}$ -questions) which only differ in their CI content. I call the CI content of a sentence that distinguishes indicatives from interrogatives, and partial interrogatives from impartial interrogatives, its *epistemic implicature*, since I take the contrast between sentences of these types to reflect the epistemic attitude of the speaker towards the at-issue content of the sentence.

We can identify three CI functions, one for each one of indicatives (IND), partial interrogatives (PAR), and impartial interrogatives (IMP), such that for each sentence type, the function maps the at-issue proposition of that sentence to a CI proposition.

- (112) a. IND: $\lambda p^a.p^c$
 b. PAR: $\lambda p^a.\neg p^c$
 c. IMP: $\lambda p^a.(\diamond p \ \& \ \diamond\neg p)^c$

According to (112), an indicative sentence S in $\text{Inq-}\mathcal{L}_{CI}$ contains a CI operator IND that maps the at-issue proposition of S to an equivalent CI proposition. As such, IND is an identity function that maps the at-issue information expressed by S to a CI proposition that expresses the same information. Note, however, that since a sentence may contain multiple CIs (in the sense of Potts (2005)), our usage condition that the speaker's information state must support the CI content of S will ensure that the speaker's information state is such that it supports the at-issue content of S, as well as any other CIs expressed by the sentence.

A partial interrogative sentence S contains the operator PAR that negates the at-issue proposition expressed by S in the CI dimension. Finally, an impartial interrogative S contains a CI operator IMP that maps the at-issue content of S and its negation to the CI dimension, each under the scope of \diamond . Effectively, the CI content of a sentence S with the at-issue proposition p^a is an ignorant information state with respect to p^a .

I summarize the three sentence types of $\text{Inq-}\mathcal{L}_{CI}$ in (113).

- (113) a. A sentence S that expresses $\langle p^a, q^c \rangle$ is *indicative*, if and only if $\forall \sigma : \sigma \models q^c \rightarrow \sigma \models p^a$. That is, a sentence S is indicative *iff* for any state σ that supports the CI content of S, σ also supports the at-issue content of S. Since the CI content of S is a speaker commitment, an indicative sentence commits the speaker to an information state that supports the at-issue content of S i.e. the speaker believes p^a .

- b. A sentence S that expresses $\langle p^a, q^c \rangle$ is a *partial* interrogative, if and only if $\forall \sigma : \sigma \models q^c \rightarrow \sigma \approx p^a$. That is, the CI content of a partial interrogative excludes all possibilities for its at-issue content. i.e. the agent believes $\neg p^a$.
- c. A sentence S that expresses $\langle p^a, q^c \rangle$ is an *impartial* interrogative, if and only if $\forall \sigma : \sigma \models q^c \rightarrow (\sigma \sim p^a \wedge \sigma \sim \neg p^a)$. That is, any state that supports the CI content of S is compatible with both the at-issue content of S and its negation, i.e. the agent is ignorant with respect to *whether* p , as she considers both p^a and $\neg p^a$ possible.

6.4 CG and the presented set

The set CG, the *common ground* (Stalnaker (1978)) is the set that contains every proposition that A and B (the conversational participants) mutually believe.

Aside from CG, we borrow the ‘presented set’ ps from Portner (2006), which is a superset of CG that contains every proposition of which A and B are mutually aware. ps represents the conversational ground where propositions are *negotiated*.⁷ ps is an intermediary set that hosts propositions prior to their absorption into CG, where propositions are evaluated by the conversational participants and will enter CG only if nobody objects. This view is in concord with the view advocated in inquisitive semantics, where propositions are treated as *proposals* to update CG (Groenendijk and Roelofsen (2009)). Concretely, if A utters S , expressing p^a –the at-issue proposition p – CG will only be updated with p if B accepts p . CG update is not a solitary task.

Since our new proposal assigns to every sentence S , an at-issue content and a CI content, sentences of different syntactic types contribute different propositions to ps . Concretely, indicatives present a pair of propositions $\langle p^a, q^c \rangle$, such that the possibilities for q^c are included in the possibilities for p^a . Partial interrogatives present a pair of propositions $\langle p^a, q^c \rangle$, such that the possibilities for p^a are the possibilities that q^c *excludes*. Lastly, impartial interrogatives present a pair of propositions $\langle p^a, q^c \rangle$, such that for any state σ that supports q^c , there exists a substate $\zeta \subseteq \sigma$, such that $\zeta \models p^a$, and there exists a substate $\tau \subseteq \sigma$ such that $\tau \models \neg p^a$.

⁷A similar idea is the *projected set* in Farkas and Bruce (2009).

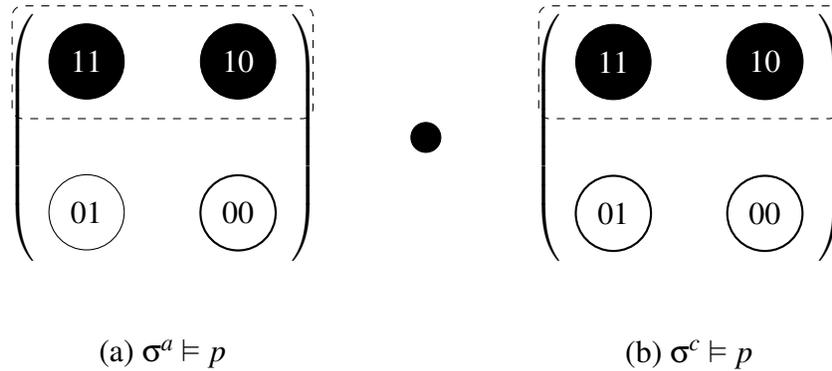


Figure 6.9: An indicative sentence with at issue proposition p .

Now onto an example. Consider an assertion p . In our semantics, assertions are accomplished via indicative sentences. Figure (6.9) represents the multidimensional picture of an assertion’s primary ingredients. The matrix on the left represent the at-issue content of S . The state that supports the at-issue content of S is superscripted with a . That is, the matrix on the left is a state that supports the at-issue content of S . One way to think about this state is to say it is what the context set would look like, if it were to be updated with p^a . That is, the at-issue content of S is a proposal to make the context set such that it is a state that supports it.

The matrix on the right represents the state that supports the CI content of S relative to its at-issue content. In the diagram, $\sigma^c \models p$ should be read as ‘the state that supports the CI content of S supports p .’ Note that we are not so much concerned with what the CI content of S is, but rather, how a state that supports the CI content of S can be viewed with respect to the at-issue content of S . In Figure (6.9), we see that the state that supports the CI content of S , also supports its at-issue content. The bullet continues to serve as a metalogical symbol to indicate the boundary across dimensions.

The indicative sentence used to make an assertion p contributes a pair of propositions to the presented set ps , such that any state that supports the CI content of S also supports its at-issue proposition. As such, the at-issue content of an indicative and its CI content propose the same alternative for update. Accordingly, CG will be updated with p if B , the hearer, accepts p .

6.4.1 *magè*-questions

Now consider the Persian partial interrogative sentence in (114).

- (114) **magè** milād raft?
 !Q Milād left
 ‘Did Milād leave?’ \approx ‘Milād didn’t leave, did he?’

(114) *presents* the at-issue proposition p^a ‘that Milād left.’ It also implicates $q^c = \neg p^a$, which is the epistemic implicature of contrary commitment. Pragmatically, the speaker had believed that Milād has *not* left, but now encounters evidence to the contrary and utters the partial interrogative in (114). Presenting the partial interrogative in (114) in *ps*, *raises* the issue for p^a , since the speaker conventionally implicates that she is committed to $\neg p$. That is, (114) is *inquisitive*, since it presents more than one possibility for update, i.e. both possibilities for p and $\neg p$. This is shown in figure (6.10).

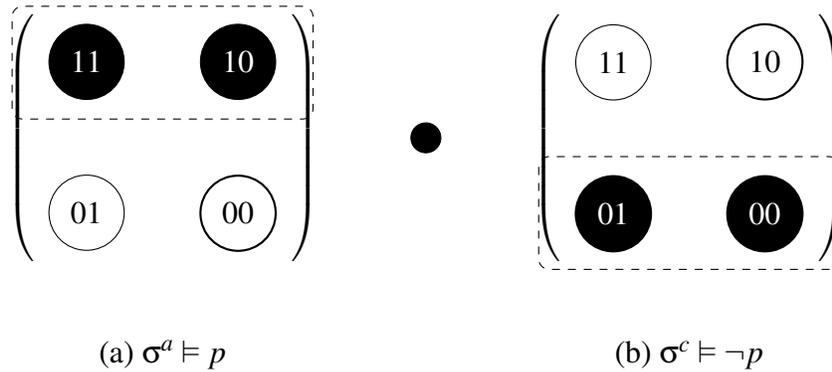


Figure 6.10: A partial interrogative sentence with at-issue proposition p^a

6.4.2 *āyā*-questions

Now consider the Persian impartial interrogative sentence in (115).

- (115) **āyā** milād raft?
 Q Milād left
 ‘Did Milād leave?’

(115) *presents* the at-issue proposition p^a ‘that Milād left.’ It also implicates q^c , a proposition that is supported by a state that is compatible with both p^a and $\neg p^a$, which is an ignorance implicature. Note that q^c does not denote an indifferent state, since p^a is at-issue. As q^c is itself inquisitive, p^a serves to highlight the possibility for p . Likewise, a negative impartial interrogative would serve to highlight the possibility for $\neg p$.

Pragmatically, an impartial interrogative presents an at-issue proposition p^a and simultaneously implicates that the speaker is ignorant whether the proposition is true. The speaker is not a reliable source for asserting p^a . As a result, impartial interrogatives are inquisitive. This is shown in figure (6.11).

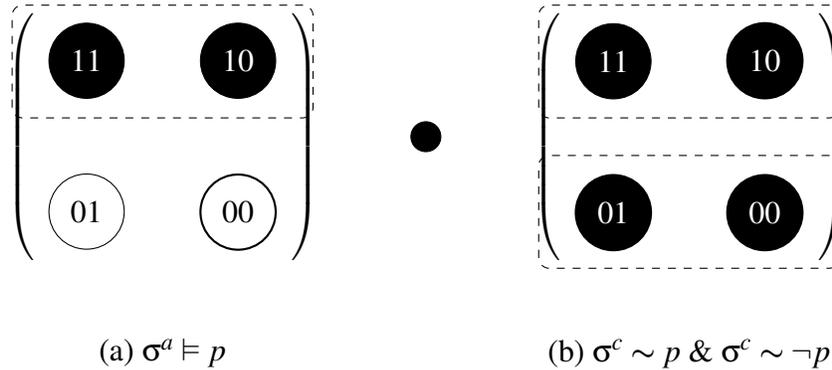


Figure 6.11: An impartial interrogative sentence with at-issue proposition p^a

6.5 Summary

In this chapter, I developed the multidimensional inquisitive semantics that forms the heart of this thesis. I showed that we can discriminate syntactically distinct sentences in inquisitive semantics, if we assume that they differ in their CI content. Accordingly, I illustrated how the semantics of impartial and partial interrogatives can be implemented in this system. In the next chapter, I will show how the present account correctly predicts the unavailability of partial interrogatives as alternative questions.

Chapter 7

Alternative Questions

In this chapter, I illustrate that partial interrogatives as a syntactic class cannot be semantically interpreted as alternative questions. I will show that this property is predicted by the multidimensional inquisitive system defended above, if we make the safe assumption that alternative questions conventionally implicate (or presuppose) that only one of the alternatives is true.

I will first discuss the difference between the yes/no reading and the alternative question reading for polar interrogatives with disjunction, and proceed to show that while the yes/no reading is available for both partial and impartial interrogatives, only impartial interrogatives allow an alternative question reading.

7.1 The yes/no reading and the alternative reading

Consider the examples below. While (116) and (117) are string-identical, the polar question in (116) is markedly distinct from the alternative question in (117), as apparent in their answer patterns. Alternative questions, which are also prosodically distinct from polar questions with disjunction, do not license a yes or no response (see e.g. Karttunen (1977)). Typographically, I will distinguish alternative questions from polar questions with disjunction by employing CAPS to mark the prosodic prominence of their focused constituents.

- (116) Did John go to the ballet or the opera?
a. Yes, he went to the ballet/ Yes, he went to both.

b. No, he decided to stay at home.

(117) Did John go to the BALLET or the OPERA?

a. He went to the ballet. (# Yes, he went to the ballet.)

b. Actually, he went to both. (# Yes, he went to both.)

c. As a matter of fact, he went to neither. He decided to stay at home.

(# No, he decided to stay at home.)

The polar question in (116) asks whether John went to either one of two places ‘the ballet’ or ‘the opera’. If John went to neither, the answer is ‘no’. Otherwise, the answer is ‘yes’.

The alternative question in (117), on the other hand, on its natural reading, queries whether it was the ballet, or whether it was the opera that John went to. Intuitively, the question elicits a response among the choice between ‘the ballet’ or ‘the opera’. If John went to both, or he went to neither, the response is likely to be slightly hedged, as in ‘well, actually both’, or ‘as a matter of fact, he went to neither.’

Aside from prosody, there are other means of distinguishing polar questions from alternative questions, such as by the discourse particle *at all* in English, which can occur on polar questions, but not on alternative questions. In (118), I show the distinction between string-identical polar questions and alternative questions, and note that only polar questions can co-occur with *at all*.

(118) a. Did John go to the ballet or the opera (at all)?

b. Did John go to the BALLET or the OPERA (# at all)?

Importantly, polar questions with disjunction appear to be structurally distinct on their yes/no reading and alternative reading. Note that the alternative reading can be disambiguated by coordinating two independent interrogative sentences with disjunction, a structure that does not have a yes/no reading, as evident by their answer patterns.

(119) a. Did John go the ballet or did John go to the opera?

b. John went to the ballet/ John went to the opera.

c. Actually he went to both/neither.

d. # yes/no.

I am going to assume that alternative questions involve ellipsis, whereby the material in the second disjunct elide under identity, as illustrated in (120) (Han and Romero (2004)).¹

(120) [Q Sara went to the ballet]_{CP} or [Q ~~Sara went to~~ the opera]_{CP}

As observed in Han and Romero (2004), negative polar interrogatives with preposed negation do not have an alternative question reading. Note that the lack of the alternative question reading is not simply due to the presence of negation, as evidenced by examples such as (122), rather it is only preposed negation which is illicit in this environment.

(121) a. Didn't John go to the ballet or the opera? [y/n-reading]
 b. * Didn't John go to the BALLET or the OPERA? [Alt-reading]

(122) Did John not go to the BALLET or the OPERA? [Alt-reading]
 ≈ Was it the BALLET or the OPERA that John *didn't* go to?

Han and Romero (2004) note that alternative questions are also unavailable with a focused auxiliary (VERUM FOCUS). They reason that since polar disjunctive questions with stressed auxiliary also fail to produce alternative question readings, then perhaps preposed negation also gives rise to VERUM FOCUS.

(123) # DID John go to the BALLET or the OPERA?

While a focus based account may be necessary to explain the unavailability of the alternative question reading for (123), I will not presently pursue this analysis for the following reasons. The first reason is that, as we saw above, the VERUM approach as presented in Romero and Han (2004) or Romero (2005) faces several non-trivial challenges in its

¹I deviate slightly from the analysis offered in Han and Romero (2004), who assume that alternative questions involve a single *wh*-phrase, Q/whether. There is evidence, however, that each disjunct involves an independent Q-phrase. In Persian, we can conjoin two interrogative sentences with *āyā* to get an alternative question.

- i. *āyā* sārā raft bālē yā *āyā* sārā raft operā?
 Q Sara went ballet or Q Sara went opera?
 'Did Sara go to the ballet or did Sara go to the opera?'

We can notice a similar effect in English embedded alternative questions.

- ii. John wants to know **whether** Sara went to the ballet or **whether** Sara went to the opera.

present treatment. Secondly, pursuing the focus based analysis for the unavailability of alternative question reading with preposed negation will not naturally carry over to the Persian examples (i.e. the unavailability of alternative question reading with *magè*, discussed below). Under such an account, one would want to say that *magè* simply is the focused counterpart of *āyā*. Presumably, we would then want to derive the epistemic implicatures of *āyā* and *magè* as a consequence of focus, an approach that seems to be misguided.

Lastly, Han and Romero (2004)'s approach is designed to explain the phenomenon under the assumption that alternative questions involve a single question operator. In the present approach, I simplify the problem by noting that our analysis must also explain the ungrammaticality of examples like (124), which I take to be equivalent to (121b).

(124) * Didn't John go to the BALLET or didn't John go to the OPERA?

I also note that tag-questions cannot have an alternative question reading, as shown in (125).

- (125) a. * John went to the BALLET or the OPERA, didn't he?
 b. * John didn't go to the BALLET or the OPERA, did he?

Neither one of the tag questions in (125) can be used as a query to determine whether it was the ballet or the opera that John did or did not go to. Under the assumption that alternative questions involve the coordination of two interrogative sentences, we can safely note that the tag-question in (126) is impossible.

(126) * John went to the ballet, didn't he or John went to the opera, didn't he?

In sum, the broad generalization that requires an explanation is that partial interrogatives with disjunction simply cannot have a semantic interpretation as alternative questions.²

²I presently cannot determine whether polar questions with a stressed auxiliary belong to the class of partial interrogatives.

7.2 Alternative questions in Persian

In Persian, *āyā* questions with disjunction can receive either a yes/no reading, or an alternative reading, which are disambiguated prosodically.³

- (127) a. **āyā** milād RAFT bāle yā operā?
 Q Milād went ballet or opera
 ‘Did Milād go to the ballet or the opera?’ [y/n-reading]
- b. **āyā** milād BĀLÈ raft yā OPERĀ?
 Q Milād went ballet or opera
 ‘Did Milād go to the BALLET or the OPERA?’ [Alt-reading]

Alternative questions can also occur in the negative. For example, the alternative question in (128) queries which one of ‘the ballet’ or ‘the opera’ John did *not* go to.

- (128) **āyā** milād BĀLÈ na-raft yā OPERĀ?
 Q Milād ballet neg-went or opera
 ‘Did Milād not go to the BALLET or the OPERA?’ [Alt-reading]

magè questions with disjunction, on the other hand, only allow a yes/no reading, and are ungrammatical as alternative questions. I illustrate this in (129) and (130) below.

- (129) a. **magè** milād RAFT bālè yā operā?
 !Q Milād went ballet or opera
 ‘Did Milād go to the ballet or the opera?’
 ≈ ‘Milād didn’t go to the ballet or the opera, did he?’ [y/n-reading]
- b. **magè** milād NA-RAFT bālè yā operā?
 !Q Milād ballet neg-went or opera
 ‘Did Milād not go to the ballet or the opera?’
 ≈ ‘Milād went to the ballet or the opera, didn’t he?’ [y/n-reading]
- (130) a. ***magè** milād BĀLÈ raft yā OPERĀ?
 !Q Milād ballet went or opera
 ‘Did Milād go to the ballet or the opera?’ [Alt-reading]

³For the yes/no reading, there is a syntactic preference for the verb to precede the disjuncts, whereas for the alternative reading, there is a preference for the verb to follow the first disjunct. I leave a proper syntactic analysis of these two constructions for a future study.

- b. * **magè** milād BĀLĒ na-raft yā OPERĀ?
 !Q Milād ballet neg-went or opera
 ‘Did Milād not go to the ballet or the opera?’ [Alt-reading]

Our job now is to explain why partial polar interrogatives do not have an alternative question reading. As I will show below, we can provide an intuitively simple and formally well-motivated explanation for this phenomenon that the present proposal can capture.

7.3 Partial interrogatives and the exclusive operator

We are now ready to see how our present system correctly predicts partial alternative questions to be ungrammatical, if we make the following assumption. Alternative questions additionally contain an exclusive operator Ξ that operates over disjunctive phrases. We can think of Ξ as a CI function that takes two disjuncts $\phi \vee \psi$ and returns the set $\{\{\phi \ \& \ \neg\psi\}, \{\neg\phi \ \& \ \psi\}\}$ (cf. Roelofsen and van Gool (2010)’s exclusive strengthening operator). That is, Ξ carries the CI content that only one of the disjuncts is true.

Before we proceed with the analysis, let us be clear about the difference between $S_1: p \vee q$, $S_2: ?(p \vee q)$, and $S_3: \Xi(?(p \vee q))$.

S_1 is an inquisitive indicative sentence, represented in figure (7.1). Note that S_1 is *informative*, since it eliminates w_{00} .

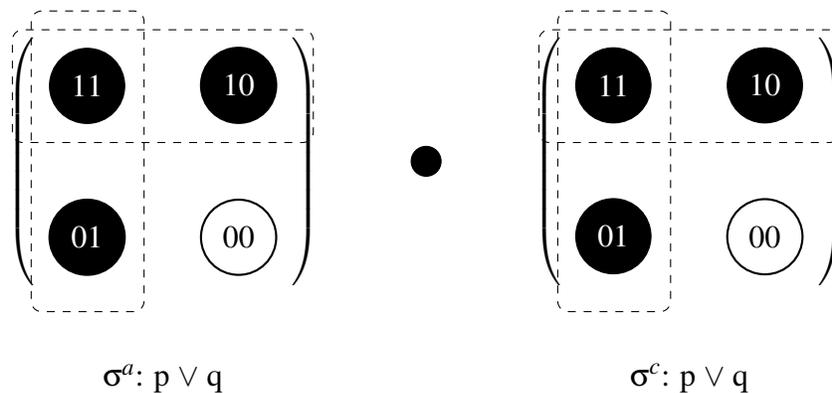


Figure 7.1: $S_1: p \vee q$

S_2 is an (impartial) interrogative sentence, represented in figure (7.2). S_2 is non-

informative, since it does not eliminate any worlds.⁴ A positive answer to S_2 confirms a possibility for $(p \vee q)$, i.e. $\{\{w_{11}, w_{10}\}, \{w_{11}, w_{01}\}\}$. A negative response to S_2 , confirms the only possibility for $\neg(p \vee q)$, i.e. $\{\{w_{00}\}\}$.

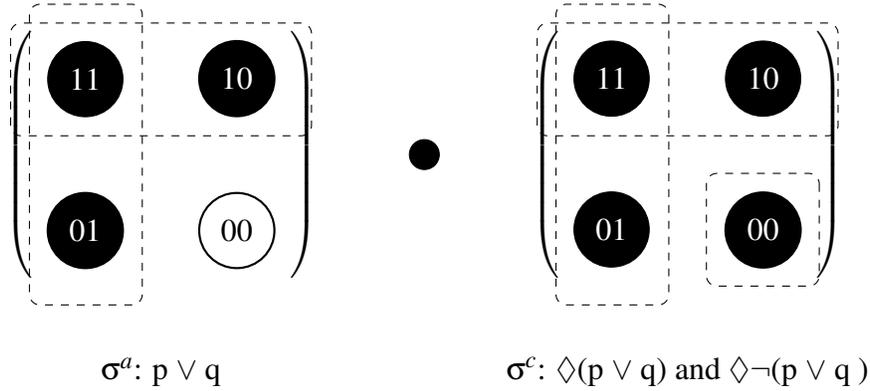


Figure 7.2: $S_2: ?(p \vee q)$

S_3 is an (impartial) alternative interrogative. The CI content of S_3 differs from that of S_2 , since S_3 is in the scope of Ξ , which is an exclusive operator. As a result, alternative interrogatives carry the CI content that one and only one of the disjuncts is true. I represent this in figure (7.3).

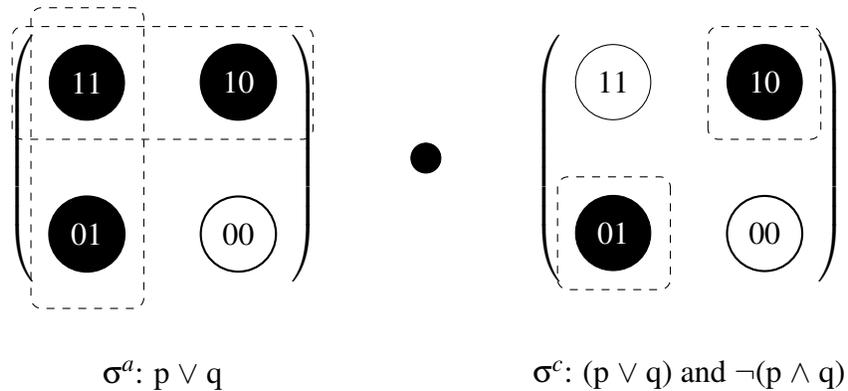


Figure 7.3: $S_3: \Xi(?(p \vee q))$

⁴The at-issue proposition of S_2 is of course, informative. However, since S_2 is an impartial polar interrogative, it does not propose to eliminate any worlds from the context set, given that it has a non-informative CI content: $\llbracket S_2 \rrbracket = \llbracket (p \vee q)^a \bullet ?(p \vee q)^c \rrbracket$.

Now let us see what happens when we place a *partial* interrogative under the scope of Ξ . We have already seen that partial alternative interrogatives are ungrammatical as alternative questions, repeated in (131), for Persian.

- (131) * **magè** milād BĀLÈ raft yā OPERĀ?
 !Q Milād ballet went or opera
 ≈ * ‘John didn’t go to the BALLET or the OPERA, did he?’

We will see that our system actually predicts (131) to be ungrammatical. Here is why. Recall that partial interrogatives map the negation of the at-issue content of a sentence to its CI dimension. This means that *magè* takes $(p \vee q)^a$ as its argument and returns $\neg(p \vee q)^c$. However, as an alternative question, Ξ operates over $\neg(p \vee q)^c$ and eliminates all the worlds where p and q have the same truth value, namely w_{00} . Given that w_{00} is the only set of worlds that confirms $\neg(p \vee q)^c$, this operation depletes the CI state of all its worlds. This is represented in figure (7.4).

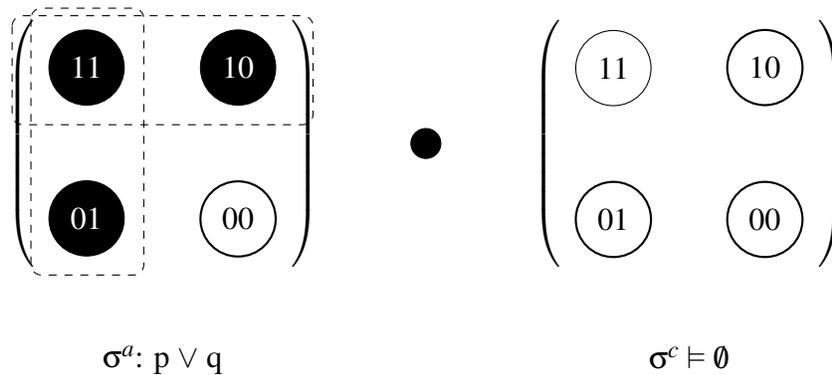


Figure 7.4: $\Xi(\text{magè}(p \vee q))$

The ungrammaticality of (131) can be accounted for when we consider that the CI content of (131) denotes $\sigma^c = \emptyset$. That is, as an alternative question, a partial interrogative commits the speaker to an absurd information state that cannot be updated. In other words, embedding a partial interrogative under the scope of Ξ ends up denoting an empty CI state.

Put differently, the exclusive implication of alternative questions requires that the speaker believe that only one of the disjuncts is true. However, since partial interrogatives commit the speaker to the CI content of the each interrogative separately, the speaker ends up

committing to φ and ψ , and but the same time commits to $\varphi \vee \psi$. Accordingly, partial interrogatives cannot receive an interpretation as alternative questions.

7.4 Summary

In this chapter, I argued that our present system correctly predicts partial interrogatives not to have an alternative question interpretation, under the assumption that alternative questions fall under the scope of the exclusive operator Ξ . This is so, since partial interrogatives commit the speaker to the CI content of both their disjuncts, φ^c and ψ^c , while simultaneously requiring that the speaker believe the conjunction of φ^c and ψ^c to be false.

Chapter 8

Inquisitive bias

This chapter discusses a favourable consequence of the analysis defended above with respect to the contrast between positive and negative polar questions, which I call *inquisitive bias*. I will argue that the discourse behaviour of positive and negative impartial interrogatives supports the view that the at-issue content of positive and negative impartial interrogatives are distinct. Accordingly, I will say that the inquisitive bias of impartial interrogatives corresponds directly to their at-issue content, namely, the interrogative's prejacent.

I will also provide a suggestion for how the present approach can handle Ladd (1981)'s inner/outer negation ambiguity, and provide a comparison to partial interrogatives in Persian. Under the present account, preposed negative interrogatives in English are special in the sense that they allow their CI content also to serve as their inquisitive bias. I will show that partial interrogatives in Persian have a similar property with respect to their prosody.

8.1 The prejacent and polarity

Let us see that aside from raising issues, impartial polar interrogatives may also be used to draw attention to certain possibilities (cf. van Rooy and Safarova (2003), Ciardelli et al. (2009) and Roelofsen and van Gool (2010)). In this respect, polar interrogatives are not unlike indicatives with a possibility modal. Consider the following examples.

- (132) a. John might be in Africa. If so, you can visit him there.
b. John might not be in Africa. If so, you can't visit him there.

- c. Is John in Africa? If so, you can visit him there.
- d. Is John not in Africa? If so, you can't visit him there.

The sentences in (132a) and (132b), which contain the possibility modal *might*, do not assert their prejacent. That is, neither sentence can be used to update CG with John's whereabouts with respect to Africa. What the sentences in (132a) and (132b) do, however, is draw attention to the possibility that John is/isn't in Africa. What is important to notice in these mini discourses is that the following *if-so*-sentences depend on the possibility highlighted by the preceding modal expression. Concretely, the anaphoric *so* refers to the possibility raised by the preceding assertion. In (132a), the positive proposition that John is in Africa, and in (132b), the negative proposition that John is not in Africa. For example, (132b) cannot mean if John *is* in Africa, you can't visit him there. The *if*-clause in (132b) restricts the interpretation of the consequent to worlds where John is *not* in Africa. Crucially, we see the exact same pattern with the examples in (132c) and (132d). That is, polar questions, much like sentences with possibility modals, can serve as a discourse antecedent to the anaphoric *so* by highlighting the possibility of their prejacent.

Note that any semantic analysis of polar questions that takes as their denotation the set of propositions that count as an answer to the question will be hard pressed to account for the set of data in (132). Under such analyses, for example, it is not altogether clear why the polar question in (132d) could serve as a positive, but not as a negative antecedent to *so*, if the denotation of the question contains both the positive and the negative propositions. This is illustrated in (133).

- (133) a. Is John in Africa? If so, you can visit him there.
 b. # Is John not in Africa? If so, you can visit him there.

I refer to the capacity of a polar question to highlight one possibility in its answer set, and not the other, its *inquisitive bias*. For impartial interrogatives, the inquisitive bias of a question is simply its at-issue proposition, namely, the question's prejacent.

Note that inquisitive bias is unique to polar questions and sentences with a possibility modal. For example, in (134), we see that assertions cannot serve merely to highlight a possibility, since they do something much stronger. They eliminate all possibilities that are incompatible with their propositional content.

- (134) a. # John is in Africa. If so, you can visit him there.
 b. # John is not in Africa. If so, you can't visit him there.

Lastly, it is worthwhile to mention that similar effects can be observed in embedded questions also. The following example is from Karttunen (1977), who notes that the example poses a difficulty for his analysis, and sets it aside. While the present account makes no claims about the semantics of embedded questions, the example is nevertheless worthy of mention.

- (135) I doubt whether they serve breakfast.

What is crucial about the embedded question in (135) is that my object of doubt is not a set of propositions, nor does it vary across worlds according to its *true answer*. The only available interpretation for (135) is that I doubt *that* they serve breakfast. That is, (135) cannot mean I doubt that they *don't* serve breakfast. However, we do not yet want to go so far as to say that the at-issue content of embedded questions just is the prejacent proposition, based on examples like (136). That is, the at-issue content of the embedded question in (136) does indeed vary across worlds. I leave a proper treatment of embedded questions such as (136) for future research.

- (136) I know whether they serve breakfast.

8.2 The inner/outer negation ambiguity

I would finally like to suggest how we could explain Ladd (1981)'s inner/outer negation ambiguity. Consider the examples below.

- (137) a. Isn't Jane going? Then I will go too.
 b. # Is Jane not going? Then I will go too.
 c. Isn't Jane going? Then I won't go either.
 d. Is Jane not going? Then I won't go either.

The examples in (137) reinforce what we have already established. (137a) and (137b) show that low negation and preposed negative polar questions differ in their discourse distribution. That is, preposed negative questions can, whereas low negation questions cannot

highlight a positive possibility. Furthermore, (137c) shows that preposed negative questions may also highlight the negative possibility. As we have seen already, the contrast between (137a) and (137c) corresponds to what Ladd (1981) calls outer and inner negation respectively. As noted by Ladd (1981), these readings can be brought out with the help of positive and negative polarity items, which may also occur inside the question itself.

- (138) a. Isn't Jane coming too?
 b. Isn't Jane coming either?

So how do we explain this contrast? I would like to suggest that preposed negative polar questions in English are ambiguous in their inquisitive bias. That is, they can either highlight their at-issue content (Ladd (1981)'s inner negation), or they may highlight their CI content (Ladd (1981)'s outer negation). In fact, it turns out that *magè* questions in Persian also share this property, which is accomplished prosodically.¹ In Persian, the final prosodic boundary on *magè* questions is employed to highlight the positive or the negative possibility. Concretely, the inquisitive bias of a rising *magè* question is the at-issue content (the prejacent), whereas the inquisitive bias of a falling *magè* question is the CI content (the polar opposite of the prejacent). This is shown in (139) and (140).

- (139) a. *magè sārā na-raft* ↑?
 !Q Sara left well
 'Didn't Sara leave?'
 b. ... *xob to-ham na-ro!*
 well you-either neg-go.IMP
 'Well, you don't leave either!'
 c. # ... *xob to-ham bo-ro!*
 well you-also dur-go.IMP
 'Well, you leave also!'

(139) illustrates that a rising negative *magè* question can only satisfy presupposition for $\neg p$, that Sara did not go. That is, the question can be continued with an imperative that presupposes $\neg p$, but not one that presupposes p .

¹Ideally, we would attribute this property to partial interrogatives in general, but the inner/outer negation distinction is not readily apparent for tag-questions. Ladd (1981) argues for a prosodic distinction between nuclear and post-nuclear tag-questions. However, whether this distinction influences the inquisitive bias of tag-questions in English, I cannot presently determine.

Conversely, as illustrated in (140) a falling negative *magè* question can only satisfy the positive presupposition p and not the negative presupposition $\neg p$.

- (140) a. *magè sārā na-raft ↓?*
 !Q Sara left well
 ‘Didn’t Sara leave?’
- b. # ... *xob to-ham na-ro!*
 well you-either neg-go.IMP
 ‘Well, you don’t leave either!’
- c. ... *xob to-ham bo-ro!*
 well you-also dur-go.IMP
 ‘Well, you leave also!’

Further experimental data is required to probe the effect of prosody on partial and impartial interrogatives more carefully. As it stands, the data presented in this chapter remains highly suggestive. I would like to conclude that once we recognize that partial and impartial interrogatives do not share the same semantics, we are better prepared to ask more pointed questions regarding their pragmatics.

8.3 Summary

In this chapter I argued that polar questions have the capacity to highlight certain possibilities in their answer set and not others, a property that I call inquisitive bias. I showed that the inquisitive bias of impartial questions is always identical to their at-issue content. I also showed that the inquisitive bias of partial interrogatives may also include their CI content. The discussion in this chapter raises interesting questions regarding cross-linguistic variation in the pragmatics of partial interrogatives, such as the effect of prosody on the inquisitive bias of partial interrogatives.

Chapter 9

Conclusion and Further Issues

This thesis has argued for a semantic distinction between two classes of natural language polar interrogatives, which I have called partial and impartial interrogatives. I showed that the distinction between these two classes of interrogatives can be formalized as a Conventional Implicature, in the sense of Potts (2005). I extended Potts (2005)'s multidimensional logic, \mathcal{L}_{CI} to inquisitive semantics (Groenendijk and Roelofsen (2009)), and developed a formal account that distinguishes three types of natural language sentences, namely, indicatives, partial interrogatives, and impartial interrogatives. I argued that for any sentence S which expresses the at-issue proposition ϕ^a , S contains a syntactic CI trigger that identifies S semantically among the class of indicatives, and partial and impartial interrogatives. Further research will determine how the present account can be extended to provide the appropriate semantics for sentences of other types, e.g. imperatives.

As a consequence, the account developed in this thesis enables us to apply the hybrid semantics of the inquisitive system to the discriminate syntax of natural languages. The present account further provides a stronger scaffolding for the investigation of interrogative pragmatics by refining the logical structure of polar interrogative sentences in such a way that what had appeared to be pragmatic problems, is now built into our semantics.

The linguistic picture that emerges from this proposal articulates novel problems at the interface of semantics, pragmatics and prosody that can be investigated experimentally. For example, the susceptibility of the inquisitive bias of partial interrogatives to prosody will require careful experimental and theoretical measures that will provide new channels of inquiry at the interface of prosody and pragmatics. I should note here that there is empir-

ical evidence that the distinction between partial and impartial interrogatives may not be unique to polar questions, but may be extended to constituent questions also. For example, as argued in Hedberg and Mameni (2010), the contrast between intonationally falling and rising constituent questions in English can be captured by appealing to partial information. There is strong empirical evidence that rising constituent questions are illicit in environments where the interrogator is entirely ignorant about the at-issue content of the question, in the sense of lacking any evidence that could help her assign a higher probability to a subset of potential answers over others. By contrast, rising constituent questions are only licit in discourse environments where the interrogator has partial information regarding the question's answer, but cannot identify the correct answer among a restricted small set of alternatives.

As an example, consider the rising and falling wh-questions in (141).

- (141) a. Who won? ↑
 b. Who won? ↓

The context is an evening after a soccer match, where the blues have played against the reds. There is a raucous cheer in the streets. Our interrogator, A, knows that the reds were playing the blues tonight, but never watched the game. Curious to hear the results, A utters (142).

- (142) I know the reds were playing the blues tonight. But tell me, who won? ↑

Meanwhile, in a nearby street corner, we witness another interrogator, C, who does not know that the reds were playing the blues. In fact, C is not a soccer fan and has no idea who was playing whom. C is nevertheless curious about the result of the game, given the enthusiasm of the crowd. In this context, while C can ask a falling constituent question, the rising variant is illicit.

- (143) a. I don't know who was playing who tonight, but tell me, who won? ↓
 b. #I don't know who was playing who tonight, but tell me, who won? ↑

Hedberg and Mameni (2010) argue that the felicity and interpretation of rising constituent questions depends exclusively on the partiality of information available to the interrogator.

I want to note here that languages are certainly sensitive to the information state of the interrogator in their interrogative grammar. While the strong view advocated in this thesis draws the distinction at the level of semantics, the semantic/pragmatic divide over the proper treatment of partial/impartial interrogatives is likely to remain a matter of debate. More research on the cross-linguistic pragmatics and prosody of partial and impartial interrogatives is required for a deeper understanding of the phenomenon.

Lastly, as the main object of the present study concerned the semantics and discourse behaviour of matrix polar questions, it remains to be seen how an adequate semantics for embedded questions can be developed within the framework of (multidimensional) inquisitive semantics.

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