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UNIFYING EMBEDDED AND UNEMBEDDED RISING DECLARATIVES VIA STRATEGY

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Abstract

Unifying Embedded and Unembedded Rising Declaratives via Strategy

by

Allison Nguyen

In this thesis, I propose unifying unembedded and embedded rising declaratives by adopting an approach that treats them as the same phenomenon.

First, I present evidence that embedded rising declaratives should be unified with their unembedded counterparts. Both embedded and unembedded rising declaratives share an intonation, as well as discourse effects. As part of unifying them, I develop a taxonomy of embedded and unembedded rising declaratives. This taxonomy breaks them into two types - one that seems to raise a question (called an *inquisitive rising declarative*), and one that seems to make an assertion (called an *assertive rising declarative*). I then explore what can and cannot embed a rising declarative, with a discussion of Simons (2007) and the predicates she discusses.

Second, I describe two previous approaches that can account for either unembedded inquisitive rising declaratives or unembedded assertive rising declaratives ([7], [2]). I also discuss two approaches that do treat unembedded inquisitive rising declaratives and assertive rising declaratives as unified phenomena ([6], [3]).

Then, I build out a theory of rising declaratives where rising declaratives are a discourse move that speakers can make when they are attempting to resolve the main issue through a series of questions, called a Strategy. As part of this, the rise in rising declaratives contributes unsettledness about

one of the questions in the Strategy. I propose a way of modeling this in the Table model.

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Rewinding it back to the very beginning - Tom Roberts: thank you for being the best Amsterdam tour guide, friend, confidante, collector of facts and gossip - we're both ridiculous and too online and I love that for us. Stephanie Rich: thank you for being stephanie rich - the world would be too sad and too small without your light. Ryan Johnson: thanks for believing that I can do anything, and for cheering me on, no matter where

in the world we exist.

It is a gift to be able to write so many sets of acknowledgements and to have so many people to thank, and I am very rich, indeed.

The real question is "what do we owe to each other?"

(*The Good Place* // season 2 episode 13)

Chapter 1

Introduction

Rising declaratives are sentences that take a declarative form (like an assertion) but can do things beyond a canonical assertion, including raising an issue and asking a question.

These rising declaratives look like falling declaratives on the surface, with the only difference between the two being the rise of the rising declarative ,(indicated in text with "?"), in general assumed to be L * H-H % ([8]).

Most literature has looked at rising declaratives of the following kind:

(1.1) A: Have you been west of the Mississippi?
B: I've been to Missouri?

Example from [12].

(1.2) *(B sees A enter the room with an umbrella)*
B: It's raining?

Example from [4].

(1.3) *(out of the blue:)*
B: This is a persimmon?

Example from [4].

In examples (1.1) to (1.2), the rising declarative can be seen to do something like raise an issue or ask a question. In (1.1), B is asking whether Missouri is an acceptable answer. In (1.2), B is asking about the weather. The last example, (1.3) has B asking an interlocutor about whether they have correctly identified the fruit.

In the above example, all the rising declaratives are unembedded. However, rising declaratives can also be embedded as a "main point" clause (such as "Niko said Lalitha speaks German?"), which I will refer to as embedded rising declaratives. In essence, rising declaratives are used when an issue has open questions remaining. The rise of the rising declarative is compatible, intuitively, with not having resolved everything - something that we might call unsettledness. This does not mean that the fall is incompatible with unsettledness, however. There are cases where both the rising declarative and falling declarative are acceptable, as in (1.4), below.

(1.4) a. A: Is John here?
B: He just texted me he's running 10 minutes late.
A: Okay, we'll wait.

b. A: Is John here?
B: He just texted me he's running 10 minutes late?
A: Okay, we'll wait.

In (1.4), both the falling declarative and rising declarative are acceptable. However, I suggest that they differ in terms of what B is contributing to the larger conversation. The falling declarative in (1.4a) can be understood as a discourse where B is simply responding to A's question, by providing evidence for an implied response (John is not here). The rising declarative in (1.4b) cannot do that. It is either a) suggesting that B is unsure of the evidence, or b) suggesting that B is unsure about something else related to A's question. One salient reading of this is that B is indicating that they are unsure if whether they should wait for John (since he is running late).

We can bring out this difference by being more explicit about context. Let's consider this example again, but in the context where A is taking attendance for an exam that has to start on time.

(1.5) A is taking attendance for an exam which starts at 3 pm promptly.

a. A: Is John here?
   B: He just texted me he's running 10 minutes late.
   A: Okay, we'll wait.

b. A: Is John here?
   B: # He just texted me he's running 10 minutes late?
   A: Okay, we'll wait.

With this time-critical example, the rising declarative in (1.5b) is not acceptable. The rising declarative has the same interpretations as in (1.4b), above, but because there cannot be a question about waiting for John, it cannot be used in this situation.

We can show a similar effect if we alter B's utterance, as in (1.6).

(1.6) A is taking attendance.

a. A: Is John here?
   B: He just texted me he's sick and not coming
   A: Okay, not here.

b. A: Is John here?
   B:# He just texted me he's sick and not coming?
   A: Okay, not here.

With this answer, where attendance is not about waiting for John, but about presence or absence, it doesn't seem like the rising declarative is acceptable. This has to be due to the rise, since the falling declarative is acceptable. Where the rise is acceptable (as in the examples previous to

this one), it is also acceptable to be answering another question besides the explicitly asked one. Where the rise is unacceptable, the explicit question has to be answered. This suggests that the rise can only be used when there's a lack of settledness about some question. The fall, however, is compatible with both settledness and lack of settledness, as shown in the three examples above.

1.1 Laying out the shape of the approach

There are multiple ways we could approach this. In many cases, the question the rise seems to raise or comment on is one that is related to the lexical content of the declarative. In unembedded cases, it is frequently the polar question form of the declarative. For example, when B utters "Lalitha speaks Ladino?", one question the rise might be commenting on is "Does Lalitha speak Ladino?".

In embedded cases, it is the polar question form of the embedded clause. These cases suggest one obvious avenue for analysis. First, let's assume that there is some rising intonation operator. This operator would start by applying to the embedded content. Here, it would apply the effects of rising intonation, and turn the embedded content into a question. However, once that is done, it's not clear how this could compose (see the discussion of [2|]) for more details). While the composition is a problem, there is an additional problem posed by rising declaratives like the ones in (1.5).

However, there are also cases where an embedded rising declarative raises or comments on a question that is not systematically related to the lexical content of the embedded clause. For example, see (1.5), above,

where the lexical content and comment do not align. This is a bigger issue for this approach.

The other approach we could pursue is to develop an account that doesn't need to have a specific scope in order to work. This is because, as we have seen, the rise always targets the maximal QUD, whether that is explicit or not. This gives rise to the "illusion of embeddedness" for what I am calling embedded rising declaratives - while these look like rising declaratives embedded under other predicates, what they really are are rising declaratives where the embedded content is the QUD. Thus, an embedded rising declarative has two components: something that the speaker commits to, to the best of their ability, and something that the speaker is indicating unsettledness about. The challenge here is unifying these with the unembedded rising declaratives. It is important to unify them - they are the same phenomena.

To handle embedded and unembedded rising declaratives in a unified way, we will adopt the idea that rising declaratives are a discourse move that speakers can make that attempts to resolve the main issue via a series of subquestions (called a *Strategy*).

Working through an example, where A says "I heard it's raining?" in response to B's question, we can see, roughly, how this will work. B has placed a question on the Table - "What's the weather?". In response, A says "it's raining?". By using this rising declarative, A is building a strategy in order to answer the question B raised. The strategy A builds has two parts: a question about whether or not it's raining, and a question about whether A is reliable about what they heard. While 8a is a little more complex, it can be handled through the use of strategies and by revising

our theory of assertions to capture the bias of the rising declarative. [1]

The organization of the paper is as follows. First, I will present data to show that embedded rising declaratives and unembedded rising declaratives should be treated as one phenomenon, including examples of intonation. Then, I will describe previous approaches that have been taken. Finally, I will argue that adopting a Strategy-based system and modifying commitment allows us to treat embedded and unembedded rising declaratives in a unified manner, and propose a way of modeling this in the Table model.

[1] This is related to [13]'s approach to rising declaratives.

Chapter 2

Background Data

2.1 Background on rising declaratives

As previously noted, rising declaratives have a rising intonation, though certain accounts have drawn distinctions between different pitch accents and different uses of rising declaratives ([6], [10]). Canonically, rising declaratives are represented using the ToBI system by L * H-H%. Contrasts between the rising declarative (a), the falling declarative (b) and the polar question (c) can be seen in (2.1)

(2.1) Tom has just arrived in the office he shares with Jack, and he's soaking wet.
   a. Jack: It's raining?
   b. Jack: It's raining.
   c. Jack: Is it raining?

In this example, (a) and (c) share a rise, and (a) and (b) share form. However, the discourse move signaled by (a), (b) and (c) are quite distinct,

suggesting that rising declaratives cannot be handled by either treating them as pure assertions or as pure questions. Rather, depending on the rising declarative, it could be functioning in a question-like manner, similar to (c), or in an assertion-like manner, similar to (b).

2.1.1 What can embed a rising declarative?

There are certain predicates that look like they embed rising declaratives, namely attitude verbs in the first and third person. The predicates rising declaratives can appear under (without receiving a quotative interpretation - see [9] for a discussion of quotative embedded RDs) are ones that express some sense that a source of evidence is needed, externally or internally.

For example, *think* and *assume* both can conjoin with a declarative, as well as predicates that share similar attributes like *suspect* and *believe*. These attitude verbs can be either first-person or third-person.

(2.2) a. I think this is a persimmon?
b. I think it's raining?
c. I assume it's raining?
d. I assume this is a persimmon?
e. I suspect it's raining?
f. I suspect this is a persimmon?

In this example, we see that rising declaratives are good embedded under *think, believe,* and *assume*. Turning to the third-person:

(2.3) a. She thinks this is a persimmon?
b. She thinks it's raining?
c. He assumes it's raining?
d. He assumes this is a persimmon?
e. They suspect it's raining?
f. They suspect this is a persimmon?

Again, the rising declarative is good embedded under the same predicates. There are some judgments where it seems that context can license some embedders for the first-person (those like *think*) but not others (embedders like *assume*). I will set these aside for now, but return to them later on.

Various properties of rising declaratives have been cataloged. One notable thing about rising declaratives is that they are less good out of the blue - namely in situations where there is no evidence for the speaker's rising declarative ([4]. Rising declaratives that look embedded under a predicate, however, don't seem to be as bad.

(2.4) A(out of the blue:)
a. *It's raining?
b. ?Tom said it's raining?

Rising declaratives have the ability to ask a biased question. Like their unembedded counterparts, the rising declaratives embedded under a predicate also show the ability to ask a biased question. (2.4) is repeated below, but with context added. Both the unembedded and the embedded rising declarative are acceptable here.

(2.5) B: What's the weather?

a. A: It's raining?

b. A: Tom said it's raining?

Here, the puzzle is that when you use a rising declarative, it is neither completely an assertion or a question. There isn't total commitment, in the same way as an assertion, and there is bias in the question, too. In 2.5, there can still be commitment to someone *saying* that it's raining, but the question about whether it's raining is still raised.

It is also true that one could question whether Tom said that it was raining, or whether I think that fruit is a persimmon. Because the rise indicates unsettledness about some issue, and it seems like the rise can target the entire utterance ("Tom said it's raining?"), inside the utterance ("is it raining?") or a QUD ("should we wait for John?"), it looks like there is flexibility about the issue that is unresolved. While I do not address it further here, it is likely that focus can help play a role in identifying what the rise is targeting.

2.1.2 More on embedders

While we've established that *think* and *said* are good embeddders, what about something like *doubt*?

Taking an IRD as our starting point, (2.6) shows that an IRD can be embedded under predicates like *think*, *assume*, and *believe*, but not under *know*, *discover*, or *doubt*.

(2.6) Jack walks into a room. Sienna:

a. I think it's raining?
b. I assume it's raining?
c. I believe it's raining?
d. *I know it's raining?
e. *I discovered it's raining?
f. *I doubt he's on the Enterprise?

The ARDs show the same pattern - good under predicates like *think*, bad under predicates like *know*.

(2.7) Tom: What fruit is this?

Ben:

a. I think Lalitha speaks Ladino?
b. I assume Lalitha speaks Ladino?
c. I believe Lalitha speaks Ladino?
d. *I know Lalitha speaks Ladino?
e. *I discovered Lalitha speaks Ladino??
f. *I doubt Lalitha speaks Ladino?

Think, *assume*, and *believe* belong to a subclass of attitude predicates that signal some level of uncertainty about the information. *Know* and the attitude predicates that indicate no uncertainty are too strong to be used to embed a rising declarative (it seems difficult to imagine questioning your own state of knowing, or having that question be a maximal QUD).

The attitude verbs that allow embedded rises correspond to those discussed by [11]. Simons observes that several attitude verbs which are not

lexically veridical (do not entail the truth of their complement) nonetheless can behave in context as though they do.

(2.8) A: Why isn't Louise coming to our meetings these days?
B:
a. Henry thinks that she left town.
b. I heard that she's left town.

Example from [11].

Simons proposes a pragmatic account of this phenomenon, relying on two components: first, that this veridical use is possible only when the embedded clause responds to the question under discussion; second, that in such cases, the embedded verb serves to provide the evidential basis for the speaker's commitment to the embedded clause. With this in mind, I suggest that the rise in an embedded rising declarative interacts with the pragmatic calculus Simons describes by having the speaker express their own lack of certainty that the evidence is reliable grounds for commitment to the embedded clause.

If this is the case, we expect that embedded rising declaratives are possible only if: a) the embedding attitude provides evidential ground for belief in the embedded clause and b) that evidential ground is potentially fallible.

With this in mind, we can appreciate why the classic Simons embedders (*think, believe, assume*) allow rising declaratives - they obey both of these properties. In contrast, dubitatives like *doubt* do not, because they do not provide grounds for belief in the embedded clause, and factives like *know* do not, because while they do provide grounds for such a belief, those

grounds are not fallible (given the factivity).

These Simons examples pose a problem for existing theories, due to the interaction between the embedders, the embedded clauses, and the rise.

2.2 A taxonomy

Historically, rising declaratives have been handled in various ways. Rising declaratives that ask a question are considered *inquisitive rising declaratives* (IRDs), which are rising declaratives that in some sense raise an issue or ask a question - they have some inquisitive flavor to them. IRDs have at most a partial commitment to p , raise p as a question, and have a bias towards p . In the example below, Jack is raising a question - "Is it raining?".

(2.9) Tom has just arrived in the office he shares with Jack, and he's soaking wet.
Jack: It's raining?

The conversation cannot move forward without Tom and Jack resolving this issue. This is what gives the inquisitive flavor to the IRDs. In addition, there is a sense of bias here - Jack has at least some belief that it is raining. If he didn't, he would use a polar question to ask ([2]). Jack is also at least partially committed to p - for example, he can't follow up "It's raining?" with "It's snowing?". An important note about this IRD is that while it might seem to be out of the blue, it is not *truly* out of the blue - there is contextual evidence for rain.

RDs that make an assertion are considered *assertive rising declaratives* (ARDs), which while able to raise an issue or ask a question, seem to be much more of an answer or an assertion. ARDs have a total commitment to p , indicate uncertainty about an issue, and have no bias towards p .

(2.10) Tom: Do you speak Spanish?
Stephanie: I speak Ladino?

In the above example, Stephanie is uncertain as to whether Ladino is a relevant Romance language, but she isn't asking whether she speaks Ladino (p = "I speak Ladino"). Rather, she's asserting it, but expressing uncertainty about it - likely the relevance.

Most accounts typically handle what we might consider the IRD cases and set aside the ARD cases (but see |7| for a treatment of ARDs and |6| and |3| for a treatment of both).

This taxonomy of *inquisitive* or *assertive* can be extended to embedded rising declaratives. As I observed earlier, these rising declaratives share distributions with their unembedded counterparts. Similarly, we can show that there are embedded rising declaratives that look like IRDs (which I will call eIRDs), and embedded rising declaratives that look like ARDs (which I will call eARDs).

Embedded ARDs, like ARDs, make an assertion as well as being able to raise an issue or ask a question.

(2.11) Tom: Who speaks a Romance language?
Stephanie: I think Jack speaks Ladino?

In the above example, Stephanie is making an assertion (that she thinks Jack speaks Ladino), but like the unembedded version above, is expressing uncertainty about an issue related to this sentence (again, likely whether or not Ladino is a relevant Romance language.)

In the following example, like the unembedded IRDs, the embedded IRD raises the issue of whether or not it is raining.

(2.12)Stephanie: I think it's raining?

This taxonomy will be refined as we build out our theory, but for now, note that there are currently four different types of rising declarative that we must try to handle in a unified way - assertive rising declaratives, inquisitive rising declaratives, and their embedded counterparts.

Inquisitive Rising Declaratives

The most widely examined type of rising declarative is the "inquisitive" rising declarative (IRD). These IRDS in some sense raise an issue or ask a question - they have some inquisitive flavor to them.

All out of the blue cases of rising declaratives are IRDs. Additionally, some rising declaratives that are used as a response to an assertion can be IRDs, as in the example below.

In (2.13), Ben is genuinely asking in some sense whether John has a sister - the issue of whether John has a sister is now something that needs to be resolved by Tom at some point in the dialogue.

(2.13) Tom: John went to the airport to pick up his sister.
Ben: John has a sister?

Example from [6]

IRDs also have, at most, a partial commitment to the expressed proposition. Ben cannot commit to John having a sister - he has indicated as much by using the rising declarative form.

Though the speaker has at most partial commitment to the expressed proposition, they are biased towards the expressed proposition. Ben is biased towards John having a sister.

Thus, IRDS have at most a partial commitment to p , raise p as a question, and have a bias towards p .

Assertive Rising Declaratives

RDs that make an assertion are considered ARDs, which while able to raise an issue or ask a question, seem to be much more of an answer or an assertion. ARDs have a total commitment to p , indicate uncertainty about an issue, and have no bias towards p . Most accounts typically handle what we might consider the IRD cases and set aside the ARD cases (but see [7] for a treatment of ARDs and [6] for a treatment of both).

In (2.14), Ben is asserting that they speak Ladino - they are not raising a question about whether or not they speak Ladino. Thus, the rising declarative is asserting "I speak Ladino", and the rise is signaling something else. What the rise is signaling is up for debate - it could be signaling a maxim violation ([14]), some sort of metalinguistic issue ([7], [6]), or something else.

(2.14) Tom: Do you speak a Romance language?
Ben: I speak Ladino?

([5])

Ben has total commitment to "I speak Ladino" - he is the expert in what languages he speaks.

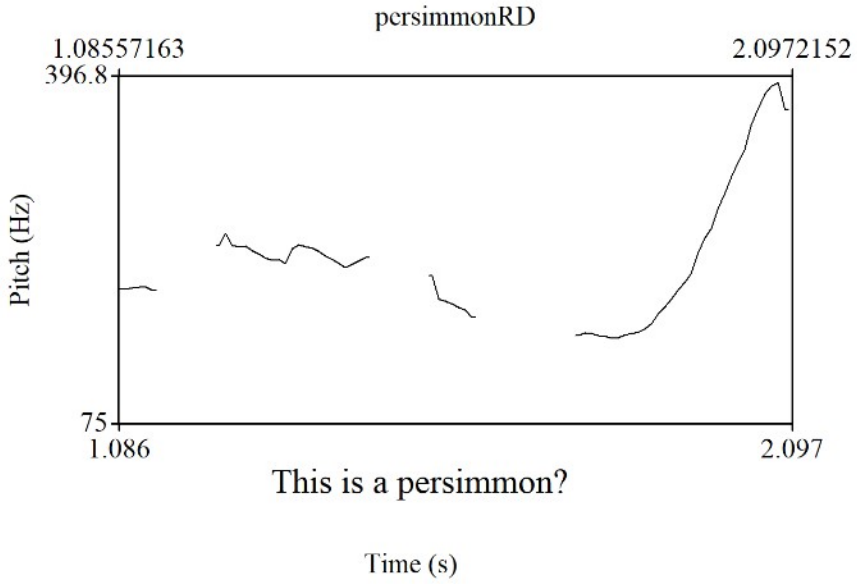
2.3 Intonation of rising declaratives

Rising declaratives are given the pitch contour corresponding to L * H-H %.

(2.15) This is a persimmon?

This example can be listened to here.

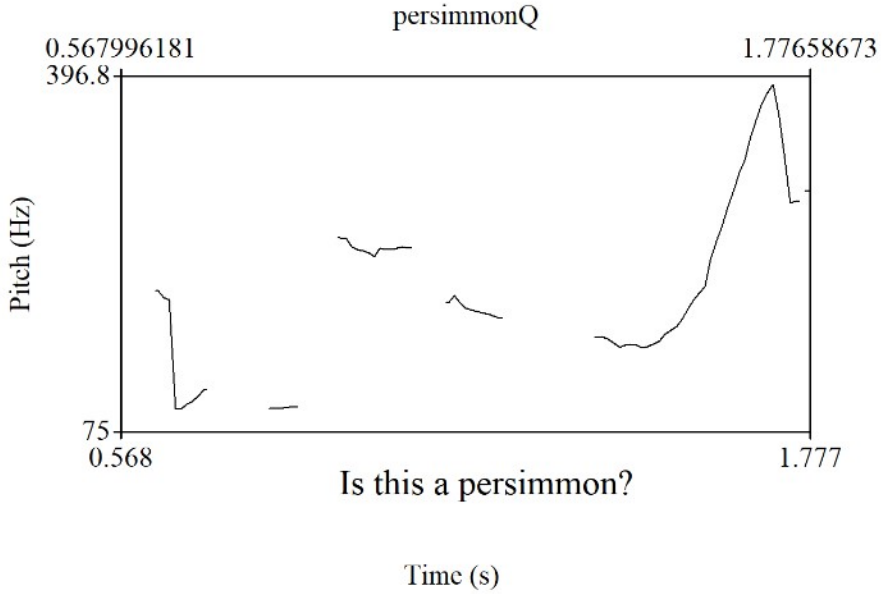
Figure 2.1: Pitch contour for the rising declarative in (2.15)



This is similar to the pitch contour assigned to polar questions. This example can be listened to here.

(2.16) Is this a persimmon?

Figure 2.2: Pitch contour for the rising declarative in (2.16)



Embedded rising declaratives (ERDs) share the same intonation as their unembedded counterparts. Contrast (a) and (b) in the example below.

(2.17) Kira walks into a room. Ezri:

a. It's raining?

b. I think it's raining?

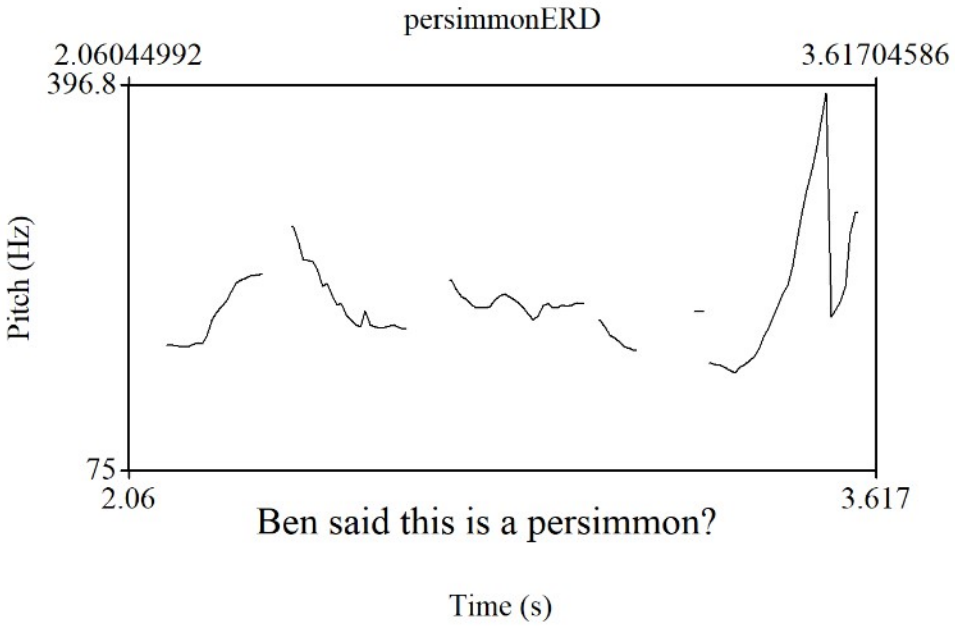
Both of these have the rising intonation of the rising declarative, suggesting that the intonation of the ERD will do something similar when the

rising declarative is embedded and when it is not. The example above is of IRDs, but the same holds true for ARDs.

Now, let us examine the pitch contour of an embedded rising declarative. This example can be listened to here.

(2.18) Ben said this is a persimmon?

Figure 2.3: Pitch contour for the rising declarative in (2.18)



Because this shares the same contour as the unembedded rising declarative, it is reasonable to assume that the rise is having the same effect in "Ben said this is a persimmon" and "This is a persimmon?", namely denoting unsettledness about a question.

2

[2]Focus can also appear within rising declaratives with embedded content.

(2.19) a. Tom said this is a persimmon?

b. Tom said this is a persimmon$_{\text{F}}$?

c. Tom said this$_{\text{F}}$ is a persimmon?

d. Tom said$_{\text{F}}$ this is a persimmon?

e. Tom$_{\text{F}}$ said this is a persimmon?

In "Tom said this is a persimmon$_{\text{F}}$?", the unanswered question is something like "Is this a persimmon (as opposed to something else)?". Compare that to "Tom said$_{\text{F}}$ this is a persimmon?", where the unanswered question is about Tom's speech act, not the fruit. This suggests that focus is a way in which to signal what maximal QUD is unresolved. Even if the embedded item is moved around, focus still identifies the maximal QUD. While I will not discuss focus more here, it seems that focus does not contribute to the discourse effects of rising declaratives beyond normal focus contributions.

Chapter 3

Previous Analyses and False Starts

Using the taxonomy developed in the previous section, we can examine how previous approaches handle rising declaratives, and make predictions about their ability to handle eARDs and eIRDs. First, we will sketch out some assumptions about the Table model ($\lfloor 1 \rfloor$), which will be necessary to understand approaches that take a compositional tact, such as [2]. Then, we will walk through some previous approaches and examine their predictions.

3.1 The Table Model

Each of these analyses shares a similar underlying structure, which have been adopted and adapted from $\lfloor 1 \rfloor$.

(3.1) a. **Common ground (CG)**: is the set of joint commitments.

b. **Table**: Items on the Table form a stack, and the Table is a record of what is "at-issue" in the conversation. When there is something on the Table, the goal of the conversation is to settle the issue (⌊1⌋).

c. **DC_X**: Each participant has their own set of propositions they have individually committed to, and which are not joint commitments. This is the commitment set of each of the participants.

d. **Projected set (ps)**: a set of future common grounds that resolve the question.

A simple Table appears below.

(3.2)

A	**Table**	**B**
Common Ground	**Projected Set**	

In this table, each participant has their discourse commitment set (DC_A and DC_B), as well a set of joint commitments (cg), the set of ways of resolving the issue (ps), and the stack of items that are at-issue (represented by S).

Assertions update the Table via the following rule:

(3.3) A(S⌊D⌋, a, $K_i = K_a$ such that)

a. $DC_o = DC_{a,i} \cup p$

b. $T_o = push(<S⌊D⌋; p>, T_i)$

c. $ps_o = ps_i \overline{\cup} p$

For example, if A makes the assertion "I like beans", the following three things happen. The assertion is added to A's set of discourse commitments, the assertion gets pushed to the Table, and the projected set gets updated. The following Table shows this update.

(3.4)

A	**Table**	**B**
{I like beans}	<I like beans>	
Common Ground	**Projected Set**	
	$ps_2 = ps_1 \cup$ {I like beans}	

3.2 Malamud & Stephenson (2015)

Malamud & Stephenson ([7]) add to the Table model projected common ground and projected DC_X. Their account of rising declaratives deal primarily with ARDs.

In Malamud & Stephenson's analysis of rising declaratives, rising declaratives are licensed only when the speaker feels that they cannot use a non-rising declarative ([7]). The rise used in the rising declarative is a signal that a metalinguistic issue (*MLI*) has been raised.

When a speaker utters p, p is pushed onto the Table, followed by a *MLI*. The *MLI*, a contextually determined set of propositions, is pushed onto the stack after p, and needs to be resolved in some fashion. When a speaker chooses a rising declarative, they are, in effect, asking their interlocutor whether it is appropriate to assert p through the use of the final rise.

Suppose A and B are chatting about B's neighborhood.

(3.5) Context: A and B are gossiping. A doesn't know anything about B's neighbor. B says, blushing, "You've got to see this picture of my new neighbor!
Without looking, A replies: "He's attractive?"

The *MLI* here is whether A is correct about why B is blushing. Because the *MLI* is on top of the stack, it must be resolved in some way (by B, since A has indicated they cannot resolve it). The following Table breaks down what the Table looks like after A has uttered the rising declarative.

Figure 3.1: A Table from [7] showing how their system works

A utters p with an NI-rise:

Current	**Projected**
CG $\{\ldots\}$	CG* $\{\{\ldots, p\}, \ldots, \{\ldots, p\}\}$
(no change to the CG)	
CS $\{\ldots\}$	CS* $\{\ldots\}$
(no change to common standards if no vague predicates)	
DC_A {...}	DC_A* $\{\{\ldots, p\}, \ldots, \{\ldots, p\}\}$
(adds p to A's projected commitments)	
DC_B $\{\ldots\}$	DC_B* $\{\{\ldots\}, \ldots, \{\ldots\}\}$
(no change to B's commitments)	
Table $\langle MLI^p, \ldots\rangle$	Table* $\{\langle p, \ldots\rangle, \langle p, \ldots\rangle, \ldots, \langle p, \ldots\rangle\}$
(adds p to the projected Table — p is expected to become an issue; adds a metalinguistic issue (MLI^p) to the Table)	

The example below shows that this account has trouble handling cases that are ambiguous between IRD and ARD readings.

(3.6) A: Where's Worf?

B: He's on the Enterprise?

A: Okay, thanks.

Notice that (3.6) is ambiguous between readings. There is one reading where B's statement can be summed up as "He's on the Enterprise? Why are you asking?", and another reading where the B is saying something like "I'm not sure this answers your question, but he's on the Enterprise". This could be due to the properties of the example. The account set forward by [7] can handle the second reading, but runs into trouble with the IRD use - the one where a question is being raised.

A has provided a potential resolution for the *MLI*, namely that this is an acceptable answer to the question. B can then accept A's resolution of the *MLI*.

For the ARD reading, in this example, when B utters "He's on the Enterprise", they're placing both "He's on the Enterprise" as well as a metalinguistic issue ("Is this an acceptable answer") on the table. B is waiting for A to either accept this as an acceptable answer, or reject this as an answer.

For the IRD reading, however, it is less clear what the MLI could be.

In addition to the inability to handing the IRD reading of the example about, it is difficult to extend this account to embedded ARDs (eARDs), like the one below.

(3.7) A: Why is everyone late?

B: I think it's raining?

In this account, the eARD must be raising a question or placing an issue on the table, and the speaker cannot be committed. However, in the eARD cases, it's not clear that the metalinguistic issue is being raised. Rather, what seems to be happening is that there is uncertainty about whether this is the answer to the question, since the speaker has to be committed to at least to the fact that they think p (it's raining).

One key takeaway from [7] is that unresolvedness about the question doesn't seem to always mean that the question is being raised. It just means that there is uncertainty. We will return to a discussion of [7] later on.

3.3 Farkas & Roelofsen (2017)

Like Gunlogson ([4]), Farkas & Roelofsen ([2]) deal with only the questioning uses.

They analyze rising declaratives as having the same content as the matching polar question, but with the addition of being a marked form of use.

For [2], when a speaker utters something like *Amelia left?*, they're expressing a bias towards one of the possible alternatives, the one corresponding to the utterance (a set consisting of "Amelia left" and "Amelia didn't leave", and the highlighted alternative would be "Amelia left".). This bias is cached out through the use of *credence* in the highlighted alternatives. The credence level is the level of the speaker's confidence in the highlighted alternative, or put another way, the likelihood of the alternative versus the other options. There are four credence levels, high, low, moderate, and

zero, and when speakers utter a rising declarative, they are expressing credence that is at most low.

Thus, in their system, when a discourse participant utters a rising declarative p, expressing $[[p]] = \{a, \bar{a}\}\downarrow$, the discourse context is affected as follows:

(3.8) a. The proposition expressed by p, [[p]] is added to the table
b. The informative content of p, $\cup$[[p]], is added to commitments(x).
c. <a, [zero, low]> is added to evidence(x)

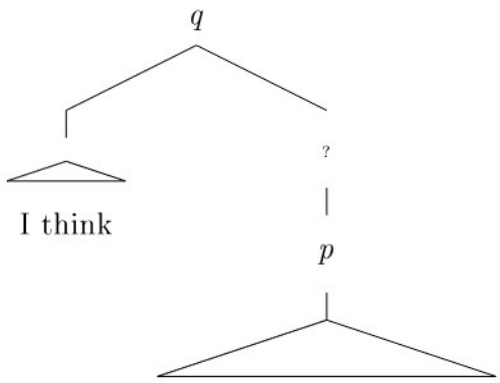
[2] has a morpheme $_?$ that allows this to be handled compositionally. $_?$ takes a sentence radical and turns it into an IRD.

This account captures several things. First, it is able to account for why speakers are able to not commit. Speakers are never required to commit to a rising declarative, they need only to have a bias. This also captures lower epistemic certainty: both p and $\neg p$ are added to the table. It also captures why these look like questions. Importantly, this account is able to unify several phenomena under one treatment, including polar questions, rising declaratives, declaratives, and tag questions.

However, $_?$ in the current form cannot work for embedded IRDs (eIRDs).

Suppose we have the following example. A and B are both examining a portrait. A says to B "Who is that?" and B says "I think that's Benjamin Sisko?".

Here, we need to capture the fact that the speaker is committed to something, namely that they think p ("that's Benjamin Sisko"), and that the speaker does have some bias towards that being Benjamin. Using the $_?$ morpheme, we would have something like:



If the $_?$ morpheme turns a sentence radial into a question, then we have no way to account for the fact that the speaker does have a commitment to q - they are committed to the fact that they think p, and furthermore, that the speaker is biased in some sense towards p.

This account fails in two ways. First, the speaker is actually asserting something in the ARD cases - it's hard to generalize this account to these cases. Second, in the eIRD cases, it's 1) unclear how to move the morpheme lower without inventing machinery, and 2) without losing the facts about commitment and bias.

It is possible to make [2] account for the facts, but in order to do so, new machinery needs to be implemented, as well as a new morpheme. One key takeaway, however, is that the rise is fundamentally doing something like raising a question, but not over the entire utterance.

The issues raised for [2] are the issues that are raised for other accounts that try to derive these effects compositionally.

Returning to our table of types, we've seen that [2] can handle the IRDs just fine, but needs more machinery to handle ARDs and eIRDs.

3.4 Jeong (2018)

In [6], rising declaratives are split into two types, ARDs and IRDs. One item that Jeong adds to her analysis is that of an inquisitive metalinguistic issue, which, like [7], can be any sort of metalinguistic issue, from a question about relevance to politeness or a desire to build rapport with the addressee. When using an ARD, speakers add the metalinguistic issue to the table, and the metalinguistic issue must be resolved before the speakers can move forward. For Jeong, IRDs are essentially polar questions with declarative syntax.

Jeong's analysis has two morphemes, one for the ARD and one for the IRD. She needs these two morphemes to get the facts about commitment for the ARD versus the IRD. However, these morphemes can't explain the split between bias and commitment we see across the eARDs, eIRDs, ARDs, and IRDs. Thus, this analysis inherits the problems the previous approaches had with handling the embedded cases.

3.5 Goodhue (2021)

Like [6] this is a unifying account of ARDs and IRDs. In his approach, Goodhue treats rising declaratives as declaratives, and adopts an abridged Farkas & Bruce model, including T as a push-down stack of sets of propositions, and a QUD as a contextually salient question or goal ([1]). One important takeaway from [3] is that there is no intonational difference between the IRDs and ARDs, just one rising intonation that contributes a not-at-issue lack of speaker commitment. This lack of commitment can be

about the propositional content, or it can be about some other issue. That is, to Goodhue, the rise signals lack of commitment to the truth of the proposition q (which defaults to the uttered proposition p). For the inquisitve cases, this works fine. For the assertive cases, Goodhue introduces the idea that the lack of commitment isn't to the uttered proposition, but to some other proposition such that p $\cap$ q addresses the QUD.

In order to get commitment, Goodhue relies on a idea that the the speaker is providing pressure for the *addressee* to commit. Thus, for something like (3.9), which is an IRD, the speaker has uttered q - *she's nine?* and the default assumption that the speaker lacks commitment holds (due to assumptions about the speaker being less knowledgeable than the addressee). B has not made a commitment, but Goodhue's pragmatic requirement for *someone* to commit means that A is the only person who can make a commitment, in this case by providing an answer.

(3.9) IRD:

B and A are on their way to a birthday part for the daughter of A's friend. They stop to get a birthday card, and B is trying to remember how old the daughter is.

B: She's nine?

The ARD case, (3.10), is presented below.

(3.10) ARD:

B is enrolling his child in a summer camp.

B: I want to sign her up for Spanish classes in the morning and rock climbing in the afternoons.

A: Okay. We have limited spots and some of the age groups have already filled up for rock climbing. How old is your daughter?

B: She's nine?

For this one, B should know more about his child than A. Thus, when B utters q - *she's nine?*, he can't be asking A to commit (and it seems unlikely that he is signaling his own lack of commitment). Thus B is lacking commitment to some p that, when intersected with q, would settle the QUD. This p is something like "there is still room in the nine year old rock climbing class".

This account seems to handle most cases. However, there are some ARDs that this account cannot handle. In (3.11), below, because the rise is signalling a lack of commitment to a proposition, it is unclear how this account might handle the case where the reading is the "why do you ask" reading.

(3.11) Kira: Where's Worf?

Jadzia: He's on the Enterprise?

Because Jadzia is Worf's spouse, she is more knowledgeable about where her husband is. Thus, when Jadzia utters q - *he's on the enterprise*, she is not asking Kira to commit, nor is she signaling her own lack of commitment. What sets this example apart from the previous one is that

in this example Jadzia is trying to figure out what Kira is doing. *Kira* has raised a question - "what am I doing", and Jadzia is attempting to resolve this.

Chapter 4

Proposed Analysis

I propose that we can handle unembedded and embedded rising declaratives using the Table model, which I will build out below. First, we will start with the unembedded falling declarative, where I will introduce the notion of *Strategies*. Then I will turn to the unembedded assertive rising declarative (ARD), where I will introduce *Strategic-Catastrophe*. By using *Strategies* and *Strategic-Catastrophe*, we can also handle embedded ARDs. To handle the embedding, the principles of *Sincerity* and *Reliability* will come into play. When we have all those pieces, we can straightforwardly handle the embedded inquisitive rising declaratives (IRDs) as a response to a question. I will also show how this system can handle embedded IRDs when they are out of the blue, due to the ability to accommodate a question. Finally, we will turn to unembedded IRDs. To handle unembedded IRDs, I will introduce *degrees of commitment*. At the end of this, we will have a *Strategy*-based system that can account for all types of rising declaratives, both embedded and unembedded.

4.1 Falling Declaratives

Consider the following exchange.

(4.1) Stephanie (speaker A): who speaks a Romance language?
Tom (speaker B): Maria speaks Ladino.

In this exchange, Stephanie asks Tom a question, and Tom responds with a declarative utterance with a falling intonation (a canonical declarative utterance). Declaratives are canonical *assertions* - by uttering this, Tom intends for "Maria speaks Ladino" to be added to the common ground. Tom is also *committed* to his utterance - it is placed on the Table and he must add it to his set of speaker commitments. Assertion updates in the Table model ([1]) have been defined as the following:

(4.2) A(S⌊D⌋, a, $K_i = K_a$ such that)
a. $DC_{a,output} = DC_{a,input} \cup \{p\}$
b. $T_{output} = push(<S⌊D⌋; \{p\}>, T_{input})$
c. $ps_{output} = ps_{input} \overline{\cup} \{p\}$

This function takes an input context K_i and returns an output context K_o, where a is the speaker of the assertion and the denotation of $S⌊D⌋$ is the singleton set containing the proposition denoted by the sentence. The assertion operator is able to handle straightforward assertions (see [1]). Let's consider (4.1).

When Stephanie speaks, they put the question "Who speaks a Romance language?" on the Table. For simplicity, we will assume that Stephanie's

utterance begins the conversation, and so the Table is empty before A's utterance, as shown in (4.3), and is then updated to the Table in (4.4) after their utterance. In (4.3), there is nothing on the Table, nothing in either A or B's discourse commitment sets, and the only thing in the projected set is the current common ground s_1.

(4.3)

Table 1. The empty Table

A	**Table**	**B**
Common Ground s_1	**Projected Set** ps = $\{s_1\}$	

Once Stephanie (speaker A) makes their utterance, the Table is updated.

(4.4)

Table 2. The Table after Stephanie's utterance

A	**Table** <Who speaks a Romance language?, 'John speaks a Romance language', 'Maria speaks a Romance language', 'John and Maria speak a Romance language', No one speaks a Romance language'>	**B**
Common Ground s_1		**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}

"Who speaks a Romance language?" is a canonical *wh*-question. It's added by the following rule, from ⌊2⌋.

(4.5) Rule for adding *wh*-questions to the Table

a. The proposition expressed by p , $||p||$ is added to the Table

b. The informative content of p , $\cup||p||$ is added to the speaker's DC

This rule does the following thing (in general). It adds a tuple made up of the form of the question and its possible answers to the Table. For concreteness, I have assumed that there are two individuals in the world, John and Maria. This creates the 4 possible answers you see (they each speak a Romance language, they both speak a Romance language, or neither of them speak a Romance language). We will also update the projected set with each of possible answers. $s_1 \cup$ {John speaks a Romance language} means that we are adding 'John speaks a Romance language' to the projected common ground.

The Table that results is the canonical table that results after a question is asked. Without making any adjustments, let us examine what happens when we proceed with the canonical Table model. The question "Who speaks a Romance language?" has an answer of the form "X speaks a Romance language." When a speaker utters "Maria speaks Ladino.", they have not answered the question. According to the rule for assertion updates, in (4.2) the speaker adds "Maria speaks Ladino" to the set of their discourse commitments, pushes it onto the Table, and updates the projected set. If we look into the projected set after Stephanie asks their question, "Maria speaks Ladino" is not a valid path forward, as shown in the Table below.

(4.6)

Table 3. The Table after Tom's utterance

A	**Table** <Maria speaks Ladino.> <Who speaks a Romance language?, {'John speaks a Romance language', 'Maria speaks a Romance language', 'John and Maria speak a Romance language', No one speaks a Romance language'}>	**B** {Maria speaks Ladino}
Common Ground s_1	**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}	

Tom uttered "Maria speaks Ladino." This is a declarative, but note that it's not a direct answer to the question. It does entail an answer, and so one could consider it a (minor) Quantity violation, but in the framework we are developing, we can also see it as a strategy-based response. The strategy I will assume is below.

Highest QUD Who speaks a Romance language?

Utterance-derived question (uQ) Does Maria speak Ladino?

Strategic question (sQ) Is Ladino a relevant Romance language?

If the answers to the utterance-derived question and the strategic question are both "yes", then we have an answer to the highest QUD.
We have shown a strategy is a list of questions, and formally, we can define it as follows:

A **strategy** is a means of answering a question Q. If Q is a question, a strategy $S = \{R_1, \ldots, R_n\}$ for answering Q is a series of questions R_1, $\ldots$, R_n such that there is an **answer set A** for Q in S.

If a speaker uses falling intonation, they believe the strategy will be successful. A strategy is **successful** in information state I if and only if there is $\{p_1, ..., p_n\}$ such that:

(i) $\{p_1, ..., p_n\}$ is an answer set for Q in S

(ii) $p_i \in I$

Finally, an **answer set A** for question Q in strategy $S = \{R_1, \ldots, R_n\}$ is a set of propositions $\{p_1, ..., p_n\}$ such that:

(i) $p_i \in R_i$

(ii) $\exists q \in Q[p_1....p_n \rightarrow q]$

For a falling declarative, where the speaker assumes the strategy will be successful (and thus has no need to use a rise), a strategy is then a set of questions the speaker knows will answer the *Highest QUD* . The answer set is the set of propositions such that the strategy succeeds.

In order to put the strategy on the Table, we need to revise our assertion rule to allow for strategies to be pushed. First, I revise the push operator to include pushing a Strategy S (and the associated questions) on the Table. The pieces of the Strategy S are the utterance (u), the polar question version of the utterance (uQ) and finally, the highest QUD that the speakers are trying to resolve, *Highest QUD*.

push(*S*,T) - push a Strategy S to answer question Q, consisting of minimally uQ, and return the updated Table. If T is of the form uQ, *Highest QUD*, push u.

It is important to note here that when pushing, parts of the Strategy may already be on the Table (for example, in (4.6), *Highest QUD* already exists on the Table, so it would not get pushed again). It is also important to note that pushing components to the Table occurs simultaneously. There is no time course - all updates are pushed simultaneously as a list of questions. With our revised rule for pushing strategies to the Table, we can now rewrite our assertion operator for the falling declarative.

(4.7) A-Strategy (S[RD], a, K_i) = K_a such that

a. $DC_o = DC_{a,i} \cup p$
b. $T_o = push(S,T_i)$
c. $ps_o = ps_i \overline{\cup} p$

The Table below shows what happens when Tom assumes the Strategy above. Tom adds p to their set of discourse commitments (DC_B), the new

Table is returned with Strategy S on the Table, and p is added to the projected set.

(4.8)

Table 4. The Table after Tom's utterance

A	**Table** <Maria speaks Ladino.> <Is Ladino a relevant Romance language?, 'Yes, Ladino is a relevant Romance language', 'No, Ladino is not a relevant Romance language'> <Who speaks a Romance language?, 'John speaks a Romance language', 'Maria speaks a Romance language', 'John and Maria speak a Romance language', No one speaks a Romance language'>	**B** {Maria speaks Ladino}
Common Ground s_1		**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}

The falling declarative that answers uQ can succeed in resolving *Highest QUD* even without any discussion about sQ . If the strategy above is assumed, then there has to be an answer to "Is Ladino a relevant Romance language?" present. Because neither speaker addresses this, yet the falling declarative can resolve *Highest QUD* , there must be some agreement already on what the relevant Romance languages are. Therefore, I will assume that in contexts like the one where Tom utters the falling declarative in (4.1), that Ladino is a relevant Romance language is common ground. Accordingly, it should be present in the Table as part of the common ground. (4.9) adds it:

(4.9)

Table 5. Tom utters 'Maria speaks Ladino', and the common ground has Ladino as a relevant Romance language

A	**Table** <Maria speaks Ladino.> <Who speaks a Romance language?, 'John speaks a Romance language', 'Maria speaks a Romance language', 'John and Maria speak a Romance language', No one speaks a Romance language'>	**B** {Maria speaks Ladino}
Common Ground s_1 = {Ladino is a relevant Romance language}	**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}	

Then, *sQ*'s answer is already in the common ground, and so asserting that Maria speaks Ladino is enough to answer the *Highest QUD*. In the Table, we can see this in the projected set – if Ladino is a relevant Romance language is already in the common ground, and Tom asserts that Maria speaks Ladino, then Maria speaks a Romance language (and this is indeed in the projected set).

Stephanie then accepts Tom's assertion, and "Maria speaks Ladino" is also added to Stephanie's commitment set.

(4.10)Table 6.

A {Maria speaks Ladino}	**Table**	**B** {Maria speaks Ladino}
Common Ground s_2 = {Ladino is a relevant Romance language}	**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}	

Looking at the Table, we are in a world contained within the projected set – a world where Maria speaks a Romance language. With Ladino being a relevant Romance language, we can then count the top-level question as answered and then remove it from the table. In the Table below, we see that the question has been cleared, and that we have returned to an empty stack.

(4.11)Table 8.

A {Maria speaks Ladino}	**Table**	**B** {Maria speaks Ladino}
Common Ground s_2 = {Ladino is a relevant Romance language, Maria speaks Ladino}	**Projected Set**	

This revision of the assertion operator can give us the ability to handle the falling declarative cases where an assertion entails an answer to a question. Let us turn now to the cases with the rise.

4.2 Unembedded Assertive Rising Declaratives

Here's the declarative from above, this time repeated as a rising declarative.

(4.12)

Stephanie: who speaks a Romance language?
Tom: Maria speaks Ladino?

The sole difference between this case and the one above is the addition of the rise. The rise indicates that a strategy may not succeed. Thus, if

a speaker uses rising intonation, they believe the strategy might be unsuccessful. A strategy is **unsuccessful** in information state I if and only if for all $\{p_1...p_n\}$ that is an answer set A for Q in S, there is some p_i such that $\neg p_i \in I$.

The rise adds the possibility of *Strategic-Catastrophe* - the possibility that there is no answer set - to the projected set.

The *Strategic-Catastrophe* $\{f_1....f_n\}$ for a strategy S for answering Q in information state I is a set of propositions such that for each f_i:

(i) for each R_j, f_i entails an answer for R_j

(ii) $I \cap f_i$ does not entail an answer to Q

and such that for every answer set A in Q in S, there is some f_i inconsistent with A.

(4.13) $ps = ps_i \overline{\cup} A \mid A$ is an answer set for strategy $\{Q_1, ... Q_n\} \cup \{ps \cup$ failure-set(S,Q,ps)$\}$

The central change here is the addition of a future where the question is not resolved. Because B's utterance serves to put on the table an answer to uQ, the only way for the question to be unresolved would be if sQ were unresolved, i.e., if Ladino's status as a relevant Romance language status weren't clear. Thus, in such a context, it cannot be that Ladino's status as a Romance language is common ground. Therefore, we will assume that when the rising declarative utterance in (4.12) is uttered, the presupposition in Table 5 isn't present. Thus, the complete Table for the rising declarative looks like this:

(4.14)The Table for the rising declarative

A	**Table** <Maria speaks Ladino> <Who speaks a Romance language?, {John speaks a Romance language},{Maria speaks a Romance language},{John and Maria speak a Romance language}, {Neither speak a Romance language}>	**B**
Common Ground s_1		**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}

Note that in this case, because of the lack of an answer to sQ , B's assertion of "Maria speaks Ladino" is not sufficient to resolve *Highest QUD* . It thus leaves that question unresolved, as well as sQ . This captures the fact that after B's rising declarative (and A's acceptance), while A and B may achieve common ground on whether Maria speaks Ladino, there is still A's original unsolved question, as well as the question that B introduces via their strategy (the strategic question: Is Ladino a relevant Romance language?) Thus, B has to push a specific strategy to the table, following the strategy rule laid out above. In this case the strategy S is minimally the

question "Is Ladino a relevant Romance language?". Because *Highest QUD* is already on the table ("Who speaks a Romance language?"), in order to end up at a licit table, B must also place u on the table. These two moves happen simultaneously, resulting in the table below.

(4.15) Table 2. The Table for the rising declarative after updates

A	**Table** <Maria speaks Ladino> <Is Ladino a relevant Romance language?, {Yes, Ladino is a relevant Romance language},{No, Ladino is not a relevant Romance language}> <Who speaks a Romance language?, {John speaks a Romance language},{Maria speaks a Romance language},{John and Maria speak a Romance language}, {Neither speak a Romance language}>	**B**
Common Ground s_1		**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}, $s_1 \cup$ *Strategic-Catastrophe*

In the Table above, the projected set is also updated using our new rule for projected set updates. There is a future where this strategy succeeds (Maria speaks a relevant Romance language, Ladino), and also a future where there is *Strategic-Catastrophe*. In *Strategic-Catastrophe*, no strategy can succeed - the speakers must try another way to resolve the *Highest QUD* . This means that these are worlds in which Ladino is *not* a relevant Romance language, nor does Maria speak it. In order to successfully resolve this, both speakers have to agree that Ladino is a relevant Romance language for this situation, which they can do by accepting "Maria speaks Ladino" or rejecting "Maria speaks Ladino".

Let us compare this with the approach taken by Malamud and Stephenson (2015).

In Malamud & Stephenson (2015), when a speaker A utters a rising declarative (p with an NI-rise in their terminology), a metalinguistic issue (MLI^p) is added to the Table, in addition to p being added to the projected commitment set and projected Table. Only by resolving the metalinguistic issue can the table move forward, by adding p to A's commitment set and the Table. Malamud and Stephenson leave this MLI^p unspecified, pointing out that it could be almost any metalinguistic issue, from appropriate-ness to questioning specific parts of the utterance. In the analysis I have just argued for, it is true that A is raising a new issue via their pursuit of a strategy, but it is not the case that the issue is a new issue. Rather, the issue arises from the choice to use a strategy, and is contained within the strategy itself as sQ . For example, the issue for the example above is whether Ladino is a relevant Romance language in this context, something that could be construed as metalinguistic. By using the strategy-based

approach, it is easy to see where the metalinguistic issue arises – it is the undiscussed sQ .

4.3 Embedded Assertive Rising Declaratives

Now, let's turn to an embedded case, shown below in (4.16).

(4.16)

Stephanie: who speaks a Romance language?
Tom: Jack says Maria speaks Ladino?

Like before, when Stephanie speaks, they put the *wh*-question on the Table following the rule in (4.5). This results in the canonical Table, below.

(4.17)

A	**Table** <Who speaks a Romance language?, {John speaks a Romance language},{Maria speaks a Romance language},{John and Maria speak a Romance language}, {Neither speak a Romance language}>	**B**
Common Ground s_1		**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}

Tom's utterance ("Jack says Maria speaks Ladino?") is a rising declarative that does not seem to directly answer the question. We assume that Tom's answer is, like in the unembedded case, an answer to the uQ ("Does Maria speak Ladino?") – Jack is reliable about what languages Maria speaks. This leaves the uncertainty about sQ , whether Ladino is a relevant Romance language. This is a version of Simons (2007) - the speaker is expressing their own lack of certainty - just adapted for the Table. The change in uttering the unembedded rising declarative is adding the lack of answer set to the projected set.

Again, parallel to the previous example, the structure of the strategy means that if Tom is signaling the possibility the strategy may fail, then it can only be if sQ is false (since Tom is asserting uQ). I assume the following definitions of reliability and sincerity of an agent relative to a question.

Reliability A speaker A is reliable about Q if and only if A believes p and p is an answer to Q, then p is true

Sincerity A speaker is sincere if and only if for all p , if A says p then A believes p

In assuming sincerity, I am assuming that a speaker A is offering an answer p in good faith, and that if they say p , then they believe p . The principle of sincerity arises out of the idea that speakers are cooperative and that speakers obey Quality – speakers will say what they believe in. Reliability is about whether speaker A is a good source of evidence. For example, if Jack is *reliable* about what languages Maria speaks, he's right about what languages Maria speaks, while also believing in his answer. Assuming that the principles of reliability and sincerity, given above, hold (and are in the common ground), Jack is reliable about what languages Maria speaks, and Tom is sincere about his utterance answering the question.

(4.18)

A	**Table** <Jack says Maria speaks Ladino> <Is Ladino a relevant Romance language?, {Yes, Ladino is a relevant Romance language}, {No, Ladino is not a relevant Romance language}> <Who speaks a Romance language?, {John speaks a Romance language},{Maria speaks a Romance language},{John and Maria speak a Romance language}, {Neither speak a Romance language}>	**B** {Jack says Maria speaks Ladino}
Common Ground s_1 = {Reliable(Jack), Sincere(Tom)}	**Projected Set** $ps_1 = s_1 \cup$ {John speaks a Romance language},$s_1 \cup$ {Maria speaks a Romance language}, $s_1 \cup$ {John and Maria speak a Romance language}, $s_1 \cup$ {No one speaks a Romance language}, $s_1 \cup$ *Strategic-Catastrophe*	

Like the unembedded ARD case, what is at issue is whether Ladino counts as a relevant Romance language. This means that Ladino as a relevant language cannot be in the common ground.

This embedded ARD works out exactly like the unembedded version, shown above in the previous section. After A asks "Who speaks a Romance language?" and B says "John says Maria speaks Ladino?", the Table is as in (4.18). B places the strategic question on the Table ("Is Ladino a relevant Romance language?") simultaneously with their utterance *u*. The projected set contains all possible futures, including the possibility of *Strategic-Catastrophe*. In order to resolve this, both speakers have to agree that Ladino is a relevant Romance language. Once that is settled, the Table can be cleared.

4.4 Embedded Strategic Inquisitive Rising Declaratives

This is not the sole strategy you could pursue. Instead of calling relevance into question, you could choose instead to call reliability into question. These cases might arise when a speaker doesn't actually know the answer or is reporting someone else's answer, and wants genuine confirmation of whether that person's answer can be trusted. A case of this reading is worked out below.

(4.19)

Stephanie: What fruit is this?

Richard: Tom says this is a persimmon?

When Stephanie speaks, as before, they put the *wh*-question on the

Table following the rule presented in (4.5). The Table below is the result.

(4.20)

A	**Table** <What fruit is this, {It's a persimmon.}, {It's a kumquat.}>	**B**
Common Ground s_1	**Projected Set** $ps_1 = s_1 \cup$ {It's a persimmon},s_1 $\cup$ {It's a kumquat}	

First, let us consider the falling declarative where Richard utters "Tom says this is a persimmon." This, like the other falling declarative we looked at, is again an indirect answer to the question. The Strategy assumed here is below.

Highest QUD What fruit is this?

Utterance-derived question (uQ) What did Tom say this is?

Strategic question (sQ) Is Tom reliable about what fruit this is?

Again, if we have an answer to uQ and sQ , then there is an answer to the *Highest QUD* .

For the falling declarative, I have already shown that an answer to one of the questions can succeed without answering the other. I will assume in contexts like these, Tom being reliable is common ground. Accordingly, it should be present in the Common Ground section of the Table. (4.21) is the Table from above, but with this added to the common ground.

(4.21)

A	**Table** <What fruit is this, {It's a persimmon.}, {It's a kumquat.}>	**B**
Common Ground s_1 = Reliable(Tom)		**Projected Set** $ps_1 = s_1 \cup$ {It's a persimmon},s_1 $\cup$ {It's a kumquat}

(4.22) is the Table after Richard makes their assertion.

(4.22)

A	**Table** <Tom says this is a persimmon.> <What fruit is this, {It's a persimmon.}, {It's a kumquat.}>	**B** {Tom says this is a persimmon}
Common Ground s_1 = Reliable (Tom)		**Projected Set** $ps_1 = s_1 \cup$ {It's a persimmon, Tom says this is a persimmon},s_1 $\cup$ {It's a kumquat, Tom says this is a persimmon}

The answer to *sQ* is already in the common ground, and so asserting that Tom says that this is a persimmon is enough to answer *Highest QUD* .

For the case of the rising declarative with the strategic IRD flavor, the only way the question remains unresolved is if whether Tom is reliable can be called into question. It's not that case that the conversational participants need to ground on the principle of reliability, rather, they have to ground on whether *Tom* fulfils reliability to a satisfactory degree. In order to do that, Richard has to push a specific strategy to the Table, using *push*(S,T). In this case, the strategy S would minimally be the sQ , "Is Tom reliable about what fruit this is?" Because *Highest QUD* is already on the Table, Richard must place u on the Table to result in a licit Table. These moves happen simultaneously, resulting in the Table below. Note that this Table does have one thing in the common ground, the *sincerity* principle.

(4.23)

A	**Table**	**B**
	<Tom says this is a persimmon.> <Is Tom reliable?, {Tom is reliable}, {Tom isn't reliable}> <What fruit is this?, {It's a persimmon.}, {It's a kumquat.}>	{Tom says this is a persimmon}

Common Ground	**Projected Set**
s_1 = Sincere (Richard)	$ps_1 = s_1 \cup$ {It's a persimmon, Tom says this is a persimmon, Tom is reliable},$s_1 \cup$ {It's a persimmon, Tom says this is a persimmon, Tom is not reliable}, $s_1 \cup$ {It's a persimmon, Tom didn't say this is a persimmon, Tom is reliable}, $s_1 \cup$ {It's a persimmon, Tom didn't say this is a persimmon, Tom is not reliable}

Note - for space saving reasons, the projected set is shown only with the *persimmon* outcomes, but there are more in the projected set.

Then Stephanie accepts Richard's evidential claim about Tom's speech act, resulting in the Table below.

(4.24)

A	**Table** <What fruit is this?, {It's a persimmon.}, {It's a kumquat.}>	**B** {Tom says this is a persimmon}
Common Ground s_1 = Sincere (Richard) ∪ Tom says this is a persimmon	**Projected Set** $ps_1 = s_1 \cup$ {It's a persimmon, Tom is reliable},$s_1 \cup$ {It's a persimmon, Tom is not reliable}	

Once this has happened, there are only two ways for the conversation to move forward: either Tom is reliable, or he is not. Finally, Stephanie and Richard commit to Tom's reliability and Tom's truthfulness.

(4.25)

A	**Table** <What fruit is this?, {It's a persimmon.}, {It's a kumquat.}>	**B** {Tom says this is a persimmon}
Common Ground s_1 = Sincere (Richard) ∪ Tom says this is a persimmon ∪ Reliable (Tom)	**Projected Set** $ps_1 = s_1 \cup$ {It's a persimmon, Tom is reliable}	

Because Stephanie and Richard agree on John's answer to *Highest QUD* , *Highest QUD* is finally removed from the Table.

(4.26)

A {Tom says this is a persimmon}	**Table**	**B** {Tom says this is a persimmon}
Common Ground s_1 = Sincere (Richard) ∪ Tom says this is a persimmon ∪ Reliable (Tom)	**Projected Set**	

4.5 Embedded Strategic Inquisitive Rising Declaratives out of the blue

These embedded strategic IRDs don't occur merely as responses to questions. They can also occur out of the blue, as in

(4.27)Lalitha (to Niko): Jack said it's raining?

As in other cases, let's begin by considering the falling declarative version of the utterance. Initially, the Table is empty. After Lalitha's utterance, the Table is updated. Because she has said this out of the blue, there is no *Highest QUD* that she is responding to. The falling declarative then, should proceed like any other assertion. No strategy is pushed to the Table here.

(4.28)

A	**Table** <Jack said it's raining.>	**B** {It's raining}
Common Ground s_1 = Sincere (Lalitha)	**Projected Set** ps_1 = {It's raining}	

Now, let's look at the rising declarative ("Jack said it's raining?"). In this case, unlike the ARD and embedded ARD cases, the *Highest QUD* ("What's the weather?") is not on the Table. I assume, then, that the *Highest QUD* must be accommodated. This assumption arises out of the idea that, out of the blue, no one has asked this question. Thus, the listener must reason out what question the speaker is trying to answer by making the rising declarative. The *Highest QUD* could be any question (and in fact, the space of possible questions is broad) but for this rising declarative, I will assume "What's the weather?" is the question the speaker is actually trying to resolve. Thus, when Lalitha pursues the strategy below, the *Highest QUD* has to be put on the Table as well, as part of the accommodation of *Highest QUD* .

Highest QUD What's the weather?

Utterance-derived question (uQ) What does Jack say the weather is?

Strategic question (sQ) Is Jack reliable?

Using the *push*(S,T) rule, Lalitha adds *u*, *sQ* , and *Highest QUD* simultaneously to the Table. The resulting Table is below.

(4.29)

A	**Table** <Jack said it's raining?> <Is Jack reliable about the weather?> <What's the weather?, { It's raining}, {It's sunny}>	**B**
Common Ground s_1 = Sincere (Lalitha)	**Projected Set** ps_1 = s_1 ∪ {It's raining, Jack is reliable, Jack said it's raining},s_1 ∪ {It's sunny, Jack is reliable, Jack said it's raining}	

This conversation proceeds in the same manner as the embedded ARDs. It is worth noting here that the state of the Table is such that neither speaker can move forward by agreeing that it is raining, because neither of them know the weather. One way of clearing the Table is for Niko to accept that Jack is reliable about the weather, and thus, accept that since Jack is reliable, it *must* be raining.

4.6 Unembedded inquisitive rising declaratives

I will now turn to the unembedded IRD case, presented below. As a reminder, the unembedded IRD cases are those that are used out of the blue, and in some sense ask a question. An example is below.

(4.30) Lalitha (to Niko): It's raining?

To handle these, let's start by reviewing what we learned from the other cases. From the unembedded falling declaratives that are indirect answers, we added in the notion of *Strategies*. The unembedded ARDs (the previous cases but with rising intonation) showed what the rise does - it indicates that the Strategy may not be successful and in fact, might undergo *Strategic-Catastrophe*, where no part of the Strategy could possibly succeed. To add this to the model, we updated the projected set to include the *Strategic-Catastrophe*. For the embedded ARD and embedded strategic IRD, we add in the notions of *reliability* and *sincerity*. So far, we have been able to handle the unembedded and embedded ARD cases, as well as the embedded strategic IRD cases using our adjusted assertion operator, repeated below.

(4.31)A-Strategy (S[RD], a, K_i) = K_a such that

a. $DC_o = DC_{a,i} \cup p$

b. $T_o = push(S,T_i)$

c. $ps_o = ps_i \overline{\cup} p$

failure set

This requires B to commit to p , but also projects a discourse future in which the strategy fails, as required by the failure set. This is a contradiction. B is committed to p , and yet p may not resolve the question (introduced by the strategy) on the Table. With classical total commitment, the contradiction with the rise prevents p from ever being placed on the Table. This approach is perfectly fine for IRDs, and in fact, captures their discourse dynamics. IRDs, as shown previously, are the rising

declaratives that have a question-like flavor to them – they seem to raise a question (p or not p) rather than require commitment to p . However, as noted, IRDs are not like polar questions, which have no bias towards which one of the alternatives the speaker favors. In using an IRD, a speaker is expressing a bias towards the highlighted alternative, whatever that is.

One way to handle the contradiction that arises is to relax the requirement that B commit to p . By relaxing this, we can remove the inconsistency. The reason we might want to relax commitment comes from how IRDs behave. Intuitively, IRDs show a weakened commitment to p . Consider the following scenario.

(4.32)A: What is this fruit?
B: It's a persimmon? # It's a yuzu? # It's a kumquat?

If B is not committed in some sense to "it's a persimmon", he should be able to say three rising declaratives in a row, as is the case with the *yes/no* version of this, below.

(4.33)A: What is this fruit?
B: Is it a persimmon? Is it a yuzu? Is it a kumquat?

But B cannot do this. Thus, B has to have committed *somewhat* to p . B cannot commit completely, but B cannot remove his entire commitment, either.

[2] model this lack of commitment by adding credence to the discourse context through an evidence set– speakers have access to the level to which

they believe the highlighted alternative to be true. They define four credence levels: *zero, low, moderate* and *high*. *Zero* credence is when a speaker considers the highlighted alternative and the complement to be equally likely or believes the highlighted alternative to be less likely than the complement. *Low* credence is when the speaker believes the highlighted alternative to be somewhat more likely than the complement, and *high* credence is when the speaker believes the highlighted alternative to be much more likely than the complement, with *moderate* credence falling between those two levels. In their system, rising declaratives have a credence of at most *low*, that is, the speaker can only have some small amount of confidence in the highlighted alternative.

Rather than adding an evidence set, I propose that credence can be handled by folding it directly into the discourse commitments, through relaxing the requirement to totally commit to p . By replacing total commitment to p with graded commitment, we can relax the requirements and handle the contradiction.

Graded commitment would allow p on the Table. When someone is totally committed to an utterance, as we've seen above, they cannot be unsure or change their mind about the utterance without radical belief revision. That is, once you have committed to p, committing to not-p requires you to resolve the contradiction. But, with graded commitment, by not fully committing, changing your mind doesn't cause a contradiction.

Modifying the discourse commitments to relax the commitment results in the following, where the speaker adds an ordered pair $<p\ ,d>$ to their discourse commitments, where p is the proposition and d is the highest degree of commitment the speaker can hold without contradiction.

(4.34)A-Strategy (S[RD], a, K_i) = K_a such that

a. $DC_o = DC_{a,i} \cup \{<p\ ,\ d>\}$

b. $T_o = push(S,T_i)$

c. $ps_o = ps_i \overline{\cup}\ p$

failure set

Thinking about the levels of credence that the speaker can commit to, it seems obvious that there needs to be a level where the speaker is committed to p being true. We call this *high* degree of commitment. However, since a rising declarative indicates something less than complete commitment, there needs to be a level that captures that. We can define a level of credence that seems to capture the fact that when B utters "it's raining?", B has some reason to say that. A low L level of credence means that the speaker is committing to p being probably true, *probably(* p *)*.

Introducing the idea of graded commitment is a fairly drastic move, and requires more care and explanation than I can effectively do here. However, we can state some intuitive constraints on graded commitment. For instance, if a speaker utters "it's raining" and has a least a low level of commitment, they cannot then also commit to "it's not raining".

These examples motivate a restriction on graded commitment, namely that if you have any degree of commitment to p, you cannot have any degree of commitment to $\neg p$ (or, more generally, to anything that is contrary to p). That is, having any degree of commitment to p means that you think p is more probable than $\neg p$. This leads to the principle in (4.35), the principle of *credential commitment.*

This principle will have little work to do in our discussion of unembedded IRDs below, but I hope it serves as a proxy for a fuller treatment of the logic of graded commitment.

(4.35) Credential commitment principle:

> If p and q are contrary, then for a Speaker a, if $<p\ ,d> \in \mathrm{DC_a}$, then $<q,d'> \notin \mathrm{DC_a}$.

Putting this together with the modifications to the assertion rule for strategies, the final version of the assertion operator is as follows:

(4.36)A-Strategy (S[RD], a, $\mathrm{K_i}$) = $\mathrm{K_a}$ such that

a. $\mathrm{DC_o} = \mathrm{DC_{a,i}} \cup \{<p\ ,\ d>\}$, where d is the highest credence a can commit to without contradiction.

b. $\mathrm{T_o} = \mathrm{push}(S,\mathrm{T_i})$

c. $\mathrm{ps_o} = \mathrm{ps_i} \overline{\cup}\ \mathrm{p}$

failure set

This allows the speaker to vary their commitment to p through the use of credential commitment. Degrees of commitment is related to whether an update gets put on the Table. For unembedded ARDs, there is *high* commitment to p , and p is put on the Table. For the embedded ARD, degree of commitment is again tied to being placed on the Table, with the speaker showing *high* commitment to both p and q. For the embedded IRD, because there is no commitment to p , it does not get placed on the

Table, but q does (because the speaker has committed to it). Likewise, we should expect the unembedded IRD to be unable to place p on the Table, due to the lack of commitment, and this is what we observe.

Returning to our example, when Lalitha utters "It's raining?", it's tempting to assume the strategy in (4.37) is built, and then the Table is updated with the full strategy, since there is nothing on the Table initially.

(4.37)

Highest QUD What's the weather?

Utterance-derived question (uQ) Is it raining?

However, this cannot be the case. If we think about what the rise does (indicate that *Highest QUD* is still unresolved because the strategy might not succeed), then that would require simultaneously asking and providing an answer to uQ , as well as indicating that this could be an unsuccessful strategy. This would be a contradiction. This is shown in the Table below, where the strategy has put both the uQ and u on the Table - this is the asking and answering contradiction.

(4.38)

A	**Table** <It's raining?> <Is it raining? {"It is raining", "It is not raining"}> <What's the weather? {"It's raining","It's sunny"}>	**B**
Common Ground	**Projected Set**	

So it seems clear here that rather than proceeding as normal, some strategy needs to be pursued. You can, of course, push *any* strategy, but whatever is pushed to the Table needs to be internally consistent. The previous strategies of the ARDs (embedded and otherwise), are of the form *Highest QUD* $\rightarrow \{uQ \rightarrow u, sQ\}$. Pushing a strategy and using a rise leads to an ARD, since *Strategic-Catastrophe* indicates that sQ is still unsettled, which means that *Highest QUD* isn't resolved, either.

For an IRD, in contrast, it seems that there is no sQ , so it might be that only the uQ is pushed. But if you try to only push that, you end up with an inconsistent move. The strategy is a path for resolving *Highest QUD* and in this case, you would commit to the utterance u, which then answers uQ . And since uQ answers *Highest QUD* , by asserting u, you have resolved both *Highest QUD* and uQ . Thus, there must be no higher question than uQ here (unlike the embedded IRDs, where there could be other, higher questions). This creates strategies of the form uQ , u, and the rise indicates that uQ isn't resolved.

In order to implement that here, we return to the evidence that pushing

both u and uQ would cause a contradiction. While it is the case that u can be placed on the Table with graded commitment, here it is not added to the Table. Rather, the speaker adds $<u, d>$ to their discourse commitments. In the case of "It's raining?", the speaker would add the ordered pair $<$*it's raining*, $L>$ to their discourse commitments. This would commit them to something like *it's probably raining*, while never placing *it's raining* on the Table. This is shown below.

(4.39)

A	**Table** <Is it raining?, {It's raining}, {It's not raining}>	**B** <{It's raining}, L>
Common Ground s_1	**Projected Set** ps_1 =$s_1 \cup$ {it's raining}, $s_1 \cup$ {it's not raining}	

Notice here that we've captured the essence of why IRDs feel like questions - there's no answer to the maximum question on the Table. While Lalitha commits to *probably*(raining), *it's raining* is never put on the Table as an answer, and thus there are *no* answers available to resolve *Highest QUD* . In order for the conversation to continue, Niko must assist in resolving the *Highest QUD* , either by confirming or denying that it is raining. Lalitha cannot answer this with a more general statement about the weather unless it is accompanied by a response to Niko. Any response is infelicitous, as shown in (4.40)below.

(4.40) Lalitha (to Niko): It's raining?

Niko:

a. # The forecast says snow later.

b. No. The forecast says snow later.

Thus, by pushing a new type of discourse commitment, one that also records the speaker's limited ability to commit, we can proceed with the unembedded IRD. As shown in (4.39) above, the only path forward is to actively resolve whether it is raining.

Chapter 5

Conclusion

This paper has examined embedded rising declaratives and provided an account of their discourse effects. Understanding how these rising declaratives contribute to discourse is important for building out a unified analysis. Because these rising declaratives share many things - prosody, discourse effects, with their unembedded counterparts, it is clear that these are one thing, and therefore an account of rising declaratives should be able to capture the facts for both the unembedded and embedded rising declaratives. By proposing an account where speakers can deploy rising declaratives in order to resolve the main issue via a Strategy, we can capture these facts.

First, I introduced falling declaratives that are indirect answers, to show how a *Strategy*-based account would function for canonical assertions. Then, I introduced assertive rising declaratives, which use a *Strategy*, but also have the addition of a future where no *Strategy* can succeed, the *Strategic-Catastrophe* in the projected set. We then turned to the embedded assertive rising declaratives, which work out like their unembedded counterparts. I then discussed the embedded strategic inquisitive rising

declarative, which, again, follow from introducing the notions needed to handle the assertive rising declaratives of both the unembedded and embedded type. Then, I turn to the unembedded inquisitive rising declaratives, and add to the discourse commitments the notion of *degrees of commitment*.

Using this approach, we have a unified *Strategy*-based account of rising declaratives, where we can account for their behavior and what the rise contributes. As I have shown, it cannot be that the rise forms the question, since some of the QuDs being raised and answered are not explicitly the question being asked. Thus, it must be that the rise contributes *unresolvedness* - something is unresolved, be it the main QUD or some sQ. This approach has benefits - for example, it can explain what the metalinguistic issue is in |7|. In addition, it treats rising declaratives as assertions, with unsettledness about some issue contributed by the rising intonation. There are, of course, some things not addressed in this account, and some things left to work out, including a deeper discussion of focus and commitment.

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