

Indirect Evidence in Denotation & Discourse: At Best Second-Best*

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Abstract

This paper develops a threshold-based semantics for the Turkish indirect evidential marker, then shows that this marker's behavior in interrogatives, so-called *interrogative flip*, follows from the structure of discourse as formulated by models that incorporate speaker commitment. I first establish that the indirect evidential marks information for which a speaker's evidence is at best second-best, given general knowledge about the world. After formalizing this generalization in modal semantic terms, I show that it explains the marker's canonical absence in reports of historical fact, as well as its optional presence in evaluative and mirative expressions. In addressing the problem of interrogative flip, I enhance an existing discourse model with the novel concept of projected discourse commitment.

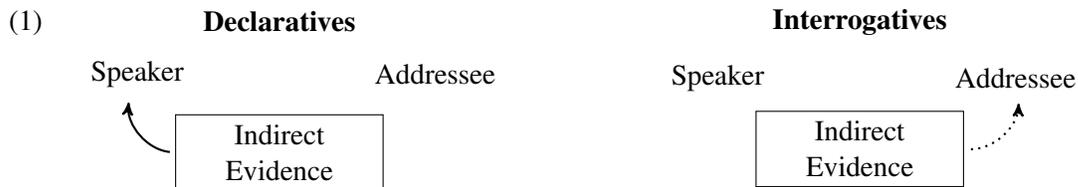
1 Introduction

Evidentiality, broadly defined, is the grammatical encoding of the source of the information expressed by a given utterance (Aikhenvald 2004). Turkish, as well as a genetically diverse array of languages spoken in Eastern Europe, the Caucasus, and Central Asia, exhibits a variety of evidentiality in which information acquired “indirectly” licenses an evidential marker: in the case of Turkish, the vowel-harmonic suffix *-mİş*. Unraveling exactly what information the evidential marker contributes is not a straightforward task (e.g., Slobin & Aksu 1982, Johanson 2000, Şener 2011). In many contexts, the suffix is interpreted as indicating that the speaker was told the information by a third party (hearsay), or has inferred it from facts at hand. Elsewhere, the suffix serves to express surprise at information whose source sits before the speaker's eyes, or to temper the presumptuousness of judgments and opinions. Well-known historical and scientific facts, on the other hand, are generally immune to the marker.

Evidential systems vary greatly in terms of what kinds of evidence, and what combinations thereof, they mark. The morphosyntactic shape of the markers themselves range from verbal affixes, to clausal clitics, to auxiliary verbs and discourse particles (AnderBois 2014). Yet despite the remarkable diversity among the evidential systems of the world, many such systems share a handful of traits that are all the more remarkable for their universality. One such common trait has come

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to be known as *interrogative flip*: in languages with grammaticalized evidential marking¹ an evidential appearing in an interrogative sentence reflects by default the addressee’s presumed source of information for the answer (San Roque et al. 2015). This phenomenon, schematized in (1), results in a contrast between interrogatives and declaratives, where the evidential canonically qualifies the speaker’s own evidence.



The goal of this paper is to address two basic questions about indirect evidentiality in Turkish. First, given the observations above, precisely what kind of evidence qualifies as indirect? Second, why does the perspective of the evidential shift from the speaker to the addressee in interrogatives? My claim is that given a comprehensive account of the semantics of indirect evidentiality, the perspective shift observed in interrogative contexts falls out of an independently justified commitment-based discourse model (Gunlogson 2001, Farkas & Bruce 2010).

The paper begins by introducing declarative and interrogative data that exemplify what I deem *perceptual* uses of the indirect evidential, followed by a range of *non-perceptual* data that skirt the witnessed/non-witnessed divide and prompt a broader generalization about the nature of indirect evidential content. After taking an inventory of prominent theoretical accounts already available, a new formal proposal is developed and applied to the perceptual and non-perceptual data. Finally, I lay out the commitment-based discourse structure used in the paper and explain how interrogative flip can be shown to follow from it.

2 Perceptual Uses of the Indirect Evidential

In this section, the data exemplify what I have dubbed “perceptual” uses of the indirect evidential: those that indicate that a speaker has inferential or reportative evidence, as opposed to unmediated visual confirmation, for the proposition expressed by an utterance.

¹The term “grammaticalized” is often used to distinguish between evidentiality as encoded by a dedicated affix or clitic, rather than by lexical or periphrastic means.

2.1 Declarative Sentences

After bare verb roots, with or without negation marking, *-mİş* is suffixed directly to the stem. After nominals, or verb stems bearing one or more tense, aspect, or modality suffixes, *-mİş* is preceded by the copula: *-Ø/-y-*. The examples in (2) illustrate the suffixation of *-mİş* to a bare verb root, and also serve to introduce the concepts of inferential versus reportative evidence. When a speaker has inferred that a proposition must hold based on facts at hand, she is said to have inferential evidence for that proposition. When a speaker has received a report about the truth of a proposition from another person, he is said to have reportative (or hearsay) evidence for that proposition.

- (2) **Inferential Context:** The speaker notices Hakan’s briefcase in the corner of the living room, but has not seen Hakan personally.

Reportative Context: Hakan’s sister has told the speaker that Hakan came home early, but the speaker did not personally witness Hakan’s arrival.

- (a) # *Hakan ev-e erken gel-di.*
Hakan home-DAT early come-PAST
‘Hakan came home early.’
- (b) *Hakan ev-e erken gel-miş.*
Hakan home-DAT early come-EVID
‘Hakan (apparently) came home early.’²

The example in (3) illustrates the appearance of the copula, here in its phonologically overt form *-y-*, when *-mİş* follows a vowel-final nominal. Note that the unmarked counterpart is bare.

- (3) **Inferential Context:** The speaker observes a cow behaving strangely, and believes this might be a symptom of illness.

Reportative Context: The speaker was told by another person that the cow is sick, but may or may not believe so herself.

- (a) # *İnek hasta.*
cow sick
‘The cow is sick.’
- (b) *İnek hasta-y-miş.*
cow sick-COP-EVID
‘The cow is/was (apparently) sick.’

²The English adverbial ‘apparently’ is not always a satisfactory translation for the content contributed by *-mİş*, but at times I include it to make salient the contrasts between glosses.

The contexts provided in (3) open the door to a first assumption about the meaning of *-mİş*: perhaps *-mİş* simply serves to indicate doubt on the part of the speaker. This point is often touched on in the descriptive literature. Johanson (2000), for instance, observes that indirect evidentials in the Turkic language family express neither doubt nor confirmation regarding an event. While doubt is certainly compatible with *-mİş*, the suffix need not express any doubt on the part of the speaker. In other words, *-mİş* specifies what kind of evidence a speaker has for the proposition at issue; her belief in the proposition itself is left to be determined by the context. In the reportative context given in (3b), for instance, the speaker may not believe that the cow is sick if she does not trust the reporter of the diagnosis; however, if her source is trustworthy, she might just as well believe the assessment without hesitation.³

It is important to note early on that while *-mİş* conveys indirect evidentiality in Turkish, the simple past tense suffix *-DI* does not necessarily indicate that a speaker's evidence is "direct." Simple past tense is merely the elsewhere case, the unmarked counterpart to *-mİş* when suffixed to a bare verb root. When suffixed to nominals, the absence of any suffix at all serves as the unmarked counterpart to *-mİş*. This is also true of verb stems bearing one or more tense, aspect, or modality suffixes. I take it that the presumption of direct evidence can arise in the absence of *-mİş* via a process of scalar implicature (Horn 1972). In other words, we need not assume that unmarked forms carry their own (direct) evidential content in Turkish. Instead, in particular contexts an unmarked form may implicate that a speaker possesses direct evidence via competition with the marked form *-mİş*.

2.2 Interrogative Sentences

Cross-linguistically, evidential questions are common. When a language possesses grammaticalized evidentials, they are rarely banned in interrogatives, and in interrogatives, the most common pattern is for the evidential to reflect the perspective of the addressee, the person to whom the question is posed (San Roque et al. 2015). That is, the evidential indicates that it is the addressee who possesses indirect evidence. This stands in contrast to the declarative case, where an evidential encodes the speaker's evidence for a proposition. Referred to as "interrogative flip," the phenomenon is sometimes described in terms of an evidential "anchor," the discourse participant whose perspective the

³Interesting contrasts regarding speaker doubt, first observed by Şener (2011, 100), emerge when context disambiguates whether a speaker's information is reportative versus inferential.

evidential takes. Example (4) illustrates a context in which the addressee, not the speaker, is expected to have received direct visual confirmation for the answer she will provide. Here, the simple past tense marker *-DI* is preferred, as in (4a).

- (4) **Context:** A babysitter has been watching a child named Hande for the evening. Hande is still young enough that she must be sat in a highchair and fed by someone else in order to eat. (Consequently, at any meal, the person feeding her sees everything that Hande eats.) The mother returns home and asks the babysitter how the evening went.

(a) *Hande yoğurd-u-nu bitir-di mi?*
 Hande yogurt-3S.POSS-ACC finish-PAST INT
 ‘Did Hande finish her yogurt?’

(b) # *Hande yoğurd-u-nu bitir-miş mi?*
 Hande yogurt-3S.POSS-ACC finish-EVID INT

In (5), on the other hand, the addressee is presumed to have indirect evidence for her response. As such, *-miş* is preferred. Here, the speaker is aware that the addressee, now the mother, will have inevitably received her information from another source, the babysitter.

- (5) **Updated Context (4):** The father returns home and asks the mother for the same information that the mother sought in (4). The father knows that the mother did not feed or witness the feeding of Hande.

(a) # *Hande yoğurd-u-nu bitir-di mi?*
 Hande yogurt-3S.POSS-ACC finish-PAST INT

(b) *Hande yoğurd-u-nu bitir-miş mi?*
 Hande yogurt-3S.POSS-ACC finish-EVID INT
 ‘Did Hande finish her yogurt?’

We also find that an interrogative cannot “coerce,” so to speak, the evidentiality of the addressee’s response. Revising the context of example (5), we observe in (6) that when the father uses the simple past *-DI* in his question, the mother will not simply respond with the same morphology. Instead, her response makes use of the indirect evidential *-miş*, and provides clarification for the switch.

- (6) **Revised Context (5):** The father mistakenly believes that the mother fed Hande and utters the interrogative in (5a), *Hande yoğurdunu bitirdi mi?* The mother responds as follows.

(a) # *Evet, bitir-di.*
 yes finish-PAST

(b) *Bakıcı-ya sor-du-m, bitir-miş.*
 babysitter-DAT ask-PAST-1S finish-EVID
 ‘I asked the babysitter, and she (Hande) did finish it.’

Based on the data presented in this section, an account of *-mİş* must not only explain the marker's ambiguity between reportative and inferential evidence and allow for variable speaker doubt: it must also predict interrogative flip. Given the cross-linguistic pervasiveness of interrogative flip in languages with grammaticalized evidentials, any account of indirect evidentiality should have as a central goal the explanation of why evidentials take speaker perspective in declaratives and addressee perspective in interrogatives. As documented in San Roque et al. (2015), a survey article of evidential questions, there do exist languages in which evidentials are said to take speaker (e.g., Yukaghir) or variable (e.g., Macedonian) perspective in interrogatives. Nonetheless, according to San Roque et al., interrogative flip is “the most common pattern for evidentials cross-linguistically.”

3 Non-Perceptual Uses of the Indirect Evidential

Some uses of *-mİş* fail to respect the distinction between eyewitness evidence on the one hand, and inferential or reportative evidence on the other. Perhaps the most obvious discrepancy arises when a speaker uses *-mİş* to convey her surprise at an event she has witnessed firsthand: the so-called “mirative” use. In these cases, *-mİş* serves to indicate that the proposition at issue is counter to the speaker's expectations. Another discrepancy is the use of indirect evidentiality to temper evaluative expressions. That is, a well-timed *-mİş* can render an otherwise arrogant-seeming opinion less presumptuous, or even complimentary. Finally, indirect evidentials are consistently absent in statements of scientific or historical fact, a detail that is often mentioned but not explained in the literature on Turkish.

3.1 Mirative Expressions

The question of how reportative, inferential, and mirative evidence can be said to denote a natural class is not new, even in Turkish linguistics (Slobin & Aksu 1982), and the debate continues in the semantics and pragmatics literature (DeLancey 2001, Peterson 2010, Rett & Murray 2013). Recent typological work suggests that the link between indirect evidentiality and mirativity, like interrogative flip, may constitute a linguistic universal, or at least a very strong cross-linguistic tendency (Aikhenvald 2012). Consequently, the capability to explain this link is one of the desiderata for an account of indirect evidentiality.

Example (7) offers a typical context in which one might expect to hear the mirative *-mİş*. Note that not only is the event remarked on suddenly; it is also counter to the expectations of the speaker. In situations of surprise, *-mİş* is common but optional, a trait shared by other non-perceptual data presented.

(7) **Surprised Context:** Unaware that her addressee was planning to come home early, the speaker answers a knock at the door and, to her surprise, is greeted by her addressee standing on the stoop.

- | | |
|----------------------------|---------------------------------|
| (a) <i>Erken gel-di-n!</i> | (b) <i>Erken gel-miş-sin!</i> |
| early come-PAST-2S | early come-EVID-2S |
| ‘You’re here early!’ | ‘(It seems) you’re here early!’ |

Because a speaker can convey surprise without using *-mİş*, we already see that this use differs from the non-mirative case. If a speaker omits *-mİş*, then an utterance cannot express indirect evidentiality, but it can still convey surprise. Given the context in (7), the utterance of (7a) will never be misleading; given the contexts provided in (2), uttering (2a) is. This observation is in agreement with the notion that *-mİş* is not specified for reportativity, inferentiality, or mirativity; instead, *-mİş* highlights some more general class of evidence that a speaker has for the proposition at issue. In situations of surprise, as argued in Section 5.3, claiming to have this class of evidence can be used for pragmatic effect.

3.2 Evaluative Expressions

For a wide range of utterances, the evidence that supports the propositions they express cannot easily be categorized as “witnessed” or “non-witnessed.” Evaluative expressions are a case in point. Without diving into the psychology of opinions, I present an example of the effect *-mİş* has on the communication of them. The exchange in (8) illustrates a scenario in which the speaker comments on the quality of an interlocutor’s joke. While the response in (8a) runs the risk of coming across as arrogant, the response in (8b) is likely to be perceived as complimentary.

(8) **Context:** Berk makes a joke that alludes to a well-known Turkish short story. Gökhan may respond to Berk’s joke as follows.

- | |
|---|
| (a) <i>Türk edebiyat-ı şaka-sı iyi-y-di.</i> |
| Turkish literature-3S.POSS joke-3S.POSS good-COP-PAST |
| ‘The Turkish literature joke was good.’ |

- (b) *Türk edebiyat-ı şaka-sı iyi-y-miş.*
 Turkish literature-3S.POSS joke-3S.POSS good-COP-EVID
 ‘The Turkish literature joke was good. (But who am I to judge?)’

Uses of *-miş* like the one in (8b) are not uncommon. I categorize them as non-perceptual uses of the evidential because the speaker cannot be said to have inferential or reportative evidence for the judgment offered. Given their prominence in spoken Turkish, an account of the semantics of *-miş* should be able to explain its use in evaluative expressions as well.

3.3 Optionality and Historical Facts

We have already seen, in the mirative, that sometimes “witnessed” evidence licenses *-miş*. Conversely, not all “unwitnessed” evidence requires *-miş*. In recounting the circumstances of a grandparent’s birth, we will see that *-miş* is typically used. This is expected, as one’s evidence for events prior to one’s own birth is inevitably either reportative or inferential. A reasonable assumption would be that in discussing the events of a historical figure’s life, one would do the same. However, this is not the case. Historical information almost never bears the indirect evidential in Turkish. Example (9) presents the relevant contrasts, for the case of one’s grandfather, the first president of Turkey, and the (less familiar) second president of Turkey. Uttering (9b) with *-miş* is unusual, and might give rise to any number of inferences: e.g., the speaker is new to Turkey, did not receive a public education there, or doubts the veracity of the trusted historical canon. Judgments regarding (9c) are less clear-cut and more context-dependent.

- (9) **Context:** During the course of a conversation among non-historians about family members, Turkish history, and other subjects, a speaker might utter the following. (Turkish speakers generally find these judgments canonical.)

- (a) *Dede-m Türkiye-'de doğ-{{#du / müş}}.*
 grandfather-1S.POSS Turkey-LOC be.born-{{#PAST / EVID}}
 ‘My grandfather was born in Turkey.’
- (b) *Atatürk Selanik-'te doğ-{{du / #müş}}.*
 Atatürk Thessaloniki-LOC be.born-{{PAST / #EVID}}
 ‘Atatürk (Turkey’s first president) was born in Thessaloniki.’
- (c) *İsmet İnönü İzmir-'de doğ-{{??du / müş}}.*
 İsmet İnönü Izmir-LOC be.born-{{??PAST / EVID}}
 ‘İsmet İnönü (Turkey’s second president) was born in Izmir.’

One might stipulate away the infelicity of *-mİş* in (9b) by positing an exemption for historical facts, but the lesser-known historical detail in (9c) generally favors *-mİş*. We might assume, then, that only “strong” historical facts are impervious to the indirect evidential. This is an ad hoc explanation, and not satisfying for a semantic account of *-mİş*.

What is more, by carefully tuning the context, we can reverse the judgments in (9a) and (9b). In (10), the student has presumably only recently learned that Atatürk was born in Thessaloniki, and believes she can acquire better evidence than she already has. As such, the fact no longer has the status it normally does for Turkish speakers: i.e., its truth cannot be taken for granted. Note that the generalized modality (GM) marker *-Dir* appears in Student B’s response. Here, it is suffixed to the non-finite post-verbal *-mİş*, which contributes no evidential content.⁴

(10) **Modified Context (9b):** A middle school student (A) requests homework help from an online forum called *eÖdev* ‘eHomework,’ where the titles of students’ posts reflect the topics they are requesting help with. Here, Student A’s post is shown with the accompanying reply by Student B.

A: *Can-ım Atatürk Selanik-’te doğ-muş.*
 dear-1S.POSS Atatürk Thessaloniki-LOC be.born-EVID
 ‘My dear Atatürk was (apparently) born in Thessaloniki.’

B: *Evet, Selanik-’te 1881 yıl-ı-nda doğ-muş-tur.*
 yes Thessaloniki-LOC 1881 year-3S.POSS-LOC be.born-EVID-GM
 ‘Yes, Atatürk was born in Thessaloniki.’

A: *Sağol...*
 ‘Thanks...’⁵

Similarly, while utterances like (9a) bear *-mİş* in most readily imagined contexts, scenarios can be generated that favor its omission. In (11), as in arguments, promises, and oaths more generally, omitting *-mİş* allows the speaker to avoid drawing attention to what kind of evidence she may have for the proposition expressed. This example shows that given the same evidence and speaker, a proposition for which *-mİş* is canonically preferred can be asserted without it.

(11) **Modified Context (9a):** In an argument about one’s regional identity, the speaker is accused of not being an authentic Istanbulite, but rather a mere Ankaran. The speaker lays out her arguments for being a true Istanbulite.

⁴For more information on non-finite, non-evidential *-mİş* and the generalized modality marker *-Dir*, see Göksel & Kerslake (2005) and Meriçli (2016b).

⁵<http://eodev.com/gorev/7264521>

Annem İstanbul'da doğdu, babam İstanbul'da doğdu, nenem, dedem İstanbul'da doğdu. Ankara'da büyüdüm diye Ankaralı mı oluyorum?

'My mother was born in Istanbul, my father was born in Istanbul, **my grandmother, my grandfather were born in Istanbul**. You're telling me that since I grew up in Ankara, I'm an Ankaran?'⁶

Relatedly, *-mİş* is optionally used for narrative effect in storytelling. Zeyrek (1990) observes the suffix's function and distribution in Turkish folktales, but this aspect of Turkish evidentiality is typically ignored in formal studies of the phenomenon. An account that accommodates the optionality of the suffix, however, may offer insights into its stylistic function. Zeyrek (1990) also briefly discusses what might be described as an age-off period for indirect evidential marking. For information acquired indirectly, especially widely acknowledged facts about current affairs and history, speakers come to favor the omission of *-mİş* over time. Why this is generally not the case for events in the lives of relatives remains to be explained.⁷

In the descriptive literature, *-mİş* is generally described as distinguishing information for which a speaker possesses evidence that was not witnessed firsthand, with an exception for the mirative case. I have provided support for the claim that this observation is on the right track, but not broad enough. The suffix *-mİş* may sometimes mark propositions for which the speaker clearly has firsthand evidence, as in the mirative case, but it can also be used to weaken the force of evaluative expressions, whose epistemic status evades clear classification as witnessed or non-witnessed. In the same vein, non-witnessed, well-known historical facts generally do not license *-mİş*, as one might expect. Finally, propositions that canonically prefer indirect evidential marking can also lack it in the proper context, and vice versa. All the data presented so far indicate that the felicity conditions of *-mİş* are profoundly context-dependent. In subsequent sections, I will show that they correspond to the following generalization.

(12) CLAIM

The use of *-mİş* signals that a discourse participant's evidence is **at best** the **second-best** realistically available evidence for the proposition at issue.

⁶Aslı Göksel, p.c.

⁷Donka Farkas (p.c.) has suggested that this use of *-mİş* is perhaps similar to the "humble" *-mİş* of evaluative expressions, conveying politeness or deference on the part of the speaker.

4 Existing Accounts

Here I briefly⁸ outline previous approaches to the semantics of evidentiality, with a focus on the accounts most relevant to the two main questions of this paper. First, I introduce the modalized approach to evidentiality that serves as a foundation for my own. Then, I highlight some basic aspects of the only (to my knowledge) extant theoretical account of evidentials in interrogative sentences. In general, no account so far has adequately defined the umbrella term “indirect,” addressed the contrasts observed regarding non-perceptual uses of evidentials, or explained the universal prevalence of interrogative flip.

4.1 Indirect Evidence in Izvorski (1997)

Izvorski (1997) is widely acknowledged as the foundational account of evidentiality within a modal semantic framework. Although the paper focuses on establishing a modal semantics of indirect evidentiality in Bulgarian, it also takes aim at the noted cross-linguistic link between present perfect relative tense and indirect evidentiality. The central analysis in Izvorski (1997) begins by establishing that sentences involving indirect evidentials are of the form $Ev(p)$, where Ev is an indirect evidentiality operator on the at-issue (or “core”) proposition p . In Izvorski’s view, Ev is a modal, akin to *must*, whose base has been relativized to the epistemic state of the speaker. As such, the utterance of $Ev(p)$ results in an interpretation that p is possible, likely, or necessary given what the speaker knows. The strength of Ev depends on how reliable the source of the speaker’s indirect evidence is.

To fill in the meaning of the modal operator Ev , Izvorski adopts the enriched modal semantics of Kratzer (1981) and defines the constrained epistemic modal base $f(w)$, the function that assigns to every possible world w the set of propositions that a speaker knows in w and considers indirect evidence for the at-issue proposition p . The base f is called “constrained” because it is crucially the subset of a speaker’s epistemic modal base that is counted as *indirect* evidence for p . Though different accounts differ in precisely how the modal base f is constrained, the notion of a constraint on f is a running theme in every descendant analysis, including mine.

⁸For a more comprehensive survey of relevant analyses, see Meriçli (2016a).

After defining f , Izvorski introduces an ordering source $g(w)$, the function that assigns to every possible world w the set of propositions that represent the speaker's beliefs about available indirect evidence for p in w . The set of propositions g imposes an ordering on the set of all possible worlds W as shown in (13a). A world v is more ideal than a world u ($v <_g u$) if the set of g -propositions (beliefs about indirect evidence) true in u are a strict subset of those that are true in v .

(13) Izvorski's (1997) Modal Base and Ordering Source

$$(a) \forall u, v \in W : v <_{g(w)} u \text{ iff } \{p : p \in g(w) \wedge u \in p\} \subset \{p : p \in g(w) \wedge v \in p\}$$

$$(b) f(w) = \{q : \text{speaker knows } q \text{ and considers } q \text{ indirect evidence for } p \text{ in } w\}$$

$$(c) g(w) = \{q : \text{speaker believes } q \text{ with respect to indirect evidence in } w\}$$

The evidential proposition $Ev(p)$, then, contributes the denotation shown in (14). In prose, $Ev(p)$ is true in w if and only if p is true in all worlds accessible from w that come closest to the ideal represented by the speaker's beliefs about indirect evidence available in w . Note that $\bigcap f$ is simply the set of all worlds in which all the propositions of f are true.

$$(14) \llbracket Ev(p) \rrbracket^{f,g} = \{w : \forall u[(u \in \bigcap f(w) \wedge \neg \exists v(v \in \bigcap f(w) \wedge v <_{g(w)} u)) \rightarrow u \in p]\}, \\ u, v, w \in W$$

The ordering source introduces variability into the quantificational force of Ev as follows. If in the world of evaluation w a particular piece of indirect evidence for p is considered reliable, then $g(w)$ highly ranks worlds where the following two conditions hold: the specified evidence for p exists and p is true. Because $Ev(p)$ asserts that all those worlds are elements of p , Izvorski claims, it is understood that p is likely in w . For the case where a particular piece of indirect evidence for p is seen as unreliable, the set of worlds where such evidence exists and p is true is "restricted." According to Izvorski, this produces the interpretation that p is less likely in w .

Still, Izvorski's account and subsequent accounts for which the distinction is relevant leave the definition of "indirect evidence" unspecified. Specifically, the analysis allows for variation in the strength of the indirect evidence that a speaker might have, but it makes no predictions about what kind of evidence actually qualifies as indirect in the first place. Creating a definition of "indirect evidence" broad enough to include mirative and evaluative expressions, but narrow enough to (usually) exclude historical facts, is far from straightforward. In Izvorski (1997) and in other accounts both theoretical and descriptive, this definition is either left unaddressed or discussed only informally (e.g., Johanson 2000, Coşkun 2010, Şener 2011).

Several studies have adapted the modal semantics of Izvorski (1997) to languages with finer-grained evidential systems. Matthewson et al. (2007), for instance, develops three distinct accessibility relations to account for the distinct perceived, reported, and inferential evidence morphemes of St’át’imcets. While Faller (2011) replicates this analysis to some extent, it also incorporates a more nuanced semantics of inference and conjecture, for which Cuzco Quechua possesses separate evidential markers. Matthewson et al. (2007) concludes that evidentials should be analyzed as epistemic modals, but Faller (2011) argues that evidentials and epistemic modals are distinct categories that merely overlap in some cases. Like these other accounts but unlike the one proposed in Section 5, Şener (2011) defines separate modal bases for reportative and inferential evidence in Turkish.

4.2 Murray (2010) on Interrogatives

Sentences with evidentials are sometimes analyzed as involving two propositions that differ with regard to their status as “at-issue” content. One proposition represents the “at-issue” material that falls under the scope of the evidential, and the other the evidential content itself: what kind of evidence the speaker has for the at-issue proposition (e.g., Murray 2010, AnderBois 2014). This distinction, prominent in illocutionary analyses of evidentiality, is illustrated in (15).

- (15) (a) p : a proposition (within the evidential’s scope)
 (b) $\text{IND}(i,p)$: proposition that speaker i has indirect evidence for p
 (c) $\text{HRD}(i,p)$: proposition that speaker i has reportative evidence for p

In combination with the intricate update semantics laid out in Bittner (2011), Murray is able to capture important generalizations about the not-at-issue nature of evidential content. Also, unlike that of Izvorski (1997) and other modal accounts, Murray’s formalism easily lends itself to addressing the behavior of evidentials in interrogatives. Rather than anchoring the not-at-issue, evidential proposition to the speaker, as in $\text{HRD}(i,p)$, it can simply be anchored to the addressee: $\text{HRD}(u,p)$. Suppose a speaker asks a polar interrogative question as in (4). The information state undergoes a number of successive updates. First, the context set⁹ is partitioned into the two alternatives p and $\neg p$. Next, a not-at-issue restriction is imposed. In this case, the restriction does not constrain the context set, because the fact that the addressee has reportative evidence is already part of the

⁹Roughly the same as the well-known concept introduced by Stalnaker (1978).

common ground. In other words, the context set is contained by the union of the sets $\text{HRD}(u, p)$ and $\text{HRD}(u, \neg p)$.

$$(16) \quad cs \subseteq \text{HRD}(u, p) \cup \text{HRD}(u, \neg p)$$

Beneath this attractive result lurks a crucial assumption: that the *addressee* is the discourse participant with the reportative evidence when a question is asked. Within the argument of HRD, the switch from i (the speaker) to u (the addressee) does not fall out of more basic principles, either of Murray’s (2010) account or of the update semantics adopted therein. That is, in Murray’s analysis of evidential interrogatives in Cheyenne, interrogative flip is not predicted, but stipulated. Again, given the prevalence of interrogative flip, it would be desirable to derive it rather than stipulate it.

5 The Meaning of Indirect Evidentiality

In this section, I propose a denotation of *-mIḡ* that aims to more firmly fix the meaning of “indirect evidence,” rather than merely presuming that such an epistemic class exists.

5.1 Formalizing the Best Evidence

With a nod to Izvorski (1997), and by extension Kratzer (1981), I assume a possible worlds semantics, where W is the set of all possible worlds and $f_s(w, p)$ is a constrained epistemic modal base: as given in (17), the function that assigns to every possible world w the set of propositions that the speaker s knows in w and considers evidence for the at-issue proposition p . This starting point differs from the starting points of previous accounts in that it does not bake an “indirect” flavor into the modal base. That is, $f_s(w, p)$ is not restricted to containing only what qualifies as indirect evidence for p , as in the (more) constrained modal base $f(w)$ of Izvorski (1997).¹⁰ Similarly, this starting point involves only one modal base, as opposed to the separately defined bases of Matthewson et al. (2007), Faller (2011), or Şener (2011). In Faller’s case, for instance, the finer-grained morphological paradigm for Cuzco Quechua evidentials justifies the creation of the independent functions $f_{epistemic}$, $f_{perceived}$, and $f_{reportative}$. In Turkish, as in all the languages that Aikhenvald (2003) dubs Type I, these distinctions in evidence type are left to be determined by the context.

¹⁰Note that including the at-issue proposition p among the arguments of $f_s(w, p)$ is only meant to make explicit a feature that both my analysis and Izvorski’s share: that the modal base is relativized not only to the speaker s and to the world w , but also to the proposition p . In Izvorski (1997), only the dependence on w is made formally explicit.

$$(17) f_s(w, p) = \{q : s \text{ knows } q \text{ and considers } q \text{ evidence for } p \text{ in } w\}$$

“The function that assigns to every possible world w the set of propositions that the speaker s knows in w and considers evidence for p .”

In explaining the machinery inside of $\llbracket -mI\grave{s} \rrbracket$, I will use the contrast between (9a) and (9b) to make each step more concrete. The data are given again in (18).

$$(18) \quad (a) \quad \begin{array}{l} \textit{Dede-m} \quad \quad \quad \textit{Türkiye-'de} \quad \textit{doğ-}\{\#du / \#mu\grave{s}\}. \\ \text{grandfather-1S.POSS} \quad \text{Turkey-LOC} \quad \text{be.born-}\{\#PAST / EVID\} \\ \text{'My grandfather was born in Turkey.'} \\ \Rightarrow p_G = \{w : \text{my grandfather was born in Turkey in } w\} \end{array} \quad (9a)$$

$$(b) \quad \begin{array}{l} \textit{Atatürk Selanik-'te} \quad \quad \quad \textit{doğ-}\{\#du / \#mu\grave{s}\}. \\ \text{Atatürk} \quad \text{Thessaloniki-LOC} \quad \text{be.born-}\{\#PAST / \#EVID\} \\ \text{'Atatürk (Turkey's first president) was born in Thessaloniki.'} \\ \Rightarrow p_A = \{w : \text{Atatürk was born in Thessaloniki in } w\} \end{array} \quad (9b)$$

Next, I define the set of propositions $\mathcal{G}(w)$, which represents general world knowledge in w . It contains propositions that qualify as common knowledge in a particular speech community. $\mathcal{G}(w)$ constitutes a source of context dependence in the meaning of $-mI\grave{s}$: it depends on the broad context of utterance that involves who the speakers are and what is generally taken for granted in their speech community. For instance, whether a given proposition is considered a historical fact depends upon speakers' ages, levels of education, and even national origin.

The propositions of $\mathcal{G}(w)$ will be generally held facts such as, ‘People cannot witness the births of those older than them,’ ‘There generally exist records one has not examined regarding the birthplaces of relatives,’ and ‘Information about the birthplaces of historical figures has typically received heavy scrutiny.’ While this is in theory a very large set of propositions, subsequent steps in the derivation will show that its size need not pose a problem. I use the set $\mathcal{G}(w)$ merely as a tool for setting constraints in the framework, and only overtly discuss those elements of $\mathcal{G}(w)$ that are most relevant for illustrating the analysis.

$$(19) \quad \mathcal{G}(w) = \{g_1, g_2, g_3, \dots, g_n\}$$

$$g_1 = \{u : \text{people cannot witness the births of those older than them in } u\}$$

$$g_2 = \{u : \text{there generally exist records one has not examined regarding the birthplaces of relatives in } u\}$$

$$g_3 = \{u : \text{historical figures' birth records have typically been examined in exhaustive detail in } u\}$$

$$\vdots$$

Next, a set of inferences (propositions) about the world $\mathcal{I}(w, p)$ is defined according to the following conditions. For each element of common knowledge $g_i \in \mathcal{G}(w)$, check that g_i is consistent with the at-issue proposition p . Then, for any given world u , if the remaining g_i are true in u , then the proposition $q \in \mathcal{I}(w, p)$ must also be true in u . In other words, $\mathcal{I}(w, p)$ is the set of all propositions that necessarily follow from p and $\mathcal{G}(w)$ together – or the set of all inferences that might arise from the utterance of p in w . If p_G is the proposition expressed by ‘My grandfather was born in Turkey,’ then $\mathcal{I}(w, p)$ contains the inferences ‘The speaker did not witness the birth of his grandfather’ and ‘There likely exist records the speaker has not examined regarding the birth of his grandfather,’ among others. If p_A is the proposition expressed by ‘Atatürk was born in Thessaloniki,’ then $\mathcal{I}(w, p)$ contains the inferences ‘The speaker did not witness the birth of Atatürk’ and ‘All records regarding the birth of Atatürk have likely been examined with scrutiny.’

$$(20) \quad \mathcal{I}(w, p) = \{q : u \in \bigcap_{i=1}^n (g_i \cap p) \rightarrow u \in q\}$$

“Intersect each proposition in the set of common knowledge $\mathcal{G}(w)$ with the at-issue proposition p . Then intersect those intersections. A proposition q is a member of $\mathcal{I}(w, p)$ iff all the worlds in the second intersection are also in q .”

$$\begin{aligned} \text{e.g., } g_1 \cap p_G &\subseteq \{v : \text{the speaker did not witness his grandfather's birth in } v\} \\ g_2 \cap p_G &\subseteq \{v : \text{there likely exist records the speaker has not examined} \\ &\quad \text{regarding the birth of his grandfather in } v\} \\ g_1 \cap p_A &\subseteq \{v : \text{the speaker did not witness Atatürk's birth in } v\} \\ g_3 \cap p_A &\subseteq \{v : \text{all records regarding the birth of Atatürk have likely been} \\ &\quad \text{examined in exhaustive detail } v\} \end{aligned}$$

To set the stage for defining precisely what sort of evidence licenses *-mIs*, I introduce $f_0(w, p)$, the partially ordered set of all possible evidence for the at-issue proposition p in w . For either p_G or p_A , f_0 will contain propositions such as those expressed by ‘ s directly observed p ,’ which outranks ‘ s found previously unexamined records documenting p ,’ which might outrank ‘ s was told by reliable sources over many years that p .’¹¹

$$(21) \quad f_0(w, p) = \{q_{best}, q_{best-1}, q_{best-2}, \dots\}, \quad q_{best} > q_{best-1} > q_{best-2} > \dots$$

$$\begin{aligned} q_{best} &= \{u : s \text{ saw } p \text{ in } u\} \\ q_{best-1} &= \{u : s \text{ found previously unexamined records documenting } p \text{ in } u\} \end{aligned}$$

¹¹In (21), the expression ‘ $q_{best} > q_{best-1}$ ’ means that q_{best} is more highly ranked than q_{best-1} , reversing the ‘ $<_g$ ’ of Izvorski (1997). I assume that if each proposition is defined with the appropriate degree of specificity, then the ordering remains constant from context to context, and from proposition to proposition. In other words, the proposition expressed by ‘ s saw p without his glasses on, and has poor eyesight’ is an element of f_0 (say, $q_{best-47}$) distinct from the element q_{best} given in (21).

$$\begin{aligned}
q_{best-2} &= \{u : s \text{ uncovered photos and correspondence indicating } p \text{ in } u\} \\
q_{best-3} &= \{u : s \text{ was told } p \text{ over many years by reliable sources in } u\} \\
&\vdots
\end{aligned}$$

Intersecting f_0 , the set of all possible evidence, with \mathcal{I} , the set of all inferences that might arise from uttering the proposition in w , eliminates all evidence not consistent with common knowledge in light of the at-issue proposition p . The result is the set of all realistically available evidence, $f_c(w, p)$. I call f_c the set of all “world-compatible evidence,” because it contains only that evidence that is compatible with speakers’ general knowledge about the world. In (22), I demonstrate the result of intersecting f_0 and \mathcal{I} for the propositions expressed by (9a) and (9b). For p_G , the proposition expressed by ‘My grandfather was born in Turkey,’ just the topmost element of possible evidence q_{best} is lost. For p_A , however, several elements of possible evidence are eliminated from f_c : q_{best} , q_{best-1} , and q_{best-2} .

$$(22) \quad f_c(w, p) = f_0(w, p) \cap \mathcal{I}(w, p)$$

$$\begin{aligned}
\Rightarrow \quad f_c(w, p_G) &= \{\cancel{q_{best}}, q_{best-1}, q_{best-2}, q_{best-3}, \dots\} = \{q_{best-1}, q_{best-2}, q_{best-3}, \dots\} \\
\text{for } p_G &= \{w : \text{my grandfather was born in Turkey in } w\} \quad (9a)
\end{aligned}$$

$$\begin{aligned}
f_c(w, p_A) &= \{\cancel{q_{best}}, \cancel{q_{best-1}}, \cancel{q_{best-2}}, q_{best-3}, \dots\} = \{q_{best-3}, \dots\} \\
\text{for } p_A &= \{w : \text{Atatürk was born in Thessaloniki in } w\} \quad (9b)
\end{aligned}$$

In both cases, while f_c has shed one or more propositions, those remaining retain the partial ordering imposed on f_0 . That is, f_c is not only a subset of f_0 ; the propositions that f_c retains fall in the same relative ordering as in f_0 .

Now that the architecture of the account has been established, I claim that the Turkish indirect evidential suffix *-mİş* contributes the following denotation.

$$(23) \quad \llbracket -mİş \rrbracket^{s,w} = \lambda p. [\forall r \in f_s(w, p) \exists q \in f_c(w, p) \text{ s.t. } q > r]$$

$$\Rightarrow \llbracket p_G \rrbracket \llbracket -mİş \rrbracket^{s,w} = 1 \quad (9a)$$

$$\llbracket p_A \rrbracket \llbracket -mİş \rrbracket^{s,w} = 0 \quad (9b)$$

In the language of truth conditions, this means that a predicate bearing *-mİş* is true if and only if some piece of evidence that is more convincing than the speaker’s best evidence is realistically available. For p_A -*mİş* to be true, some proposition ranked higher than q_{best-3} , for instance ‘ s found previously unexamined records documenting p_A ’ (q_{best-1} in (21) above) would have to be

realistically available in w , and therefore an element of $f_c(w, p_A)$. Because p_A is considered a historical certitude, such evidence is not realistically available.

The suffix $\llbracket -mI\mathcal{S} \rrbracket$ indicates that in relation to the very best world-compatible evidence, the speaker’s own evidence is at best second-best. For the case of (9a), this means that not only did the speaker not witness her grandfather’s birth; she also crucially lacks evidence that she plausibly could have, of the sort that is taken to support trusted historical facts – archival documents, old photos, etc. For the case of (9b), whether the speaker has archival documents or old photos to support her claim is irrelevant, because her finding any that have not already been examined is effectively impossible. In other words, the range of world-compatible evidence available for p_A is constrained relative to that available for p_G .

5.2 Context Dependence

So far, I have shown that the denotation in (23) correctly predicts the contrast between (9a) and (9b). As for (9c), the system works much the same way, except that the birthplace of İsmet İnönü is not as well known as Kemal Atatürk’s. It generally does not qualify as common knowledge in Turkey that when someone provides information about the life of İnönü, no stone has been left unturned regarding that information. Hence, elements that were missing in $f_c(w, p_A)$ are present in $f_c(w, p_I)$, where p_I is the proposition expressed by ‘İsmet İnönü was born in Izmir.’ The result is that for most speakers the birthplace of İnönü is epistemically more on par with that of their own grandfather. The caveat *most speakers* is important, because for a person who does have more conclusive evidence (an archival researcher on the matter) or someone not intending to give the impression that it exists (a history teacher), p_I will not favor the use of $-mI\mathcal{S}$.

Example (9c) highlights an important element of context dependence in the denotation of $-mI\mathcal{S}$. Whether a “better” piece of evidence is thought to exist in support of a given proposition crucially depends on what is taken to constitute general, common knowledge about the world. That is, the propositions that populate $\mathcal{G}(w)$ will be different for different speech communities, speakers, eras, and contexts of utterance. This implies, in turn, that the set of all realistically available (world-compatible) evidence $f_c(w, p)$ will vary along the same dimensions: if $\mathcal{G}(w)$ changes, then so does $\mathcal{I}(w, p)$, which will place different constraints on the set of all possible evidence $f_0(w, p)$ when deriving f_c .

This discussion brings us to the modified contexts of (10) and (11), where a sentence about Atatürk’s birthplace appears with *-mİş*, and a sentence about one’s grandfather’s birthplace appears without *-mİş*: the opposite of what is observed in (9a) and (9b). In (10), Student A reveals that he or she is not certain whether the proposition at issue (p_A) qualifies as a proposition for which elements of possible evidence like q_{best-1} and q_{best-2} are unavailable. To Student A, it is not clear whether p_A is to be taken as a historical fact; for Student B, however, it is.

As for example (11), similar to the history teacher in the case of (9c), the speaker avoids conceding that she lacks the best world-compatible evidence for p_G by omitting *-mİş*. As a general tendency, *-mİş* is omitted from sentences where it would otherwise appear when the sentence is uttered in the context of an argument, an oath, or, as we have seen, a history class. Example (11) reiterates that unmarked utterances do not necessarily implicate direct evidentiality. That is, a speaker who omits *-mİş* in the context of an argument is not indicating that a proposition has the evidential status of a historical fact (and therefore lying); rather, she simply chooses not to associate any evidential information with that proposition at all.

5.3 Explaining Mirative Expressions

If common knowledge does not rule out the possibility of visual evidence, as is the case in reportative and inferential uses such as (2b) and (3b), then *-mİş* is preferred simply because q_{best} , the proposition expressed by ‘the speaker has visual confirmation for p ,’ is always an element of $f_c(w, p)$. By using *-mİş*, the speaker indicates that q_{best} is not a member of $f_s(w, p)$, which satisfies the denotation in (23). The difficulty with mirative expressions is that the opposite appears to be true. The judgment in (7b) is surprising, so to speak, given our framework.

How can it be that the speaker’s evidence in (7) qualifies as indirect simply because the proposition at issue is counter to her expectations? It seems that robust previous evidence for $\neg p$ can interact with the mechanics of *-mİş*. To observe those mechanics in action, the first step is to define a constrained epistemic modal base f_s in terms of the the at-issue proposition.

- (24) (a) $p_{early} = \{w : \text{you're here early in } w\}$
 (b) $f_s(w, p_{early}) = \{q : s \text{ knows } q \text{ in } w \text{ and } q \text{ serves as evidence for } p_{early}\}$

The context in (7) entails that the speaker has the best realistically available evidence for p_{early} : immediate visual confirmation. This evidence is represented by the element q_{best} in $f_0(w, p_{early})$. World knowledge indicates $q_{best} \in f_c(w, p_{early})$ as well.

$$(25) \quad f_c(w, p_{early}) = \{q_{best}, q_{best-1}, q_{best-2}, \dots\}, \quad q_{best} > q_{best-1} > q_{best-2} > \dots$$

$$q_{best} = \{u : s \text{ sees } p_{early} \text{ in } u\}$$

$$\vdots$$

We have seen that a speaker might omit $-mI_s$ in the midst of an argument, in order to avoid highlighting that her evidence is less than the best realistically available evidence. In a sense, the use of $-mI_s$ in situations of surprise is the converse: including $-mI_s$ in (7) allows the speaker to actively deny that her evidence is the best.

$$(26) \quad \llbracket p_{early} \rrbracket \llbracket -mI_s \rrbracket^{s,w} = 1 \Rightarrow q_{best} \notin f_s(w, p_{early})$$

Yet it is clear that the speaker does see Hakan standing before her, in which case $q_{best} \in f_s(w, p_{early})$ must hold. It appears we have a contradiction, unless the following is true.

$$(27) \quad q_{best} \neq \{u : s \text{ sees } p_{early} \text{ in } u\}$$

In fact, this is just what we would expect, if a speaker's evidence for $\neg p_{early}$ is so robust that she *cannot believe her eyes*. The speaker makes the claim that, given what she already knows, the proposition expressed by 'I see that you are here early' cannot be reliable evidence. In other words, $-mI_s$ allows the speaker to indicate that visual confirmation, in this case, does not constitute the highest ranked proposition in f_c ¹²

5.4 Explaining Evaluative Expressions

We now return to the evaluative use of $-mI_s$ in (8b). As in the mirative case, the appearance of $-mI_s$ is unexpected because the speaker's experience of the joke is unmediated, and evaluations need not bear $-mI_s$ in general – see (8a). The speaker appears to have firsthand evidence for the quality of the joke. As usual, we begin by defining a constrained modal base f_s in terms of the at-issue proposition.

¹²An alternative account of the mirative in this framework suggests itself nonetheless. Making use of a concept that I call "epistemic lag," we might claim that in situations of surprise, a sentence expressing the proposition p_{early} is uttered so suddenly and with so much evidence against it, that the speaker's eyewitness evidence for p_{early} has not yet been added to f_s . That is, at the time of utterance, $q_{best} \notin f_s(w, p_{early})$ does hold. Because this explanation verges further into the realm of cognitive psychology and away from that of pragmatics, I leave its elucidation for future work, perhaps in the experimental realm.

- (28) (a) $f_s(w, p_{eval}) = \{q : s \text{ knows } q \text{ in } w \text{ and } q \text{ serves as evidence for } p_{eval}\}$
 (b) $p_{eval} = \{w : \text{the Turkish literature joke was good in } w\}$

Because the claim expressed by p_{eval} is subjective, the evidence taken to support it will inherently be subjective as well. To possess q_{best} for an evaluative claim such as p_{eval} is to be the ultimate authority on Turkish literary humor. Some realistically available elements of evidence are laid out schematically in (29).

- (29) $f_c(w, p_{eval}) = \{q_{best}, q_{best-1}, q_{best-2}, \dots\}, \quad q_{best} > q_{best-1} > q_{best-2} > \dots$
 $q_{best} = \{u : s \text{ considers self a respected authority on intellectual humor in } u\}$
 $q_{best-1} = \{u : s \text{ cultivates an appreciation for Turkish literature in } u\}$
 $q_{best-2} = \{u : s \text{ can perceive irony in literary references in } u\}$
 \vdots

As long as q_{best} is plausible given general world knowledge, which it may very well be for any speaker, then $q_{best} \in f_c(w, p_{eval})$. To temper the presumptuousness of the judgment offered, a speaker can choose to indicate that $q_{best} \in f_s(w, p_{eval})$ is false. One way to do this, I have shown, is to use $-mI_s$.

- (30) $\llbracket p_{eval} \rrbracket \llbracket -mI_s \rrbracket^{s,w} = 1 \Rightarrow q_{best} \notin f_s(w, p_{eval})$

The implication in (30) illustrates the use of $-mI_s$ to deny that one's evaluation is the most authoritative possible. When a speaker's evidence is subjective, using $-mI_s$ indicates that even one's best evidence is worse than what would underlie an expert's opinion. By stating that maximum authority is not among the pieces of evidence that justify one's opinion, the opinion is softened.

5.5 When a Speaker Has No Evidence

This account makes an interesting prediction about cases when a speaker has absolutely no evidence for the proposition at issue p . Just like the less-than and greater-than relations in mathematics, the ordering operator ' $>$ ' is only defined over pairs of arguments, which in its case must be propositions. This fact has the following consequence.

- (31) $f_s(w, p) = \{\emptyset\} \Rightarrow \llbracket p \rrbracket \llbracket -mI_s \rrbracket^{s,w} \text{ undefined}$

That is, when a speaker has no evidence whatsoever for the proposition at issue, $\llbracket -mI_s \rrbracket$ is undefined. This observation is relevant for the canonical scenario in which a speaker asks an (unbiased)

information-seeking question: generally, the speaker has no evidence for or against the propositions at issue following such a discourse move. Hence, we would expect that *-mIs* can never be indexed to the discourse participant asking a question, a desirable consequence in light of interrogative flip.

6 Indirect Evidentiality in Discourse

Several previous studies have shown the appropriateness of commitment-based discourse models for addressing topics in the literature on evidentiality. Proposing a revised version of the discourse model developed in Gunlogson (2001), Gunlogson (2008) suggests that such a route might prove fruitful. Adopting a variety of Gunlogson’s framework as refined by Farkas & Bruce (2010), the analysis in AnderBois (2014) takes aim at a phenomenon AnderBois dubs “reportative exceptional-ity.” Northrup (2014), working within the illocutionary evidential school, further develops the Gunlogsonian model to examine evidential discourse particles in Japanese. While Davis et al. (2007) proposes a probabilistic pragmatic account of evidentiality, the authors nonetheless speculate that a “more narrowly semantic account,” for instance one based on modality, could predict the same pragmatic effects. Showing that is the aim of this section.

6.1 A Commitment-Based Discourse Model

Like AnderBois (2014), I adopt the variety of discourse model pioneered in Gunlogson (2001, 2008) and developed further in Farkas & Bruce (2010). One of the model’s primary contributions to work on discourse structure is the introduction of a formalism for keeping track of the public discourse commitments that speakers make independently of one another. This move allows the model to dive deeper into the mechanics of discourse than others that keep track of only what propositions have been accepted as true by both speakers: the common ground (*cg*) of Stalnaker (1978). In a commitment-based discourse model, the *cg* is equivalent to the set of all propositions to which both speakers have expressed a public commitment.

One pillar of the system in Farkas & Bruce (2010) is the Table, which keeps a running log of information that has not yet either been confirmed, rejected, or set aside by all the discourse participants. The discourse is only in a “stable” state when the Table is completely empty. Although Farkas & Bruce add syntactic objects paired with their denotations to the Table, I use a simplified

Table that records only denotations. I assume, along with Farkas & Bruce, as well as Murray (2010) and by extension Hamblin (1971), that the denotation of a polar interrogative consists of two complementary alternatives. For a polar interrogative question denoting $\{p, \neg p\}$, uttered at a stable state in the conversation, we have the following discourse structure.

(32)

speaker (<i>s</i>)	Table	addressee (<i>a</i>)
DC_s	$\{q, \neg q\}$	DC_a
Common Ground <i>cg</i>		Projected Set <i>ps</i>

DC_s : $\{p : p \text{ is a public commitment of } s, \text{ not shared with } a\}$

cg : $\{p : p \text{ is a joint commitment of } s \text{ and } a\}$

Table : $\{p : \text{neither } p \text{ nor } \neg p \text{ follows from } cg\}$

ps : $\{p : p \in q \cup cg \text{ or } p \in \neg q \cup cg\}$

Note that the *ps* is always recoverable if the Table and the *cg* are known. Crucial for my analysis is an understanding of how the discourse effects of the speech acts of assertion and question differ. Farkas & Bruce (2010) provides a clear account of this distinction within its model. Again stripping away some of its stack-based formalism, the account is as follows in (33). It is important for both Farkas & Bruce's and my own analysis that the discourse effects shown in (33) correspond specifically to falling declaratives in the case of assertion, and rising polar interrogatives in the case of question.

- (33) (a) **Assertion:** $\{p\}$ is added to DC_s and Table *ps* becomes $\{p \cup cg\}$
 (b) **Question:** $\{p, \neg p\}$ is added to Table *ps* becomes $\{p \cup cg, \neg p \cup cg\}$

Rising polar interrogative questions therefore add nothing to either the speaker's (DC_s) or the addressee's (DC_a) public discourse commitments. In order for the discourse to return to a stable state, first the addressee must add one of the alternatives p or $\neg p$ to DC_a (as well as to the Table): that is, questions *project* addressee commitment. Following the addressee's response, the speaker must then (canonically) accept whatever the addressee added to the Table by adding it to his own set of discourse commitments, DC_s . At that point, a joint commitment to either p or $\neg p$ has been established, and the Table is cleared.

6.2 Predicting Interrogative Flip

Unlike other accounts of the discourse effects of evidentials (Davis et al. 2007, AnderBois 2014), I offer no special treatment for sentences involving grammaticalized evidential markers. Treating

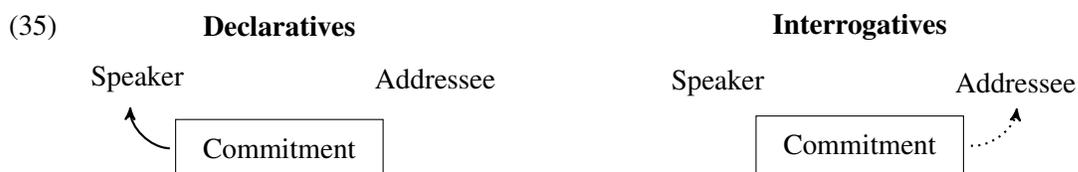
$-mI_s$ as an operator on par with modality and tense permits us to have a speaker commit to the entire proposition, including $-mI_s$, expressed by a given utterance. To distinguish this proposition from the at-issue proposition p , I introduce the variable p_{ev} , which makes explicit that the content contributed by Izvorski's (1997) $Ev(p)$ is itself propositional. It is the proposition expressed by $p-mI_s$.

$$(34) \quad p_{ev} := p-mI_s$$

- (a) **Assertion:** $\{p_{ev}\}$ is added to DC_s and Table ps becomes $\{p_{ev} \cup cg\}$
 (b) **Question:** $\{p_{ev}, \neg p_{ev}\}$ is added to Table ps becomes $\{p_{ev} \cup cg, \neg p_{ev} \cup cg\}$

According to (34), the discourse effects of propositions bearing $-mI_s$ are exactly the same as those of any other proposition, which we saw in (33). This result is attractive from the standpoint of maintaining a simple and straightforward discourse structure. Yet it also yields desirable results for an account of $-mI_s$.

Now recall the schematic in (1), which illustrates to which discourse participant $-mI_s$ is anchored in declaratives versus interrogatives. If in committing to p_{ev} , a discourse participant commits to having a particular kind of evidence, then it comes as no surprise that $-mI_s$ is anchored to the discourse participant who commits to p_{ev} . The figure in (35), analogous to that in (1), is meant to clarify the correlation between discourse commitment and evidential anchor in declaratives and interrogatives.



We can make the discourse effect of $-mI_s$ explicit with a small addition to (23). The index s , which is misleading in the interrogative case, has been replaced in (36) with a less biased letter, κ . Given the semantics of $-mI_s$ and the structure of discourse, κ will always be indexed to the discourse participant who commits to p_{ev} .

$$(36) \quad \llbracket -mI_s \rrbracket^{\kappa, w} = \lambda p. [\forall r \in f_{\kappa}(w, p) \exists q \in f_c(w, p) \text{ s.t. } q > r], \quad p-mI_s \in DC_{\kappa}$$

Recalling (31), $-mI_s$ is undefined when a speaker has no evidence at all for p . This is a sensible result for declaratives, which indicate that a speaker's evidence for a claim is of a certain type. For polar interrogatives, however, this formal constraint reveals a deeper implication: given that $-mI_s$

is acceptable in polar interrogatives, and that the speaker may have no evidence to decide either alternative, p or $\neg p$, the modal base of $-mI\mathcal{S}$ in polar interrogatives must not be the speaker's. Hence, the semantics of $-mI\mathcal{S}$ and the structure of the discourse model, both motivated by independent ends, are in harmony on the matter of polar interrogatives: the former rules out speaker perspective, and the latter demands addressee perspective. Consequently, the condition added to (36), while illustrative, is technically unnecessary: the structure of discourse will ensure $p\text{-}mI\mathcal{S} \in DC_\kappa$.

In conclusion, interrogative flip follows from the account presented here. If the evidential anchor is always associated with the discourse participant who commits to the proposition at issue, we need not separately stipulate, as in Murray (2010, 2014), that the anchor is the addressee in interrogatives.

6.3 Projecting Commitment

Still, there is a hitch. At the moment that the interrogative $\{p_{ev}, \neg p_{ev}\}$ is place on the Table, the addressee has not yet committed to p_{ev} or $\neg p_{ev}$.

(37) At the time of utterance: $\forall \kappa \in \text{DISCOURSE}, \neg(p_{ev} \in DC_\kappa \vee \neg p_{ev} \in DC_\kappa)$

Thus, immediately after a polar interrogative question has been posed, the condition in (36), $p_{ev} \in DC_\kappa$, is not satisfied. It has already been noted that interrogatives project addressee commitment. In order to formalize projected commitments, however, we must slow down our model. An analog exists in Farkas & Bruce (2010): the projected set (ps) projects the common ground (cg) after every discourse move. Making the assertion p projects a common ground in which p is added to cg : $\{\{p\} \cup cg\}$. Asking the question $\{p, \neg p\}$ projects two common grounds: $\{\{p\} \cup cg, \{\neg p\} \cup cg\}$. The notion of projection set, of course, skips a step.

Instead, we can project DC_κ after every discourse move. An element of ps can only become the new cg following one or more public discourse commitments issued by each speaker. In the case of a falling declarative assertion, the addressee must (canonically) commit to the proposition placed on the table. In the case of a rising polar interrogative question, the addressee must (canonically) commit to one of the alternative propositions on the Table, and then the speaker must do the same. The ps projects joint commitments, but joint commitments actually arise incrementally. By taking the ps as inspiration and defining “projected commitment sets” PC_s and PC_a , we can begin to build a more incremental account of the discourse effects of indirect evidentials. Like the ps , but more dynamic, the PC_s and PC_a are updated following each move in a discourse.

- (38) (a) **Assertion** (by s): PC_a becomes $\{\{p\} \cup DC_a\}$
 (b) **Question** (by s): PC_a becomes $\{\{p\} \cup DC_a, \{\neg p\} \cup DC_a\}$

When speaker s asserts p , a list of addressee public discourse commitments DC_a is projected in which p is added to the current DC_a : $PC_a = \{\{p\} \cup DC_a\}$. When speaker s asks $\{p, \neg p\}$, two different lists of addressee discourse commitments are projected: $PC_a = \{\{p\} \cup DC_a, \{\neg p\} \cup DC_a\}$. Now that we have slowed down our discourse model, we propose a more general principle.

(39) CLAIM

In satisfying the domain of any function $\mathcal{F}(\kappa, w, p, \dots)$, $p \in (DC_\kappa \cup PC_\kappa)$, first scan DC_κ for p , then scan PC_κ for p , $\forall \kappa \in \text{DISCOURSE}$.

In the case of an assertion, the speaker commits to p_{ev} in tandem with uttering it. Therefore, the domain of $\llbracket -mI\mathcal{S} \rrbracket^{\kappa, w}$ is satisfied in that instant. In the case of a question, the speaker commits to neither p_{ev} nor $\neg p_{ev}$, and so $\llbracket -mI\mathcal{S} \rrbracket^{\kappa, w}$ must scan PC_κ ($\forall \kappa$) to satisfy its domain. While (39) might at first sight seem unsatisfyingly ad hoc, it manages to express what is potentially a primitive maxim about the way discourse works: if an expression must be anchored to a committing party, anchor it to the party who commits first. Testing this maxim against other indexical phenomena could offer interesting insights into the structure of discourse.

7 Conclusion

Much work remains, beginning with a definition of ‘>’, the central processing unit behind the denotation in (36). As envisioned here, it is a partial ordering based on what is perceived to be common knowledge. This discussion, I hope, pushes further open the door to an experimentally grounded, probabilistic approach to the study of evidentiality. Such work, perhaps in the image of recent research on *must* by Degen et al. (2015), would ideally test neither the type nor the “strength” of the evidence that licenses indirect evidential marking, but rather the relationship of that evidence to whatever a majority of speakers judge to be the best for a given stimulus.

Difficult empirical questions also remain. One omission in this paper and others is the challenging topic of the behavior of $-mI\mathcal{S}$ in embedded contexts. Şener (2011, 90-94) shows that the perspective of $-mI\mathcal{S}$ can be interpreted either in terms of the speaker or the subject of the sentence. Coşkun (2010) and Schenner (2010) both take up the topic: the former presents a wide variety of

examples of *-mİş* in embedded contexts, but does not specify to whom, in each example, the evidential is anchored. This is another area where an experimental study might yield insightful results. In laying out an experimental methodology for investigating perspective shift in embedded contexts, Harris & Potts (2009) might provide a helpful point of departure.

A final note, only recently brought to the author's attention, concerns what *kinds* of inference *-mİş* felicitously encodes. Deduction, induction, abduction: awareness is growing in the semantic and pragmatic literature that certain modal operators are limited to denoting only very specific flavors of inference – or speculation, more properly, in the case of induction and abduction. A different approach to the semantics of *-mİş* might, in taking stock of these distinctions, come even closer to an explanation of the present perfect connection addressed in Izvorski (1997) and Meriçli (2016a). In the meantime, I argue, the second-best account is the best we've got.

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