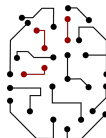


Futurity, evidentiality & modality: Day 3

Evidence in language

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- ▶ Day 2:
 - ▶ Evidence, knowledge & justification at large
 - ▶ Assertion and grounds for claims
- ▶ Today: evidence and evidentiality in language
- ▶ Evidentiality and related categories:
 - ▶ Empirical landscape
 - ▶ Theoretical landscape
- ▶ Nature and source of evidential restrictions:
 - ▶ Hard-wired semantically vs. derived pragmatically
 - ▶ World-based vs. event-based

Evidentiality (textbook definition)

Linguistic category that signals the source for the semantically determined information for an utterance (Aikhenvald 2004, 2018; Murray 2017, 2021 a.o.)

- Kinds of evidence (in broad strokes, based on Willett 1988; see detailed discussion in Krawczyk 2012)

Direct	Indirect	
	inference	hearsay
<ul style="list-style-type: none"> •visual •auditory •other sensory 	<ul style="list-style-type: none"> •assumption •observable results 	<ul style="list-style-type: none"> •secondhand •thirdhand •folklore

► Evidential systems

- Typically 2- to 4-way oppositions (Aikhenvald 2004:23-66)
- Parallel: tense and aspect (Speas 2010)

► Methodological note

- Much work on evidentiality: understudied languages
- Semantic fieldwork: unique challenges for data collection (Bochnak and Matthewson 2015)
- Conventions for representing linguistic examples: Leipzig glossing rules (<https://www.eva.mpg.de/lingua/resources/glossing-rules.php>)

- ▶ Evidential utterances: two main contributions
 - ▶ Scope proposition: $\phi/\Box\phi/\Diamond\phi$
 - ▶ Evidential signal: evidence/source for the scope proposition
- ▶ Typical evidential paradigm

(1) Cuzco Quechua (Quechuan: Peru; adapted from Faller 2002)

a. Direct

para-sha-n=**mi**
 rain-prog-3=**dir**
 'It is raining, *I see.*'

c. Inference

para-sha-n=**chá**
 rain-prog-3=**inf**
 'It must be raining, *I gather.*'

b. Hearsay

para-sha-n=**si**
 rain-prog-3=**rep**
 'It is raining, *I hear.*'

d. Neutral

para-sha-n
 rain-prog-3
 'It is raining.'

Q: Do the sentences in (1) talk about the same scope proposition?

- ▶ Common (if not universal) property: evidential signal as a type of **not-at-issue** content (see overview in Korotkova 2020)
 - ▶ Scope proposition: at-issue, main point of an utterance
 - ▶ How speaker learned it: not-at-issue, backgrounded/peripheral information (includes presuppositions, cf. vFG's treatment of *must*)
- ▶ How do we know what is the main point of an utterance?
 - ▶ At-issueness: can be construed and diagnosed empirically in several ways (see overview in Koev 2018)
 - ▶ Evidential at-issueness: best understood through the relevance to the QUD (Korotkova 2020; see also Roberts 2019 on *must* and *might*)

- ▶ NAI status \approx QUD-irrelevance, diagnosed via answerhood (Beaver et al. 2017; Simons et al. 2010; Tonhauser et al. 2013)
 - ▶ Based on this diagnostic, many constructions convey NAI content (incl. presupposition triggers and Pottsian conventional implicatures)
- (2) ✓ *Question 1 (targets the main clause): What happened last night?*
Question 2 (targets the appositive): Who is Margaret's cousin?
Food Network interviewed Pauline, who is Margaret's cousin.
(based on Snider 2017:255)

- Evidential signal: NAI, systematically doesn't answer questions

(3) Cuzco Quechua

✓ *Question 1 (targets the scope proposition): And where is this child of yours?*

Question 2 (targets evidence): How do you know where he is?

San Salvadur-pi=s ka-sha-n.

San Salvador-loc=**rep** be-prog-3

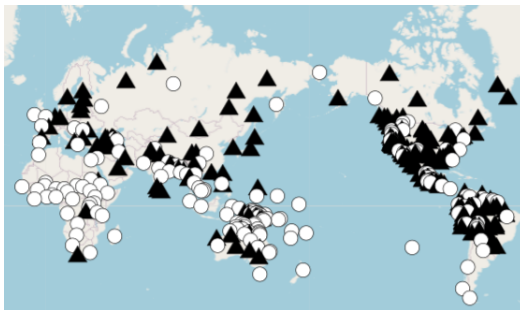
'He is in San Salvador, **I hear**'.

(adapted from Faller 2019:11,14)

- Spoiler alert: we will be seeing this with other evidential constructions

Evidentiality VII

- ▶ Legacy of the typological tradition (carried over to semantic literature): focus on evidentiality as a grammatical category
- ▶ 237 out of 414 lgs surveyed: grammatical evidentials (de Haan 2013)



(from the World Atlas of Language Structures database; <https://wals.info/>)

Evidence beyond evidentials I

- ▶ Our focus:
 - ▶ How natural language talks about evidence more broadly
 - ▶ Similar point: Bittner (2014) on temporality as a semantic notion vs. tense as a morphosyntactic category
- ▶ Evidentiality: varied morphosyntax (across and within languages)
 - ▶ Separate category (Gitksan, St'át'imcets)
 - ▶ Focus particles (Aymara, Quechua)
 - ▶ Discourse particles (Japanese, German)
 - ▶ Part of the verbal mood system (Cheyenne, Ecuadorian Siona)
 - ▶ Modal verbs (English, German)
 - ▶ Part of the tense and aspect system (Bulgarian, Turkish)
 - ▶ ...
- ▶ Natural parallel: modality across categories (Arregui et al. 2017)

Evidence beyond evidentials II

- ▶ Case in point: English (see Diewald and Smirnova 2010 on European lgs)
 - ▶ No grammatical category for evidentiality (unless evidentiality is subsumed under modality), much like Chinese or Vietnamese wrt tense
 - ▶ Host of expressions sensitive to evidential restrictions
 - Evidential adverbials
 - Evidential adjectives
 - Epistemic modals (some)
 - Raising constructions
 - Future and other futurate markers
 - Temporal adverbials
 - Markers of question bias
 - Doxastic attitudes
 - Predicates of personal taste
 - Subjective attitude *find*
 - ...

Evidence beyond evidentials III

► Epistemic modals

(4) Our friend *must* (Day 1)

#Context 1: I look out of the window and see a downpour. [Dir]

✓ *Context 2: In a windowless room, I see people entering with wet raingear.* [Inf]

#Context 3: I'm told that it's raining. [Hearsay]

It **must** be raining. (based on von Stechow and Gillies 2010)

Q: How about *likely*?

► Raising verbs (Rett et al. 2013; Rudolph 2019 on English; Asudeh and Toivonen 2012 on Swedish; de Haan 2000; Koring 2013 on Dutch)

Q: In which of the contexts from (4) above is (5) felicitous?

(5) It **seems like** it's raining.

Evidence beyond evidentials IV

► By temporal adverbials: *by now* & co (Altshuler and Michaelis 2020)

- (6) #Context 1: *I'm at home and see Shira.* [Direct]
 ✓Context 2: *I'm not at home and make a conjecture.* [Inference]
 #Context 3: *I'm told that Shira is at home.* [Hearsay]
 Shira is at home **by now**. (based on Altshuler and Michaelis 2020)

Q: What kinds of inference would license the target sentence in (6)?

Evidence beyond evidentials V

- ▶ Question bias (Domaneschi et al. 2017; Romero 2020; Sudo 2013 a.o.)
 - ▶ Biased questions: non-naïve inquiries for information
 - ▶ Sp has an idea about the answer
 - Based on prior belief ('epistemic bias')
 - Based on contextual evidence ('evidential bias')
- ▶ Japanese polar questions with *no*: require contextual evidence, infelicitous in neutral contexts (Sudo 2013; Hirayama 2018)

(7) *Context: My friend has just entered our windowless office wearing a dripping wet raincoat. I ask:*

- a. ima ame futteru no?
now rain is.falling q
'Is it raining?'
- b. #ima hareteru no
now sunny q
Intended: 'Is it sunny?'

(adapted from Sudo 2013)

Evidence beyond evidentials VI

- ▶ The Acquaintance Inference (AI): feature of several subjective expressions (what counts as 'subjective' is irrelevant for us here; see Kennedy 2013; Anand and Korotkova 2022)
 - ▶ Predicates of personal taste, aesthetic predicates
 - ▶ English subjective attitude *find* and its counterparts elsewhere

- (8) ✓ *Context 1: Eating the curry.* [Direct]
 # *Context 2: Reading a recipe.* [Inference]
 # *Context 3: Looking at a picture.* [Inference]
 # *Context 4: Seeing other patrons ordering the curry.* [Inference]
 # *Context 5: Reading reviews.* [Hearsay]

That curry is **tasty**.

(based on Anand and Korotkova 2018)

Q: How about *Vienna is a beautiful city*?

Q: How about *That Ming vase is fragile*?

- ▶ Spoiler alert: we'll go back to the AI on Day 5

Evidence beyond evidentials VII

- ▶ This isn't the end of the story:
 - ▶ Many more expressions can be construed as dealing with evidence
 - ▶ Holds not just for English, but across languages (futures, adverbials, subjective expressions, markers of bias . . .)
 - ▶ Natural language: great propensity in expressing (grammatically & lexically) evidentiary grounds for a claim
- Q: If we are no longer confined by the morphosyntax: should we include all expressions dealing with (un)certainty under this umbrella as well?

Bottom line

- ▶ Evidentiality: dedicated category for evidence/information source
- ▶ Evidential restrictions: ubiquitous in the grammar across languages
- ▶ What do all of those expressions have in common semantically?
- ▶ How do we analyze evidence across the board?
- ▶ How do we connect evidence-in-language and evidence-in-philosophy?

Evidentiality within formal semantics I

- ▶ Common thread: relationship between evidentiality and (epistemic) modality
- ▶ Long-standing typological tradition: evidentiality as a kind of modality (Bybee 1985; Palmer 1986; van der Auwera and Plungian 1998)
- ▶ Aikhenvald's work: evidentiality as a distinct category
- ▶ But we are after semantics, not the shape of grammatical systems

Evidentiality within formal semantics II

1 Modal accounts

Evidentials as epistemic/informational modals in Kratzerian semantics, propositional operators (Izvorski 1997; Kratzer 2012; Matthewson et al. 2007; Matthewson 2012; McCready and Ogata 2007 a.o.)

2 Illocutionary accounts

Evidentials as commitment modifiers, interact with the structure of speech acts (Faller 2002, 2019; Krifka 2019; Murray 2014, 2017; Murray and Starr 2020; Northrup 2014 a.o.)

3 Deictic accounts

Evidentials as temporal/spatio-temporal operators, evidentiality as a by-product of event ontology (Altshuler and Michaelis 2020; Bowler 2018; Chung 2007; Davis and Hara 2014; Faller 2004; Kalsang et al. 2013; Koev 2017; Nikolaeva 1999 a.o.)

Evidentiality within formal semantics III

- Précis of a modal account of direct evidentiality (couched in the framework from Day 1)

(9) $\llbracket \text{Ev } \phi \rrbracket^{c,g,w,K} = \forall w' \in \cap K. \llbracket \phi \rrbracket^{c,g,w',\{\cap K\}}$, defined if K directly settles $\llbracket \phi \rrbracket^{c,g,w,K}$, where

- A kernel K is a set of propositions that are known directly.
- K directly settles ϕ iff $\exists q \in K [q \subseteq p \wedge q \subseteq \neg p]$.
- $\cap K$ is a set of all propositions that are known.

(inspired by von Stechow and Gillies 2010)

NB: Intensional quantification is vacuous in the direct case

Q: Can we model hearsay evidentiality with kernels?

Evidentiality within formal semantics IV

- Précis of an illocutionary account of direct evidentiality (couched in the modified Table Model, Farkas and Bruce 2010; Murray 2014, 2017 works similarly)

Proposal to update cg with $Ev\phi$

(10)

Sp	Table	Ad
$TC_{Sp} \cup \{\phi\}$	ϕ	TC_{Ad}
$AeC_{Sp} \cup \{\phi\}$		AeC_{Ad}
$IndC_{Sp}$		$IndC_{Ad}$
cg		

Acceptance of the proposal

Sp	Table	Ad
$TC_{Sp} \cup \{\phi\}$ $AeC_{Sp} \cup \{\phi\}$ $IndC_{Sp}$		$TC_{Ad} \cup \{\phi\}$ $AeC_{Ad} \cup \{\phi\}$ $IndC_{Ad}$
$cg \cup \{\phi\}$		

- TC_x : set of propositions the truth of which x is committed to.
- AeC_x : set of propositions for which x has adequate evidence.
- $IndC_x$: set of propositions for which x has indirect evidence.
- cg : common ground, set of joint commitments of the interlocutors.

(inspired by Faller 2019)

Q: How is it different from an assertion without evidentials?

Evidentiality within formal semantics V

- Précis of a deictic account for direct evidentiality

(11) $\llbracket \text{Ev } \phi \rrbracket^{c,g,w,t} = \exists t' [t' \preceq t \wedge \phi(t')]$,
 defined if the speaker acquired ϕ in w at t'' such that $t' \circ t''$ and $t'' \preceq t$.
 (inspired by Koev 2017)

- Crucial innovation: the Evidence Acquisition Time (EAT)
 - Directness: overlap of the event runtime and the EAT
 - Indirectness: non-overlap between the event runtime and the EAT
- Some cases: overlap not just in time, but also in space (Faller 2004; Chung 2007)

NB: This is a gross simplification of temporal nuances (see detailed discussion in Hirayama and Matthewson 2022; Johnson 2022)

Evidentiality within formal semantics VI

- ▶ Current debate: focus on the presumed modal-illocutionary dichotomy
- ▶ Our point: those approaches have much in common
- ▶ The interesting (to us) dichotomy: intensional vs. extensional views
- ▶ Caveat:
 - ▶ We're talking about theories, not specific markers
 - ▶ Might be the case of genuine semantic variation

	Intensional (with world-shifting)	Extensional (w/out world-shifting)
Semantic (ev.signal hard-wired)	Modal Illocutionary	
Pragmatic (ev.signal not hard-wired)	Mandelkern (2019)	Deictic

- ▶ Dismantling the modal-illocutionary dichotomy
 - ▶ Arguments for the illocutionary view on evidentiality: the special behavior of hearsay (see discussion in Korotkova 2016, 2017, 2021)
 - ▶ But speech reports, incl. hearsay, are special across the board (cf. Anand and Hacquard 2014 on doxastic vs. speech predicates)
 - ▶ Both types of approaches: compatible empirical predictions
 - ▶ No evidence for semantic (rather than syntactic) variation (Korotkova 2016)

The intensional view II

- ▶ Differences between approaches: primarily conceptual
 - ▶ Modal accounts ~ semantic aspects: modal base selection, modal force
 - ▶ Illocutionary accounts ~ pragmatic aspects: the nature of the update
- ▶ Differences easy to reconcile: take both into account
 - ▶ Bona fide modals (*must*, *might*): distinctive discourse profile in assertions (Cariani 2020; Roberts 2019; von Stechow and Gillies 2010, 2011)
 - ▶ But if we need an account of the pragmatic contribution of *must* and *might*, we can extend it to evidentials
 - ▶ Differences between illocutionary evidentials vs. epistemic modals become negligible (cf. Krifka 2019, where the evidential-modal difference is collapsed)

The intensional view III

- ▶ What is modality anyway?
 - ▶ We assume that modality is about worlds (see discussion in Vetter 2011)
 - ▶ We will take modality to involve intensional quantification
 - ▶ Modal auxiliaries: *might, can*
 - ▶ Probability operators: *likely*
 - ▶ Attitude verbs: *think, know*
 - ▶ Progressive aspect
 - ▶ Verbs of search and desire: *look for, seek, want*
 - ▶ Disjunction
 - ▶ ...
 - ▶ Despite interesting semantic differences, they have the same core (cf. Hacquard 2013 on modal auxiliaries vs. attitude verbs)
- ⇒ Illocutionary accounts of evidentiality: modal at heart
- ▶ Discourse commitments: public beliefs (Gunlogson 2003 and later work)
 - ▶ Updates: functions on information states, world-based

The intensional view IV

- ▶ Basic blueprint of intensional accounts: attitude of an agent towards a proposition, defined by some accessibility relation (=evidence type)
 - ▶ This schema: Hintikka semantics for attitudes
 - ▶ Preferable over Kratzerian semantics: explicit perspectival anchoring
- ▶ Evidentials as 1-person attitudes: self-attributions of a mental state
 - ▶ The 1-person component: the unique autocentric holder of an event
 - ▶ The mental state component: a form of reasoning about propositions (cf. Eckardt 2020; Krawczyk 2012; Winans 2016)
- ▶ General template

$$\begin{aligned}
 (12) \quad & \llbracket \text{ev } \phi \rrbracket^{c, \langle e, w \rangle, g} = \forall \langle e', w' \rangle \in \text{Reason}_{\iota x. \text{Holder}(x, e), w} : [\phi(e')(w')], \\
 & \text{where } \text{Reason}_{\iota x. \text{Holder}(x, e), w} \\
 & = \{ \langle e', w' \rangle \mid \text{it is compatible with what } \iota x. \text{Holder}(x, e) \text{ reasons in } w \text{ at } e \\
 & \quad \text{for } \iota x. \text{Holder}(x, e) \text{ to be } \iota y. \text{Holder}(y, e') \text{ in } w' \text{ at } e' \}
 \end{aligned}$$

Informally: an evidential describes the mental state of having reasoned about particular evidence, with a set of indices being the content of that mental state—a conclusion of the reasoning process

The intensional view V

- ▶ What about pragmatics and QUD-at-issueness?
- ▶ Same as with overt attitudinal constructions
 - ▶ Ordinary attitudes: variable AI status, can function as “discourse” parentheticals (Hunter 2016; Hunter and Asher 2016; Simons 2007)
 - ▶ Slifting parentheticals (see discussion in Koev 2021): the attitude always NAI (much like evidentials in Murray 2014, 2017)

- (13) a. *Question 1 (targets the content of the report): Who won the election?*
 Slifting: ✓Democrats won, **she claimed**.
 Embedding: ✓**She claimed** that the Democrats won.
- b. *Question 2 (targets the fact of the report): What did she do next?*
 Slifting: #The Democrats won, **she claimed**.
 Embedding: ✓**She claimed** that the Democrats won.

The intensional view VI

► Space for variation within the general template

- 1 The nature of the accessibility relation: type of attitude & evidence
- 2 Modal force (commitment strength?): does the agent endorse ϕ ?

- Direct: always strong, $\#Ev\phi \wedge \neg\phi$

- Inferential

Strong: $\#Ev\phi \wedge Ev\neg\phi$ (Georgian, Turkish)

Weak (also called conjectural): $\checkmark Ev\phi \wedge Ev\neg\phi$ (Cuzco Quechua)

- Hearsay: full spectrum (pace AnderBois 2014)

Full endorsement: $\#Ev\phi \wedge \neg\phi$ (St'át'imcets, Turkish)

Lack of endorsement: $\checkmark Ev\phi \wedge \neg\phi$ (Cheyenne, Georgian)

► Parallel: attitude predicates show similar variation

- 1 Sensitivity to different evidence types within doxastic verbs talking about inference (cf. Dorst and Mandelkern 2020 on *guess*)
- 2 Variation in strength (not predicted by the classic account)
 - Doxastics with a preferential component (Anand and Hacquard 2013)
 - Existential belief: \approx 'allow for a possibility' (Močnik 2019)

The intensional view VII

- ▶ Almost all intensional views (except Mandelkern 2019):
 - ▶ The evidential signal is hard-wired, part of the semantics
 - ▶ Formalized as a type of attitude (accessibility relation/commitment source/modal base)
 - ▶ Evidence tracked: doxastic, not propositional (the general template ensures that the agent self-ascribes evidence, not merely has access to it)
- ▶ Other expressions with evidential restrictions: often analyzed along the same lines (e.g., most accounts of questions bias and common-ground management operators talk about higher-order attitudes, cf. Frana and Rawlins 2019; Repp 2013)
- ▶ Any version of the attitudinal view makes sense intuitively
 - ▶ Evidence as a kind of mental state
 - ▶ This is what we have seen on Day 2 for justification and knowledge
- ▶ Natural question: why do we have non-intensional accounts at all?

Motivation for the deictic view I

- ▶ English *by* temporal adverbials: strictly temporal semantics, evidential pragmatics (Altshuler and Michaelis 2020)
 - ▶ Core meaning: function from a set of eventualities to a set of times
 - ▶ $\llbracket VP \rrbracket$ is an event: there is a prominent state s that results from it.
 - ▶ $\llbracket VP \rrbracket$ is a state: it results from some prominent event e .
- (14)
- a. Ava left **by Friday**.
 \approx The onset of the resulting state of Ana's past leaving must be on or precede Friday.
 - b. The soup is cool **by now**.
 \approx The onset of the state of the soup's being cool must be on or precede the utterance time.
- ▶ Indirectness:
 - ▶ Not part of the semantics
 - ▶ Quantity implicature: calculated in light of more informative alternatives (e.g. *The soup is cool now*)

Motivation for the deictic view II

- ▶ Evidentiality and tense: evidential perfects (term from Izvorski 1997)
 - ▶ (Present) perfect morphology: hearsay and inference
 - ▶ Common in the Anatolia-Balkans-Caucasus region (Johanson and Utas 2000)
- ▶ Case in point: Georgian (South Caucasian; Georgia, Azerbaijan)
 - ▶ Evidential distinctions only in the past
 - ▶ The form in (15) in complementary distribution with other tenses: neutral past, present, future

- (15) #Context 1: *I observe the dragon hiding the treasure.* [DIRECT]
 ✓Context 2: *I enter and the dragon's cave is empty.* [INFERENCE]
 ✓Context 3: *I'm told that the dragon hid the treasure.* [HEARSAY]

urtʃxul-s gandʒ-i **daumalia**
 dragon-dat treasure-nom hide.3sg.s.3sg.o.ind.pst
 'The dragon hid the treasure, *I hear/infer.*'

(NK: own data)

- ▶ Many deictic approaches have been proposed for such systems (Bowler 2018; Koev 2011, 2017; Nikolaeva 1999 a.o.)

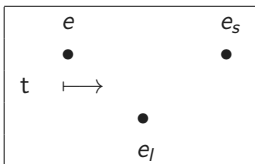
Motivation for the deictic view III

- ▶ Core idea:
 - ▶ Deictic evidentials: operators on times/events/situations, not worlds
 - ▶ What is encoded: relation between the VP event and learning about it
 - ▶ Indirectness is a by-product of temporal/event ontology: non-overlap
- ▶ How it might work for a language like Georgian (based on Koev 2011 for Bulgarian)

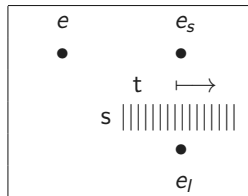
(16) The dragon hid the treasure, **I hear/infer**.

e = hiding, s = resulting state, t = topic time,
 e_s = speech event, e_l = learning event

Hearsay



Inference



Motivation for the deictic view IV

- Support for including evidence acquisition into our ontology: Bulgarian evidential perfect

(17) Bulgarian

Context: One of Nixon's aids vividly recalls walking into the President's office and seeing the President erase some tapes. A few months later she learns about the Watergate scandal from the newspapers and makes sense of what she has seen. When asked what happened on that day, she says:

Toj zaličava-l ulik-i-te.
he remove-**ind** clue-pl-def.pl

'He was covering up some tapes, **as I learned later.**'

(adapted from Koev 2011:125)

- Recent detailed discussion of evidence acquisition and temporal anchoring: Johnson (2022) on Mvskoke, with an elaborate tense system

Motivation for the deictic view V

- Further support for event-sensitivity of (some) evidential markers:
Standard Tibetan *shag* (Kalsang et al. 2013)

- Direct perception of an event's part (not just the resulting state)
- Only for events that have natural parts/stages (can be quantized)

- (18) a. Eventuality of breaking: several distinct parts

Context: Speaker watched part of a slow motion video in which a vase was very slowly breaking. She missed the beginning and saw only the part where cracks were beginning to form in the vase.

chags **shag**

broke **dir**

'It broke, **I witnessed**'.

- b. Eventuality of snoring: no distinct parts

*mdangs dgong bKra shis sngur pa rgyabs kyi **shag**

last night Tashi snore aux imperf **dir**

Intended: 'Tashi was snoring last night, **I witnessed**.'

(Kalsang et al. 2013:531-532)

Motivation for the deictic view VI

- ▶ Under the deictic view (some versions): directness \sim perception
(through perception may not be sufficient, cf. (17) above)
 - ▶ Works for some languages (e.g. Standard Tibetan)
 - ▶ Arguably too narrow in some cases

(19) Cuzco Quechua: 'direct' *mi* as Best Possible Grounds

- a. Information from an expert or an encyclopedia

Africa-pi=**n** elefante-kuna-qa ka-n
 Africa-loc-**bpg** elephant-pl-top be-3
 'In Africa, there are elephants.'

(Faller 2002:133)

- b. Dius kan=**mi**.
 God be-**bpg**
 'God exists.'

(Faller 2002:132)

Q: How is this different from the assertion norm?

Motivation for the deictic view VII

- Q: Are we at risk of conflating directness and certainty/reliability (cf. McCready 2015)?
- Q: Is indirectness the same as uncertainty? How to tell?
- It is attractive to reduce/decompose indirectness to events, but there may be problems

Motivation for the deictic view VIII

- ▶ If indirectness is a Gricean implicature, how we account for specialized restrictions?
 - ▶ Evidential perfects may be associated with different licensing conditions
 - ▶ We see it elsewhere in language as well

(20) Georgian: inference based only on visual results

#Context 1 (perception): I saw mom making pies.

✓Context 2 (visual results): I come home and see a pile of pies on the table.

#Context 3 (olfactory): I come home and smell a distinct flavor.

#Context 4 (stereotypicality): It is Fat Week and mom always makes pies.

deda-s ghvezel-i **dauc'xvia**
 mom-dat pie-nom.sg bake.3sg.s.3sg.o.**ind.pst**
 'Mom made pie, I infer.'

Motivation for the deictic view IX

- More on inference: present-oriented uses of English *will* with an inferential flavor

- (21) a. **Smoky barbecue:** reasoning from a result to a cause
Context: Angela knows that her neighbors barbecue often. A friend is over at her house and they both smell something smoky. Angela says:
 The neighbors #will/✓must be barbecuing (right now).
 (Winans 2016:26)
- b. **Paint fumes:** reasoning from a cause to a result
Context: Dad is painting his neighbor's kitchen. Reid wants to watch. Reid asks Mom if he can go next door and watch Dad paint. She knows that paint causes fumes so she says: You can't go over there, ...
 ... It ✓will / #must be hard to breathe in there (right now).
 (Winans 2016:29)

- Spoiler alert: we'll go back to the future on Day 4

Motivation for the deictic view X

Bottom line

- ▶ Motivation for the deictic view:
 - ▶ Relevance of the evidence acquisition time
 - ▶ Sensitivity to the VP event
- ▶ Consequences for the theory:
 - ▶ Needed in some cases: a finer-grained account that makes reference to the event structure
 - ▶ No evidence against an intensional account that does just that (e.g. the enriched general template)
 - ▶ Independent evidence: modals often sensitive to temporal and aspectual distinctions (Condoravdi 2002; Hacquard 2006, 2020); more on Day 4
- ▶ We need separate arguments for inclusion/exclusion of the modal component

Diagnosing modality I

- ▶ We understand modality as operators dealing with possible worlds
- ▶ But why do we need possible worlds in semantics?
 - ▶ Worlds: allow to describe circumstances different from the present ones
 - ▶ Involved in explaining a series of puzzles about reference and identity:
 - referential opacity
 - 'de re' / 'de dicto' ambiguities (Russell 1905; Quine 1956 & co)

(22) **Verbs of search and desire** (Forbes 2020)

- a. King Arthur searched for the Holy Grail. [intensional]
doesn't commit the speaker to the existence of the HG
- b. King Arthur found the Holy Grail. [extensional]
commits the speaker to the existence of the HG

(23) **Attitude predicates** (and attitudinal operators *according to X, in X's opinion*)

- a. ✓ Mary thinks that [the shortest spy]_{de re} is not [a spy]_{de dicto}.
- b. # The shortest spy is not a spy.

Diagnosing modality II

- ▶ Two diagnostics for the presence of worlds in the semantics of evidentials
 - ▶ Modal subordination: anaphora in modal environments
 - ▶ Availability of 'de dicto' readings

- Modal subordination: anaphora blocking in intensional environments unless in the scope of another intensional operator

- (24)
- a. **Modal auxiliaries** (Roberts 1996):
If John bought a book, he will be home reading it by now.
#It's a murder mystery. / ✓It will be a murder mystery.
 - b. **Disjunction** (Simons 1996):
#Either Jones owns a bicycle or it's broken.

Diagnosing modality IV

- ▶ What different approaches predict
 - ▶ Intensional accounts: anaphora blocked (cf. discussion in McCready and Ogata 2007; Faller 2014)
 - ▶ Extensional accounts: no special effects on anaphora
- ▶ What actually happens
 - ▶ *By now*: truly extensional (in line with Altshuler and Michaelis 2020)
 - ▶ At least some evidentials amenable to a deictic analysis: trigger modal subordination (NB: we don't have access to all languages)

(25) By Friday, Magda submitted a paper_i. It_i was on modality.

(26) *I see gardening tutorials on Nana's desk, dirty gloves, soil in the basement.*

- a. nana-s xe;
nana-erg tree.nom plant.ind.pst
'Nana planted a tree, I infer'.
[Georgian]
- b. mas-ze; #dasaxldnen / ✓dasaxlebulan cixv-eb-i.
in-it inhabit.3pl.pst / inhabit.3pl.ind.pst squirrel-pl-nom
'Squirrels # inhabited / ✓apparently inhabited it'.

- (27) a. Nana posadi-l-a kaktus. [Bulgarian]
Nana plant-**ind**-fem.sg cactus
'Nana planted a cactus, I infer'.
b. #E hubav. / ✓Trjabva da e hubav.
be.3sg beautiful / must comp be.3sg beautiful
'It #is / ✓must be beautiful.'

NB: Anaphora possible if the indefinite outscopes the evidential
 ≈ 'There exists a tree/cactus and I infer that it was planted by Nana.'

Diagnosing modality VI

- ▶ Modal subordination: not a perfect tool
 - ▶ Not applicable to direct evidentials
 - ▶ Anaphora can be blocked for independent reasons
 - ▶ Anaphora can be sometimes allowed without subordination

- (28) a. The author claims that Vulcan_i exists after all.
b. It_i has circled around Mercury for ages without us ever noticing it.
(Roberts 1996:719)

- ▶ Still a useful diagnostic!

Diagnosing modality VII

- ▶ Another diagnostic: availability of 'de re' / 'de dicto' ambiguities
- ▶ Only applicable to hearsay
 - ▶ The evidence holder: always the speaker in unmodified root declaratives
 - ▶ Only hearsay introduces another perspective
- ▶ What different approaches predict
 - ▶ Intensional accounts: evidentials will behave like other speech reports
 - ▶ Extensional accounts: evidentials will behave like root clauses

Diagnosing modality VIII

► What actually happens: intensionality wins

(29) *Context: I read an article about a very dangerous disease, claimed to be caused by a fungus, while in fact I know that it is a virus.*

- a. Dünya-nın en ölümcül virüsü virüs değil-miş. [Turkish]
 world.gen sup deadly virus.poss virus neg.cop-**ind**
 ≈ 'I **hear** that the world's deadliest virus is not a virus'.
- b. Naj-smurtonosnijat virus ne bel virus [Bulgarian]
 sup-deadly virus neg be.ind.3sg virus
 ≈ 'I **hear** that the world's deadliest virus is not a virus' .

Diagnosing modality IX

- (30) *Context: I hear on the news that 2000 people participated in the rally. I was there myself and know that there weren't more than 500 people. I say:*

An der Demonstration **sollen** mehr Menschen [German]
 at def demo **rep.3pl** more person.pl
 teilgenommen haben als tatsächlich da waren.
 participate.prt have.3pl.pst than there be.3pl.pst
 ≈ 'I **hear** that there were more people at the demo than there in fact were.'
 (*tatsächlich* 'in fact'—unlike *actually*—does not ameliorate contradictions,
 sentence is bad without *sollen*)

Bottom line

- ▶ We know how to diagnose worlds and world-shifting
 - ▶ Modal subordination (inference, hearsay)
 - ▶ 'De re' / 'de dicto' ambiguities (hearsay)
- ▶ Some evidentials come out intensional
- ▶ Is there any evidence for purely deictic evidentials?
- ▶ Limited applicability of the tests: what to do about direct evidentials?

- ▶ How to model evidence?
 - ▶ Day 1: modal bases
 - ▶ McCready (2015): subjective probability
 - ▶ Other options: evidence decomposed, event/situation-based
- ▶ Is evidence an inherently modal notion?
 - ▶ Is it a coincidence that nearly all intensional accounts treat the evidential signal as hard-wired?
 - ▶ Is it a coincidence that all extensional accounts decompose evidential effects via event ontology?
 - ▶ Can it be the case that different types of evidence are to be modelled differently?

- Aikhenvald, A. Y. (2004). *Evidentiality*. Oxford: Oxford University Press.
- Aikhenvald, A. Y. (Ed.) (2018). *The Oxford Handbook of Evidentiality*. Oxford: Oxford University Press.
- Altshuler, D. and L. A. Michaelis (2020). By now: Change of state, epistemic modality and evidential inference. *Journal of Linguistics* 56(3), 515–539.
- Anand, P. and V. Hacquard (2013). Epistemics and attitudes. *Semantics and Pragmatics* 6(8), 1–59.
- Anand, P. and V. Hacquard (2014). Factivity, belief and discourse. In L. Crnič and U. Sauerland (Eds.), *The Art and Craft of Semantics: A Festschrift for Irene Heim*, pp. 69–90. Cambridge, MA: MITWPL.
- Anand, P. and N. Korotkova (2018). Acquaintance content and obviation. In U. Sauerland and S. Solt (Eds.), *Sinn und Bedeutung* 22, Berlin, pp. 161–173. ZAS.
- Anand, P. and N. Korotkova (2022). How to theorize about subjective meaning: A lesson from ‘de re’. *Linguistics and Philosophy* 45, 619–681.
- AnderBois, S. (2014). On the exceptional status of reportative evidentials. In T. Snider, S. D’Antonio, and M. Weigand (Eds.), *Semantics and Linguistic Theory (SALT)* 24, pp. 234–254. LSA and CLC Publications.

- Arregui, A., A. Salanova, and M. L. Rivero (Eds.) (2017). *Modality Across Syntactic Categories*. Oxford Studies in Theoretical Linguistics. Oxford University Press.
- Asudeh, A. and I. Toivonen (2012). Copy raising and perception. *Natural Language and Linguistic Theory* 30(2), 321–380.
- van der Auwera, J. and V. Plungian (1998). On modality's semantic map. *Linguistic Typology* 2(1), 79–124.
- Beaver, D. I., C. Roberts, M. Simons, and J. Tonhauser (2017). Questions under discussion: Where information structure meets projective content. *Annual Review of Linguistics* 3(1), 265–284.
- Bittner, M. (2014). *Temporality: Universals and Variation*. Explorations in semantics. Wiley-Blackwell.
- Bochnak, M. R. and L. Matthewson (Eds.) (2015). *Methodologies in Semantic Fieldwork*. Oxford: Oxford University Press.
- Bowler, M. L. (2018). *Aspect and evidentiality*. Ph. D. thesis, University of California, Los Angeles.
- Bybee, J. (1985). *Morphology: A Study of the Relation between Meaning and Form*. Amsterdam: John Benjamins.

- Cariani, F. (2020). Modal assertion. In S. Goldberg (Ed.), *The Oxford Handbook of Assertion*. Oxford University Press.
- Chung, K.-S. (2007). Spatial deictic tense and evidentials in Korean. *Natural language semantics* 15(3), 187–219.
- Condoravdi, C. (2002). Temporal interpretation of modals: modals for the present and for the past. In D. Beaver, S. Kaufmann, B. Z. Clark, and L. D. C. Martínez (Eds.), *The construction of meaning*, pp. 59–88. CSLI Publications.
- Davis, C. and Y. Hara (2014). Evidentiality as a causal relation: A case study from Japanese *youda*. In C. Pinón (Ed.), *Empirical Issues in Syntax and Semantics* 10, pp. 179–196.
- Diewald, G. and E. Smirnova (Eds.) (2010). *Linguistic Realization of Evidentiality in European Languages*. Berlin: de Gruyter.
- Domaneschi, F., M. Romero, and B. Braun (2017). Bias in polar questions: Evidence from English and German production experiments. *Glossa: A Journal of General Linguistics* 2(1)(26), 1–28.
- Dorst, K. and M. Mandelkern (2020). Good guesses. Ms., <https://mandelkern.hosting.nyu.edu/GoodGuesses.pdf>.

- Eckardt, R. (2020). Conjectural questions: The case of German verb-final *wohl* questions. *Semantics and Pragmatics* 13(9), 1–17.
- Faller, M. (2002). *Semantics and pragmatics of evidentials in Cuzco Quechua*. Ph. D. thesis, Stanford University.
- Faller, M. (2004). The deictic core of ‘non-experienced past’ in Cuzco Quechua. *Journal of Semantics* 21(1), 45–85.
- Faller, M. (2014). Reportative evidentials and modal subordination. *Lingua* 186–187, 55–67.
- Faller, M. (2019). The discourse commitments of illocutionary reportatives. *Semantics and Pragmatics* 12(8), 1–46.
- Farkas, D. and K. Bruce (2010). On reacting to assertions and polar questions. *Journal of Semantics* 27(1), 81–118.
- von Stechow, K. and A. S. Gillies (2010). Must ... stay ... strong! *Natural Language Semantics* 18(4), 351–383.
- von Stechow, K. and A. S. Gillies (2011). ‘Might’ made right. In A. Egan and B. Weatherson (Eds.), *Epistemic Modality*, pp. 108–130. Oxford University Press.

- Forbes, G. (2020). Intensional Transitive Verbs. In E. N. Zalta (Ed.), *The Stanford Encyclopedia of Philosophy* (Winter 2020 ed.). Metaphysics Research Lab, Stanford University.
- Frana, I. and K. Rawlins (2019). Attitudes in discourse: Italian polar questions and the particle *mica*. *Semantics and Pragmatics* 12(16), 1–48.
- Gunlogson, C. (2003). *True to Form: Rising and Falling Declaratives as Questions in English*. New York: Routledge.
- de Haan, F. (2000). Evidentiality in Dutch. In *Proceedings of the 25th Annual Meeting of the Berkeley Linguistics Society*, pp. 74–85.
- de Haan, F. (2013). Coding of evidentiality. In M. S. Dryer and M. Haspelmath (Eds.), *The World Atlas of Language Structures Online*. Leipzig: Max Planck Institute for Evolutionary Anthropology.
- Hacquard, V. (2006). *Aspects of Modality*. Ph. D. thesis, Massachusetts Institute of Technology.
- Hacquard, V. (2013). On the grammatical category of modality. In M. Aloni, M. Franke, and F. Roelofsen (Eds.), *Proceedings of the 19th Amsterdam colloquium*.

- Hacquard, V. (2020). Actuality entailments. In D. Gutzmann, L. Matthewson, C. Meier, H. Rullmann, and T. E. Zimmermann (Eds.), *The Wiley Blackwell Companion to Semantics*, pp. 1–26. Wiley.
- Hintikka, J. (1969). Semantics for propositional attitudes. In J. Davis, D. Hockney, and W. Wilson (Eds.), *Philosophical Logic*, pp. 21–45. Dordrecht: Reidel.
- Hirayama, H. (2018). Discourse effects of biased questions in Japanese. In S. Fukuda, M. S. Kim, and M.-J. Park (Eds.), *Japanese / Korean Linguistics* 25.
- Hirayama, Y. and L. Matthewson (2022). Evidential-temporal interactions do not (always) come for free. *Journal of Pragmatics* 193, 173–188.
- Hunter, J. (2016). Reports in discourse. *Dialogue and Discourse* 7(4), 1–35.
- Hunter, J. and N. Asher (2016). Shapes of conversation and at-issue content. In M. Moroney, C.-R. Little, J. Collard, and D. Burgdor (Eds.), *Semantics and Linguistic Theory (SALT)* 26, Ithaca, NY, pp. 1022–1042. LSA and CLC Publications.
- Izvorski, R. (1997). The present perfect as an epistemic modal. In A. Lawson (Ed.), *Semantics and Linguistic Theory (SALT)* 7, Ithaca, NY, pp. 222–239. LSA and CLC Publications.

- Johanson, L. and B. Utas (Eds.) (2000). *Evidentials: Turkic, Iranian and Neighbouring Languages*. Berlin / New York: Mouton de Gruyter.
- Johnson, K. (2022). Time and evidence in the graded tense system of mvskoke (creek). *Natural Language Semantics* 30(2), 155–183.
- Kalsang, J. Garfield, M. Speas, and J. de Villiers (2013). Direct evidentials, case, tense and aspect in Tibetan: Evidence for a general theory of the semantics of evidential. *Natural Language and Linguistic Theory* 31(2), 517–561.
- Kennedy, C. (2013). Two sources of subjectivity: Qualitative assessment and dimensional uncertainty. *Inquiry* 56(2-3), 258–277.
- Koev, T. (2011). Evidentiality and temporal distance learning. In *Proceedings of SALT XXI*, pp. 115–134.
- Koev, T. (2017). Evidentiality, learning events and spatiotemporal distance: The view from Bulgarian. *Journal of Semantics* 34(1), 1–41.
- Koev, T. (2018). Notions of at-issueness. *Language and Linguistics Compass* 12(12), 1–16.
- Koev, T. (koev2021). Parentheticality, assertion strength, and polarity. *Linguistics and Philosophy* 44(1), 113–140.

- Koring, L. (2013). *Seemingly similar: Subjects and displacement in grammar, processing, and acquisition*. Ph. D. thesis, Utrecht University.
- Korotkova, N. (2016). *Heterogeneity and universality in the evidential domain*. Ph. D. thesis, University of California, Los Angeles.
- Korotkova, N. (2017). Evidentials and (relayed) speech acts: Hearsay as quotation. In S. D'Antonio, M. Moroney, and C. R. Little (Eds.), *Semantics and Linguistic Theory (SALT) 25*, pp. 676–694. LSA Open Journal Systems.
- Korotkova, N. (2020). Evidential meaning and (not-)at-issueness. *Semantics & Pragmatics* 13(4), 1–24.
- Korotkova, N. (2021). The embedding puzzle: Constraints on evidentials in complement clauses. *Linguistic Inquiry* 52(1), 210–226.
- Kratzer, A. (2012). *Modals and Conditionals*. Oxford: Oxford University Press.
- Krawczyk, E. A. (2012). *Inferred Propositions and the Expression of the Evidence Relation in Natural Language. Evidentiality in Central Alaskan Yup'ik Eskimo and English*. Ph. D. thesis, Georgetown University.

- Krifka, M. (2019). Layers of assertive clauses: Propositions, judgements, commitments, acts. In Y. Hartmann and W. Angelika (Eds.), *Propositionale Argumente im Sprachvergleich: Theorie und Empirie*. Tübingen: Gunter Narr Verlag.
- Mandelkern, M. (2019). What 'must' adds. *Linguistics and Philosophy* 42(3), 225–266.
- Matthewson, L. (2012). Evidence about evidentials: Where fieldwork meets theory. In B. Stalterfoht and S. Featherston (Eds.), *Empirical Approaches to Linguistic Theory: Studies in Meaning and Structure*, pp. 85–114. de Gruyter Mouton.
- Matthewson, L., H. Davis, and H. Rullman (2007). Evidentials as epistemic modals: Evidence from St'át'imcets. In J. van Craenenbroeck (Ed.), *Linguistic Variation Yearbook* 7, pp. 201–254. Amsterdam: John Benjamins.
- McCready, E. (2015). *Reliability in Pragmatics*. Oxford: Oxford University Press.
- McCready, E. and N. Ogata (2007). Evidentiality, modality and probability. *Linguistics and Philosophy* 30(2), 147–206.
- Močnik, M. (2019). Slovenian 'dopuščati' and the semantics of epistemic modals. In *Proceedings of Formal Approaches to Slavic Languages* 27.
- Murray, S. E. (2014). Varieties of update. *Semantics and Pragmatics* 7(2), 1–53.
- Murray, S. E. (2017). *The Semantics of Evidentials*. Oxford: Oxford University Press.

- Murray, S. E. (2021). Evidentiality, modality, and speech acts. *Annual Review of Linguistics* 7(1), 213–233.
- Murray, S. E. and W. B. Starr (2020). The structure of communicative acts. *Linguistics and Philosophy* 44(2), 425–474.
- Nikolaeva, I. (1999). The semantics of Northern Ostyak evidentials. *Journal de la Société Finno Ougrienne* 88, 131–159.
- Northrup, O. (2014). *Grounds for commitment*. Ph. D. thesis, University of California, Santa Cruz.
- Palmer, F. (1986). *Mood and Modality*. Cambridge: Cambridge University Press.
- Potts, C. (2005). *The Logic of Conventional Implicatures*. Oxford: Oxford University Press.
- Quine, W. V. O. (1956). Quantifiers and propositional attitudes. *Journal of Philosophy* 53, 101–111.
- Repp, S. (2013). Common ground management: Modal particles, illocutionary negation and Verum. In D. Gutzmann and H.-M. Gärtner (Eds.), *Beyond Expressives: Explorations in Use-Conditional Meaning*, pp. 231–274. Leiden: Brill.

- Rett, J., N. Hyams, and L. Winans (2013). The effects of syntax on the acquisition of evidentiality. In S. Baiz, N. Goldman, and R. Hawkes (Eds.), *BUCLD 37: Proceedings of the 37th annual Boston University Conference on Language Development*, Volume 1, pp. 345–357.
- Roberts, C. (1996). Anaphora in intensional contexts. In S. Lappin (Ed.), *Handbook of Contemporary Semantics*, pp. 215–246. Blackwell.
- Roberts, C. (2019, December). The character of epistemic modality: Evidential indexicals. Ms., The Ohio State University, asc.ohio-state.edu/roberts.21/Roberts.EpistemicModality.pdf.
- Romero, M. (2020). Form and function of negative, tag, and rhetorical questions. In V. Déprez and M. T. Espinal (Eds.), *Oxford Handbook of Negation*, pp. 234–254. Oxford University Press.
- Rudolph, R. (2019). *Talking about Appearances: Experience, Evaluation, and Evidence in Discourse*. Ph. D. thesis, University of California, Berkeley.
- Russell, B. (1905). On denoting. *Mind* 14(4), 479–493.
- Simons, M. (1996). Disjunction and anaphora. In T. Galloway and J. Spence (Eds.), *Semantics and Linguistic Theory* 6, pp. 245–260.

- Simons, M. (2007). Observations on embedding verbs, evidentiality, and presupposition. *Lingua* 117(6), 1034–1056.
- Simons, M., J. Tonhauser, D. Beaver, and C. Roberts (2010). What projects and why. In N. Li and D. Lutz (Eds.), *Semantics and Linguistic Theory (SALT) 20*, Ithaca, NY, pp. 309–327. LSA and CLC Publications.
- Smirnova, A. (2012). Evidentiality in Bulgarian: Temporality, epistemic modality, and information source. *Journal of Semantics* 30, 479–532.
- Snider, T. (2017). *Anaphoric Reference to Propositions*. Ph. D. thesis, Cornell University.
- Speas, M. (2010). Evidentials as generalized functional heads. In A. M. DiSciullo and V. Hill (Eds.), *Edges, Heads and Projections: Interface Properties*, pp. 127–150. Amsterdam: John Benjamins.
- Sudo, Y. (2013). Biased polar questions in English and Japanese. In D. Gutzmann and H.-M. Gärtner (Eds.), *Beyond Expressives: Explorations in Use-Conditional Meaning*, pp. 275–295. Leiden: Brill.
- Tonhauser, J., D. Beaver, C. Roberts, and M. Simons (2013). Towards a taxonomy of projective content. *Language* 89(1), 66–109.

- Vetter, B. (2011). Recent work: Modality without possible worlds. *Analysis* 71(4), 742–754.
- Willett, T. (1988). A cross-linguistic survey of the grammaticization of evidentiality. *Studies in Language* 12(1), 51–97.
- Winans, L. (2016). *Inferences of “will”*. Ph. D. thesis, University of California, Los Angeles.