

Natural classes of attitude predicates: English 'coming-to-know' verbs*

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- Background: growing interest in the fine-grained semantics of attitude predicates
 - mood selection
 - question embedding/complement selection
 - meaning alternations
- Substantial empirical coverage, including understudied languages and large-scale databases
 - MECORE
 - The MegaVeridicality project
 - ZAS Database of Clause-embedding Predicates
- Somewhat less attention: how conceptual structure of attitudes influences the language of propositional attitude reports
- Overarching goal: understand natural classes within attitudes of knowledge and belief
 - Talk “Refining *find*” at Philosophy and Generative Grammar, May 6 (online)
 - Course “On the plurality of verbs: Attitudes of knowledge and belief”, ESSLI 37
 - Workshop “Conceptual structure of attitudes: Language and cognition”, ESLLI 37 (w/ Salvador Mascarenhas)
- Inspiration: work on verb classes within classic lexical semantics
- Agenda for today: English ‘come-to-know’ predicates

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1 Introduction

- Today: English ‘coming-to-know’ predicates (CtKs), aka ‘semi-factives’
 - (1) *discover, find out, figure out, learn, notice, realize ...* (and many more)
 - a. DP complements (not all): *discover the rumor*
 - b. declaratives: *discover that the glaciers are melting rapidly*
 - c. interrogatives (including concealed questions DPs): *discover which planet has 95 moons*
 - Previous work: puzzles on presupposition projection (Degen and Tonhauser 2022; Djärv 2019, 2023; Karttunen 1971, 2016) and question embedding (Egré 2008; White and Rawlins 2018)
 - (2) Factivity inference: the complement is true (Kiparsky and Kiparsky 1970)

Jane knows/regrets/is surprised/is happy that the summer is short.
presupposes: the summer is short
 - (3) Projection properties (Karttunen 1971, 2016)
 - a. **Factives**: well-behaved presupposition
 - b. **Semi-factives**: presupposition may go away in some environments (cf. work on ‘soft triggers’; Abrusán 2011, 2016)
 - (4) Difference in attitude (e.g. Djärv et al. 2019)
 - a. **Cognitive factives**: *know* + all our verbs
presuppose: Sp believes p, *assert*: attitude holder believes p
 - b. **Emotive factives**: *be happy, be surprised, fear ...*
presuppose: attitude holder believes p, *assert*: non-doxastic attitude
- Our goal: new outlook on CTKs as a natural class
 - Evidentially: specific constraints on how knowledge is grounded
 - Ontologically: change of doxastic state from agnosticism to belief
 - Aspectually: ‘culmination’ achievements (also called: right boundary achievements; intuition: achievements with a preparatory process)
- Proposal: semantic decomposition via a complex eventuality of knowledge acquisition
 - (a) initial state of unsettledness/uncertainty, followed by
 - (b) event of evidence acquisition, which triggers
 - (c) process of deliberation, which culminates in
 - (d) punctual event of belief-change, which leads to
 - (e) new belief state
- The formal structure: reference to two kinds of sub-events of a CtK event
 - e_{ACQ} : event of evidence acquisition
 - e_{DELIB} : event of deliberation

- This structure: allows us to make progress in understanding two novel puzzles

Puzzle 1 **Evidential restrictions between CtKs**: CtKs differ in their felicity with different kinds of evidential grounding for belief change

(5) **Visual perception**

Context: Seeing rain outside the window:

- a. ✓ Jane {discovered, learned, noticed} that it was raining.
- b. # Jane {figured out, realized} that it was raining.
(context adapted from von Fintel and Gillies 2010 on *must*)

Puzzle 2 **Aspectual distinctions between CtK complements**: CtKs differ on aspectual tests, depending on complement type

- (6) a. #I finished discovering he would keep his promise. PUNCTUAL
- b. ✓ I finished discovering which promise he would keep. DURATIVE
(examples adapted from Joan Didion, *The White Album*)

- we will propose that CtKs + declaratives are *culmination achievements*: achievements with an imminency interpretation with the progressive (paraphrased as “on the verge”)

- (7) Jane was just discovering that it was raining (#until 5 pm, #that entire day).

— we will build on Gyarmathy (2015) to propose an event structure that predicts that imminency

2 Evidential restrictions between CtKs

- Philosophical literature: knowledge requires justification (Lackey 2007; Williamson 2000) (largely independent of the debate on the relation between knowledge and belief)
- Linguistic literature: factivity requires acquaintance (Djäv 2019, 2023; Kratzer 2002; Özyıldız 2021)
- Not much was said beyond that! (exception: experiential attitude *remember*; Higginbotham 2003; Liefke 2023; Rosina and Liefke forth.)
- Important novel observation: CtKs show specific distinctions in justification
 - factives at large: no restrictions on how knowledge of the complement was acquired (to wit, *know* is good in all scenarios below)
 - CtKs: very specific requirements, akin to those found with evidential language (not limited to grammatical evidentiality)
- Evidential grounding distinctions considered here (familiar from the literature on evidentiality, see overview in Korotkova 2026)

(8) Taxonomy of information sources (based on Willett 1988)

DIRECT	INDIRECT	
	INFERENCE	HEARSAY
• visual	• assumption	• secondhand
• auditory	• observable results	• thirdhand
• other sensory		• narrative

- perceptual grounding: perceptual evidence for belief (e.g., witnessing event described)
- hearsay: testimony from a (reliable) source
- abductive inference: reasoning causally backwards, from an effect to a believed caused (e.g., water on ground $\rightsquigarrow$ rain; see discussion in Douven 2021)
- anti-abductive inference: inference not based on causal chains (including many sorts of deduction)
- direction-of-reasoning contrasts: ubiquitous in language (*will* vs. *must*, Cariani 2022; Cumming and Winans 2021; *apparently*, Krawczyk 2012; question particle *razve* in Russian, Korotkova 2023, forth.)

(9) **Visual perception**

Context: Seeing rain outside the window:

Jane ✓discovered / # figured out / ✓/?found out / ✓learned / ✓noticed / # realized that it was raining.

(10) **Hearsay**

Context: At school, your son attends a talk on the devastating effects of extreme heat in Greece:

He ✓discovered / # figured out / ✓found out / ✓learned / # noticed / ✓realized that Greece was burning.

(11) **Abduction: reasoning from effect to cause**

Context: Going down to the basement, seeing a rat scurrying away:

I ✓discovered / ✓figured out / ✓found out / ✓learned / # noticed / ✓realized that we have rats.

inference: one rat indicative of an entire rat problem.

(12) *Context: We're trying to find a way to hike on Crete using public transit. We see that there is a bus from Chania to Chora Sfakion. We know that there is only one road in that direction, so that bus must go by Imbros.*

We ✓discovered / ✓figured out / ✓found out / ✓learned / # noticed / ✓realized that there is a bus to Imbros.

(13) **Anti-abduction: reasoning based on stereotypical/general knowledge**

Context: Venice banned cruise ship passengers from disembarking on weekdays. Today is a Monday. Boarding a train in Verona, you claim:

I # discovered / ✓figured out / # found out / # learned / # noticed / ✓realized that there'd be no crowds today. (context adapted from Korotkova 2023)

(14) **Anti-abduction: Eliminative reasoning**

Context: You cannot find your car keys. You have looked everywhere in your house that you have been known to find them, and they are nowhere to be found. You’ve decided the last place they could be is in your car. Standing in your living room, you claim the following.

I # discovered / ✓figured out / # found out / # learned / # noticed / ✓realized that the keys are still in the car. (context from [Krawczyk 2012](#))

(15) **Summary**

	PERCEPTION	HEARSAY	ABDUCTION	ANTI-ABDUCTIVE
notice	✓	#	#	#
figure out	#	#	✓	✓
discover	✓	✓	✓	#
find out	✓/?	✓	✓	#
learn	✓	✓	✓	#
realize	#	✓	✓	✓

2.1 Notice

- knowledge grounded in perceptual—including interoceptive—experience (9)
- incompatible with inference (11,12,13,14) or hearsay (10); bans strictly inferential language in its complements (18)
- resembles ‘direct’ evidentials (e.g., in Tibetan ([Kalsang et al. 2013](#)) or Korean ([Lee 2013](#))), but also allows vivid experiences; ≠ ‘best possible grounds’ (notion going back to [Faller 2002](#))

(16) **Perceptual grounding:** *notice p* requires that *p* be grounded only in the information acquired via experience alone¹

Context: Looking at a full moon:

I noticed that the moon was brighter than it was 100 years ago.

(17) *Context: Going through the proofs submitted by my students in my head.*

I noticed that many students made an error with material conditionals.

(18) *Context: Mordecai always invites Pascal to his favorite Vietnamese café when he submits a paper. Pascal got an invitation earlier today.*

#Pascal noticed that Mordecai (apparently) submitted/must have submitted a paper.

2.2 Figure out

- inferential knowledge across the board (11,12 13, 14)
- incompatible with perception (9) or hearsay (10)

1. We thank Cleo Condoravdi for discussion.

2.3 Discover, find out, learn

- best described as requiring evidence that is causally upstream of the belief it produces (idea from [Cariani \(2022\)](#) on future-past asymmetries)
- felicitous with perception (25c; 9), abductive inference (11, 12), hearsay (10)
- incompatible with non-abductive inferences (13,14)

2.4 Realize

- compatible with various types of inference (11,12,10,13,14)
- requires unconscious reasoning, mental process associated, e.g., with intuition ([Johnson-Laird 2008](#)); unlike *figure out*, aha moment is not caused an intentional mental process

2.5 Recap

- CtKs: constraints as to how knowledge was acquired
- our claim: these constraints signal the presence an underlying evidential structure
- concretizing: these are constraints on the nature of e_{ACQ} in the event structure:

(19) $\llbracket \text{CtK} \rrbracket = \lambda p. \lambda x. \lambda e. \lambda w. e \text{ is the culmination in } w \text{ of } e_{ACQ} + e_{DELIB}, \text{ s.t.}$

- a. notice: $\text{DIRECT}(e_{ACQ})$
- b. figure out: $\text{INFERENTIAL}(e_{ACQ})$
- c. discover: $\neg \text{ABDUCTIVE}(e_{ACQ})$
- d. realize: $\neg \text{DIRECT}(e_{ACQ})$

► Knowledge-by-acquaintance

- Widely assumed to be available for all factives
- Our claim: only predicates that allow perception allow this interpretation
- Non-perceptual verbs *ascertain*, *figure out*, *realize*: only concealed question DPs
- Consequences for how factivity is decomposed (argument against [Djäv 2023](#)) and theorizing about the relation between knowledge-by-acquaintance & propositional knowledge

► Other distinctions we cannot capture at present:

- *discover* often conveys something unexpected and noteworthy (cf. [Meyer 1997](#)), likely sensitivity to the presence of a salient QUD
- *find out* and *learn* are most natural with systematic inquiry (*discover* has this use in academic discourse)
- agentivity/volitionality restrictions on *notice* and *realize* (though see below)

3 Aspectual distinctions between CtK complements

- ▶ Aspectual class/aktionsart: bread and butter of lexical semantics, a window on the meaning of ordinary, non-attitude predicates
- ▶ Much less studied with attitude predicates (though see Bondarenko et al. 2024; Özyıldız 2021 on the role of aktionsart in question embedding)
- ▶ Goal here: aktionsart reveals underlying event structure
- ▶ Well-known: *notice, realize, recognize* as textbook achievements
- ▶ Primary focus in previous literature: DP complements
- ▶ Less known: CtK exhibits standard properties (Dowty 1979; Rothstein 2004); this is modulated by complement type
 - Telicity: tested by felicity with *in*-adverbials
 - Non-durativity: tested by infelicity with aspectual verbs *stop/finish*
- ▶ CtKs are always telic (20a) and (21); but durativity varies with complement type (20b,c).

(20) CTKS + DECLARATIVES: PUNCTUAL

- a. ✓In a year, Emma discovered that Frank was coming to Highbury.
- b. (*That entire year) Emma was discovering that Frank was coming to Highbury.
- c. #Emma finished discovering that Frank was coming to Highbury.

(21) CTKS + INTERROGATIVES: DURATIVE

- a. ✓In a year, Emma discovered whether Frank was coming to Highbury.
- b. ✓That entire year Emma was discovering whether Frank was coming to Highbury.
- c. ✓Emma finished discovering whether Frank was coming to Highbury.
- d. ✓By the time I finished discovering what I wanted, it came down to simplicity with profound impact.²

- ▶ Novel observation: declarative complements aren't ungrammatical in the progressive; rather they show an **imminency reading** of the progressive
- ▶ Achievements & the progressive:
 - Typically not compatible with the progressive in the 'ongoing process' interpretation (due to non-durativity; Dowty 1979; Vendler 1957)
 - Sometimes compatible with the progressive with other interpretations (see Gyarmathy 2015 for an overview)
- ▶ The imminency reading (Bach 1986; Gyarmathy 2015; Kearns 2003; Piñón 1997 a.o.)
 - Hallmark of culmination/right-boundary achievements: those with a **preliminary/preparatory process**

2. <https://emprepinc.com/cyl/index.php/2024/05/13/7-life-categories-that-will-have-you-living-the-life-for-you/>

- Difference with accomplishments: which parts of the event structure are at-issue (available for semantic operators; see below)
 - Equivalent to substituting with 'on the verge of X' or 'about to X': the process is in final stages, but hasn't culminated yet
 - Diagnostic: progressive + just (not available for accomplishments)
- (22) a. The flight is {now arriving, about to arrive} at Gate 10. ⇔
b. John is {building, about to build} a garden shed right now. ⇔
(Gyarmathy 2015:164)
- (23) a. I was just writing the chapter (when you called). $\not\approx$ I was about to finish the chapter (when you called).
b. The flight was just arriving (when we came to the airport). $\approx$ The flight was about to arrive (when we came to the airport).
- Gives rise to the imperfective paradox (is Xing $\nrightarrow$ has Xed)
- (24) a. Rebecca was (just) reaching the summit when it began to rain.
b. Astrid was (just) winning the race when we arrived.
(adapted from Gyarmathy 2015:23)
- The imminency reading with CtKs (NB: often singular subjects/objects, not an iterative reading)³
- (25) a. Putin is discovering that overwhelming military power can be a curse.
(The Washington Post)
b. [Bondaroff] was figuring out that he had the option of becoming, in effect, a corporate muse.
(The New York Times)
c. You tapped every surface you found in front of you. [...] You were finding out that everything made a sound.
(The New Yorker)
d. We were learning that sometimes the only way to endure suffering is to transform it into art.
(Suleika Jaouad, *Between Two Kingdoms: A Memoir of a Life Interrupted*)
e. Wittgenstein is noticing that the very existence of any limit already suggests another side.
(Zach Weber, *Paradoxes and Inconsistent Mathematics*)
f. I'm just noticing that an additional book was written nearly forty years after Canticale by Walter Miller and a co-author.⁴
g. Murdoch is realizing that he's stuck with the monster he created.
(The Washington Post)

3. Some of them have other readings with the progressive, as noted already by Dowty (1979), but even the recent literature does not make reference to the ones we are after, and Gyarmathy (2015) explicitly classifies some CtKs as achievements of a different type. We suspect it has to do with complement types: previous literature has mostly looked at object DPs.

4. <https://www.goodreads.com/questions/202412-i-m-just-noticing-that-an-additional-book/answers/282856-is-this-the>

- The imminency reading is not forced for interrogative complements, including concealed questions (important: this shows that the contrast is due to the semantics of questions, and not the syntax of clausal complementation)
- (26) a. Emma was discovering whether Frank was coming to Highbury, but had a long way to go.
b. Emma was discovering that Frank was coming to Highbury, ??but had a long way to go.
c. Emma was discovering ✓the truth/#the rumor.
- Our claim: imminency with declaratives diagnoses the presence of a preparatory process for the achievement
 - Our proposal: this is the process of gaining knowledge, via deliberation (i.e., e_{DELIB} is a process)
 - Natural connection: incrementality (Fleisher 2023; Zuchewicz 2020): complements influence the aspect of the resulting VP (just like with regular, non-attitude predicates; Dowty 1991; Krifka 1989)

3.1 Making CtKs culmination achievements

- Approach: import the logic of *cover events* from Gyarmathy (2015)
 - Assumptions about culmination achievements, such as *reach the summit* (following vast literature on aspect, see overview in Gyarmathy 2015)
 - assert the punctual event of culmination, (i.e., the moment of reaching the summit)
 - presuppose a *cover event*: occurrences of other events that led to the culmination, including the preliminary process diagnosed by the imminency reading of the progressive, (i.e., everything that led to reaching the summit)
 - the cover event serves to measure out the progress toward culmination in terms of the mereology of cover event (i.e., sub-events of movement correlating with distance from summit)
 - the progressive targets the preliminary process, picking out a non-final sub-event (more work needed to derive imminency)
 - adapting to CtKs: CtKs associated with a preliminary process of gaining knowledge
 - gaining knowledge entails movement toward settledness, expressed here as credence
- (27) $\text{SETTLED}(x, p, w, t) \leftrightarrow [Cr(x, p, w, t) = 1 \vee Cr(x, p, w, t) = 0]$
- during deliberative component of the cover event, the CtK subject moves towards settlement
 - settlement obtains at culmination of cover event (CUL is a culmination point (Moens and Steedman 1988))
- (28) $\text{SETTLED}(x, p, w, \tau(\text{CUL}(e_{\text{COV}}, w)))$
- we adopt a homomorphic treatment in terms of monotonic change in credence
- (29) $\forall e', e'' \sqsubseteq e_{\text{DELIB}} [\tau(e') < \tau(e'') \rightarrow Cr_{x, w, \tau(e')}(p) < Cr_{x, w, \tau(e'')}(p)]$
 $\vee \forall e', e'' \sqsubseteq e_{\text{DELIB}} [\tau(e') < \tau(e'') \rightarrow Cr_{x, w, \tau(e')}(\neg p) < Cr_{x, w, \tau(e'')}(\neg p)]$

► Knowledge acquisition, deconstructed

- (a) initial state of unsettledness (Rawlins and White 2019; Karttunen 1973), followed by
- (b) event of evidence acquisition⁵, which triggers
- (c) process of deliberation, which culminates in
- (d) punctual event of belief-change, which leads to
- (e) new belief state

► 'Coming-to-know' blueprint

(30) $\llbracket \text{come-to-know} \rrbracket = \lambda p.\lambda x.\lambda e.\lambda w:$

a. Presupposes:

factivity: $p(w) = 1$,

cover event that includes an individual x and proposition p

$\wedge \exists e_{\text{COV}}[\text{COVER}(e_{\text{COV}}, w, p, x)]$,

where $\text{COVER}(e_{\text{COV}}, w, p, x)$ iff

$[e_{\text{COV}} = e_{\text{ACQ}} + e_{\text{DELIB}}$ events of evidence acquisition and deliberation
 $\wedge \neg \text{SETTLED}(x, p, w, \tau(e_{\text{ACQ}} + e_{\text{DELIB}}))$ initial unsettledness
 $\wedge \exists q.\exists t' \prec \tau(e_{\text{ACQ}})[Cr_{x,w,t'}(q) < 1 \wedge Cr_{x,w,\tau(e_{\text{ACQ}})}(q) = 1]$ acquiring new knowledge q
 $\wedge Cr_{x,w,\tau(e_{\text{ACQ}})}(p|q) > Cr_{x,w,\tau(e_{\text{ACQ}})}(p|\neg q)$ x considers q evidence for p
 $\wedge [\forall e', e'' \sqsubseteq e_{\text{DELIB}}[\tau(e') < \tau(e'') \rightarrow Cr_{x,w,\tau(e')}(p) < Cr_{x,w,\tau(e'')}(p)]]$ towards settledness
 $\vee \forall e', e'' \sqsubseteq e_{\text{DELIB}}[\tau(e') < \tau(e'') \rightarrow Cr_{x,w,\tau(e')}(\neg p) < Cr_{x,w,\tau(e'')}(p)]]$,
 $\wedge \text{SETTLED}(x, p, w, \tau(\text{CUL}(e_{\text{COV}}, w)))]]$, settledness at culmination

b. Asserts: **belief-change** to p

$e = \text{CUL}(te_1[\text{COVER}(e_1, w, p, x)], w) \wedge \forall t' \geq \tau(e)[Cr_{x,w,t'}(p) = 1]$. culmination in belief

► Caveats:

- our treatment of evidence in terms of credence (cf. Krawczyk 2012; McCready 2015) is a placeholder; each verb lexicalizes a more specific evidential relation;
- we treat factivity as a classic presupposition; analysis perfectly compatible with the views on factivity such that the veracity entailment becomes backgrounded due to pragmatic calculation (Scontras and Tonhauser 2025)
- we sidestep the issue of causality; it will be needed for a full account given that CtKs denote a change of state, though not of the type typically discussed (*break, flatten*);
- for simplicity, we suppress scales of change associated with culmination achievements; cf. also (Fleisher 2023; Zuchewicz 2020) specifically on factives.

5. The event of evidence acquisition is adapted from literature on evidentiality (see overviews in Hirayama and Matthewson 2022; Johnson 2022). That literature often collapses the distinction between 'acquiring evidence' and 'belief-change', even though conceptually those are distinct, which is what our analysis spells out. We suspect that bona fide evidentials make reference to similar structures, but it will be more difficult to show.

3.2 Accounting for durativity

- A tempting move: durativity with interrogatives comes from the need to resolve sub-questions, or pursuit of a strategy to resolve sub-questions
 - in moving toward settledness on *Who is coming to Highbury?*, one must answer *Is Frank coming to Highbury?*, *Is George coming to Highbury?*, ...
 - this yields a family of sub-questions to answer, creating a durative plan to answer
 - **problem**: this predicts polar questions should be as punctual as declaratives, contrary to what we see (21)⁶
- Instead: linking this problem to another declarative/interrogative contrast we discuss in Anand and Korotkova (2024): felicity under 'deliberative environments' (term from Cariani et al. 2013; Condoravdi and Lauer 2017)
 - CtKs with declarative complements are infelicitous in deliberative environments (we only discuss intention verbs here (Grano 2017), but the class is larger, including anankastic conditionals, deliberative adverbials, imperatives, etc, see Anand and Korotkova 2024)
- (31) In his Stanford experiment, Zimbardo intended / tried to discover {#that/✓how quickly} people conformed to the roles of guard and prisoner.
 - basic intuition: this arises because the factivity conflicts with unsettledness
 - technical point: this works because of projection of the factivity into the doxastic state of the attitude holder
- (32) **Deliberation Projection:**
 If p presupposes q , $\text{INTEND}(x, p, e, w)$ is defined only if $q \in \text{DOX}_{x,w,\tau(e)}$.
- (33) #[Kira intends [to learn [that Saturn has 95 moons]]].
 $\text{INTEND}(\text{Kira}, \lambda e' \lambda w' \text{LEARN}(\text{Kira}, p, e', w'), e, w) = 1$
 iff $\forall w'' \in \text{INT}(\text{Kira}, \tau(e), w) \exists t'' > \tau(e) [\text{LEARN}(\text{Kira}, p, t'', w'') = 1]$
 - a. projected unsettledness: $\lambda w. \neg \text{SETTLED}(\text{Kira}, p, w, \tau(e)) \in \text{DOX}_{\text{Kira}, \tau(e), w}$
 - b. projected Factivity: $p \in \text{DOX}_{\text{Kira}, \tau(e), w}$
- when a CtK embeds an interrogative, the factivity is caught by the question embedding, preventing contradiction (so it's not about question embedding per se, but rather an inter-venor, same effects with e.g. epistemic modals)
- (34) $\text{CtK}(x, Q, e, w) \leftrightarrow \exists p \in Q \text{CtK}(x, p, e, w)$
- (35) ✓[Kira intends [to learn [if Saturn has 95 moons]]].
 $\text{INTEND}(\text{Kira}, \lambda e' \lambda w' \text{LEARN}(\text{Kira}, Q, e', w'), t, w) = 1$ iff $\forall w'' \in \text{INT}(\text{Kira}, e, w)$
 $\exists e'' [\tau(e'') > \tau(e) \wedge \exists p \in Q [p(w'') = 1 \wedge \text{LEARN}(\text{Kira}, p, e'', w'') = 1]]$.
- (36) $\text{INTEND}(x, P, e, w) = 1$ iff $\forall w' \in \text{INT}(x, \tau(e), w) \exists e'' [\tau(e'') > \tau(e) \wedge [P(e'')(w') = 1]]$

6. One promising move would be to rethink this in terms of inquisitive possibilities vs. sub-questions, which would allow a distinction between polar questions and declaratives. This would require us to think of the durativity for polar questions as arising in decreasing entropy in credence, defined over the set of possibilities. We do not discuss this option here, but consider it potentially promising.

- Proposal: durative uses of CtKs with interrogatives are actually tracking a deliberative interpretation (*Emma was trying to discover whether Frank was coming to Highbury*)
 - this is possible with interrogative complements, but not declaratives
 - and so we get durative/non-imminent uses with interrogatives but not declarative complements
- Prediction: this should be ruled out in non-volitional cases.
 - One way to test: *realize* and *notice* are non-volitional CtKs
 - these are odd in deliberative environments
- (37) ?? In the Stanford Prison experiment, Zimbardo intended to notice/realize how quickly people conformed to the roles of guard and prisoner.
 - they are also less good in durative frames
- (38) a. # That year, Emma was realizing whether Frank was coming to Highbury.
 b. # Emma finished noticing whether Frank was at the house.
 - NB: lack of volitionality is not lexicalized: felicitous in contexts that bring attention to the subconscious (39)
- (39) Context: *Recommendations on body mindfulness*:
 Start with external body parts and work your way in ... trying to notice how that body part feels. After getting comfortable noticing external body parts, then use a slow shift towards noticing the inside body parts.
[\(https://www.kelly-mahler.com/what-is-interoception/interoception-and-mindfulness/\)](https://www.kelly-mahler.com/what-is-interoception/interoception-and-mindfulness/)
- Some residual cases: declarative embeddings can be less culminating achievement like, depending on the verification conditions
 - they are much better with generic/quantificational components
- (40) a. That whole year, I was learning that you just can't trust people.
 b. That week, I learned that no one wanted to sit with me.
- (41) a. Ms. Coppel was beginning to notice that the grand kitchens of Las Vegas were shrinking in size and range.
 b. I was beginning to realize that success in skating had a lot more to do with psychological stability or the ability to conquer fear. (*The New York Times*)
 - or with complex proofs, requiring a complex evidential/reasoning process
- (42) That whole half-decade, Rosalind Franklin was figuring out that DNA has a helical structure.
 - What these point to is a more refined representation of the structure of the inquiry:
 - can get durativity via a plurality of events of acquaintance (40)
 - can get durativity based on a complex inquiry process

4 Outlook

- ▶ Main take-home message: ‘coming-to-know’ verbs encode a complex eventuality of knowledge acquisition
 - Cover event: property of culmination achievements at large
 - One aspect: rooted in the evidential nature of CtKs
 - Another: connected to the nature of deliberation at the root of belief change
- ▶ An interesting lexical gap
 - At least in English: no vanilla ‘coming-to-know’ verb
 - Atelic factives: omnivorous wrt evidence (*know*)
 - Telic factives: always specify ‘mode of acquisition’
 - Is the gap accidental? Cross-linguistic research might be revealing
 - Preliminary observation: same picture in Romanian ([Buruiană](#) in progress) and even languages where *learn* is derivationally related to *know* (Polish, Russian)
- ▶ Evidence in language: CtKs fit squarely into a morphosyntactically heterogeneous group of evidentials expressions in English (list adapted from [Bary and Korotkova 2023](#))
 - (a) epistemic modal auxiliaries, e.g., *must* ([von Fintel and Gillies 2010, 2021](#); [Lassiter 2016](#));
 - (b) predictive expressions, e.g., *will* ([Cariani 2021](#); [Winans 2016](#));
 - (c) temporal adverbials with *by* phrases, e.g., *by now* ([Altshuler and Michaelis 2020](#));
 - (d) questions with contextual bias ([Büiring and Gunlogson 2000](#); [Sudo 2013](#), see especially discussion in [Korotkova](#) forth.);
 - (e) parenthetical constructions ([Rooryck 2001](#); [Simons 2007](#));
 - (f) perception predicates, e.g., *hear* and *see* ([Toivonen 2011](#); [Whitt 2011](#));
 - (g) appearance claims, e.g., *looks red* ([Rudolph 2020, 2023](#));
 - (h) copy raising constructions, e.g., *seems like* ([Asudeh and Toivonen 2012](#));
 - (i) predicates of personal taste, e.g., *delicious* ([Anand and Korotkova 2018](#); [Ninan 2014](#));
 - (j) subjective attitudes, e.g., *find* ([Korotkova and Anand 2021](#); [Stephenson 2007](#)).
- ▶ Old question: what is the difference between knowledge and belief?
 - Factivity does not play a role in our analysis (with the exception of deliberative projection)
 - Could we apply our template for ‘coming-to-believe’ verbs: *conclude, infer, gather* ...
 - Non-factive telic doxastics: only inferential restrictions
 - No belief-via-perception or belief-via-hearsay
 - Those have a typological parallel in the category of revelative ([Adelaar 2013](#); [Martínez Vera 2022](#))
- ▶ A very general issue: how much mileage can we get out of our knowledge-acquisition eventuality? Could we argue that all evidentials make reference to a structure like this?
 - Many evidentials: temporal interaction between evidence acquisition and prejacent time, even in those languages where they are not part of the tense-aspect system ([Bowler 2018](#); [Hirayama and Matthewson 2022](#))

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