

When-questions and tense in Inquisitive Semantics*

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SALT 29, May 17, 2019

1 Introduction

- Temporal questions may be formed from a variety of question words:

(1) *when, at what time, until when, how long, during which* + N, ...

These all have different answerhood conditions, but today I will focus on WHEN-questions.

- The main rationale for studying temporal questions is that they display a number of **tense restrictions**, with cross-linguistic variation.
- Modern frameworks for the semantics of interrogatives, such as **Inquisitive Semantics** (InqS), have mainly focused on argument questions (*what/who/which*), and not on adverb questions.
- Tense and aspect have not been implemented in InqS. Besides explaining tense use in questions, temporal sluices are a reason to investigate the inquisitive character of tense operators (sluices are seen as diagnostics for inquisitive content; [Anderbois 2014](#)):

(2) We will hold a meeting, but we don't know when.

*I thank Bert Le Bruyn, Anja Goldschmidt, Martijn van der Klis and Henriëtte de Swart for very helpful discussion and feedback. I thank the audience at the ILLC Inquisitive Semantics seminar for their valuable input. This research is part of the *Time in Translation* project (<http://time-in-translation.hum.uu.nl>), funded by NWO grant 360-80-070, which is gratefully acknowledged.

2 Tense restrictions in WHEN-questions

2.1 Data

1. Current present tense

- In both English and Dutch, WHEN-questions are incompatible with the present tense that is interpreted as 'currently ongoing':

- (3) a. When does John speak? [only OK as a futurate interpretation]
b. When does John sing? [habitual interpretation]
Every Saturday evening.
c. #When is Mary tired?
d. #Wanneer is Peter aan het zingen? [Dutch progressive]
when is Peter at the sing
'When is Peter singing?'

This is surprising, given that the described event could span a longer time interval containing the speech time. A present tense WHEN-question, however, cannot ask about the size of that interval (i.e. it does not allow answers such as "this week", "this month", etc.)

2. Present perfect

- English *when*-questions are incompatible with the present perfect:

- (4) a. When did you read the book?
b. When will you read the book?
c. *When have you read the book?

The restriction of the present perfect in *when*-question is often given in descriptive/teaching grammars of English, but not analyzed formally.

- In Dutch, however, present perfect WHEN-questions are completely natural:

(5) Wanneer heb je dat boek gelezen?
 when have you that book read?
 ‘When did you read that book?’

- This is reminiscent of the Present Perfect Puzzle (the restriction of past time adverbials with the present perfect in English, but not in Dutch/German) (Klein 1992; Portner 2003; Pancheva and von Stechow 2004 a.o.).

(6) a. John has read the book (*yesterday).
 b. Jan heeft het boek (gisteren) gelezen.
 John has the book (yesterday) read
 ‘John read the book (yesterday)’

Klein (1992) mentions the present perfection restriction for *when*-questions briefly, but does not analyze it.

Exceptions: rhetorical questions and iterative readings

- English *when*-questions can have the present perfect when they are non-temporal questions. This is the case for “rhetorical” questions with *since when* (7) and *ever* (8):

(7) a. **Since when** has Turkey been part of Europe? [Europarl corpus]
 b. **Since when** has cryptic turned down a way to make more money? [iWeb corpus]

These are known in the literature as *since when-attacks* or *meta-conversational since when-questions* (see Kiss 2017, and references there).

(8) a. When have we **ever** seen Hamas investigate its own actions? [Europarl]
 b. When have we **ever** needed an excuse to grab a gin & tonic? [iWeb]

It is difficult to interpret (7) or (8) as sincere information-seeking questions.

- English present perfect *when*-questions seem to improve under existential readings that ask about *multiple events/times*:

(9) When have you been in America?
 a. #Last month. [single time answer]
 b. ✓ In 2003, 2004, 2006, and 2009. [multiple times]

(10) [Think about the passive-aggressive person in your life, and notice how you feel as you think about them and what they do. [...]]
 When else have you felt the same feeling you’re feeling now? [iWeb corpus]

Similar observations hold for multiple event readings of present perfect WHEN-questions in Swedish.¹

	English	Dutch
current present tense	✗ (✓ under future/habitual readings of the present)	✗
present perfect	✗ (✓ in rhetorical questions and iterative readings)	✓

Table 1: Tense restrictions in WHEN-questions

¹Thanks to Jesper Carlson (p.c.) for judgments. I am working on extending and further analyzing these preliminary findings in future work.

3 Explaining tense restrictions

3.1 Current present restriction

- There is a pragmatic constraint against asking questions for which the answer is already partially established in the context. In such a case, this must be marked in the question, for example with the additive *else* (Harris 2014; Schwarz and Simonenko 2018; Theiler 2018).

- (11) [Linda invited three people to go for dinner]
- A: Linda invited Peter.
 - #B: Who did Linda invite?
 - B: Who **else** did Linda invite?
 - B: Other than Peter, who did Linda invite?
- (12) [Peter cooked a three-course dinner. We've just had the starter, which was soup.]
- #What did you cook?
 - What **else** did you cook?
 - In addition to the soup, what did you cook?

The function of *else* is both to introduce an additive presupposition, and to reduce the domain of the question ('witness removal'; Harris 2014; Theiler 2018).

(13) **Pragmatic constraint**

Do not ask a question for which the answer is partially settled in the common ground.

- Likewise, a temporal question can be partially answered in case one of several time instances is known in the context:²

- (14) [The arc of the moral universe quote is one that Dr. King used many times, including during the march from Selma in 1965 [...]]
Professor Carson, **when else** did Dr. King talk about the arc of the moral universe? [iWeb]

- Claim: temporal questions also count as partially resolved when a point in that interval has been established in the context. This can be illustrated for other tenses, such as the simple past:

- (15) [John was sick for some time, but is better now.]
A: John became sick on November 10th.
#B: When was John sick?
B: **Until** when was John sick?

- Present tense, when it has a "currently ongoing" interpretation, anchors the event time to the speech time. The pragmatic constraint explains the current present tense restriction on WHEN-questions.

- (16) [The SALT conference is going on as we speak, but the speaker doesn't know the start/end dates]
- #When is SALT?
 - ✓ **Until when** is SALT? / When does SALT end? / ...

²Most *when else* questions are biased (and come with present tense), as in (i). However, cases like (14) are also found in corpora.

(i) When else do you get to have more than one dessert?
↪ you rarely get to have more than one dessert

Partiality by plurality:	multiple answers are expected, some of them are settled.	(11,12,14)
Partiality by description:	a single answer is expected, which is already partially described.	(15,16)

Table 2: Ways in which a question can be partially settled in the common ground

Side note: There is a similarity between *else*-questions and obligatory triggers such as *too* and *again* (see [Bade 2016](#) and references there):

(17) a. John lives in France. Mary lives in France #(too).
 b. John lives in France. Who #(else) lives in France?

(18) a. John went to France last year. He went to France this year #(again).
 b. John went to France last year. When #(else) did he go to France?

This is a reason to adopt a pragmatic framework in which assertions and interrogatives are treated at the same level, such as **Inquisitive Pragmatics**. See section 4.1 below.

3.2 Present perfect restriction

- I assume a PTS-based semantics for the present perfect ([Iatridou et al. 2001](#); [Rothstein 2008](#)).

- (19) a. The present perfect introduces an interval $t = [LB, RB]$ (the *perfect time span*, PTS), and asserts that the event time E is somewhere within t .
- b. Different languages have different requirements on LB and RB in relation to the speech time S and reference time R.

- In English, the PTS must reach up to the speech time ($RB = R, R = S$), whereas in Dutch/German it need not ([Rothstein 2008](#)):

- (20) a. *I **have** always **lived** in London, but recently I moved to Amsterdam.
 b. ✓ Ich **habe** immer in London **gewohnt**, aber vor kurzem bin ich nach Amsterdam gezogen.
 c. ✓ Ik **heb** altijd in Londen **gewoond**, maar ik ben onlangs naar Amsterdam verhuisd.

- Present perfect WHEN-questions ask for the event time within the PTS, not the resultant state time:

- (21) Wanneer heb je dat boek gelezen?
 when have you that book read
 ‘When did you read that book?’
- a. In de zomervakantie. [In the summer vacation]
 b. #Gisteren om 5 uur [Yesterday at 5pm]
 (intended: answer with the time of the resultant state)

- The incompatibility of English *when*-questions with the Present Perfect can be related to the pragmatic constraint (13) discussed above: the right edge of the PTS interval is asserted to be the speech time, hence an (unmarked) present perfect *when*-question is unacceptable.
- This also provides an explanation for why English present perfect *when*-questions are good with iterative readings (recall (9–10) above): several events are located within the PTS, but do not overlap with the speech time.
- In German and Dutch, the PTS can be fully in the past, so the present perfect is compatible with WHEN-questions in those languages.
 ⇒ See Appendix A for some notes on the Dutch simple past in WHEN-questions.

4 Inquisitive semantics

Inquisitive Semantics is a framework designed to capture the meaning of questions (Ciardelli et al. 2018), but temporal questions and tense/aspect operators have not been analyzed in the framework in detail (but see Hoeks 2017 for some first steps).

Reasons to study tense in Inquisitive Semantics:

1. Temporal answers and tense restrictions in questions show that a semantic theory of questions should implement tense and aspect;
2. Temporal sluices function as a diagnostic for the inquisitive properties of tense operators;
3. Inquisitive pragmatics as a framework to implement pragmatic constraints on questions.

4.1 Implementing the pragmatic constraint from §3

- Inquisitive Pragmatics (Groenendijk and Roelofsen 2009): account of inquisitive information exchange (the direction of conversation is toward a more informative and less inquisitive state).

(22) *Sincerity Maxim* (Groenendijk and Roelofsen 2009: 18)
 Let φ be a sentence uttered by a speaker with state s , given a common ground C . Then:

1. φ should not be eliminative in s ; [Informative Sincerity]
2. if φ is inquisitive in C , then it should be inquisitive in s . [Inquisitive Sincerity]

- Inquisitive sincerity: don't ask a question that is completely settled in your own knowledge state. [except for exam questions, rhetorical questions, etc.]
- The data above suggest that a stronger version is needed for: even if the question is partially resolved in the speaker's knowledge state, the question should not be asked unmarked.

- The notion of *compliance* (Groenendijk and Roelofsen 2009) can be used to model partial answerhood (see also Theiler 2018). An assertion φ is compliant with a question ψ if φ coincides with the union of a set of alternatives in ψ .
- This will be used to capture the two types of partiality from Table 2.

4.2 Temporal sluices

- **Temporal sluices:** sluices with the word *when* (called 'sprouting' in Anderbois 2014).

(23) John went home, but I don't know when.

- A corpus search reveals that most *when*-sluices are about the future (24a,b), but past ones are also attested (24c).

- (24) a. I'm going to get it, but I don't know when. [iWeb]
 b. We will send someone out to have a look, but we don't know when. [iWeb]
 c. We know that she was previously treated for bipolar disorder, but we don't know when. [iWeb]

- Anderbois (2014: 900): sluicing requires an antecedent that makes an inquisitive contribution.

- (25) a. Symmetric entailment condition on sluicing: given $[\text{CP}_E \text{ C IP}_E]$, IP_E can be elided only if there is some salient antecedent CP_A such that: $\text{CP}_E \models \text{CP}_A$, and $\text{CP}_A \models \text{CP}_E$.
- b. Inner antecedent generalization: an expression α can serve as an inner antecedent for sluicing only if α makes an inquisitive contribution.

This makes sluices a diagnostic for inquisitive content. The occurrence of temporal sluices suggests we should look at the inquisitive properties of tense operators.

- In cases of so-called “sprouting”, sluicing is possible despite the absence of overt inquisitive content in the antecedent:

(26) *Indirect sprouting* (examples from [Anderbois 2014](#))

- a. [John baked a cake]_A, but we are all wondering with whose help.
- b. [John won]_A, but I don’t know which contest.

Anderbois suggests that existential event quantification in the antecedent provides the required inquisitive content:

- (a) $\exists e(\text{bake-cake}(e) \ \& \ \text{Ag}(e, j))$
 - (b) $\exists e(\text{win}(e) \ \& \ \text{Ag}(e, j))$
- } \Rightarrow issue: Which event?

Anderbois does not explore in detail the further technical consequences of introducing inquisitive event quantification.

- A similar question arises for temporal quantification: is it inquisitive, and does it raise an issue?

4.3 Implementing tense in Inquisitive Semantics

The only earlier formal semantic analysis of *when*-questions is [Nelken and Francez \(1998\)](#).

- [Nelken and Francez \(1998\)](#) define an intensional language ILQ that defines a *partition semantics* for questions, similar in spirit to [Groenendijk and Stokhof’s \(1984; 2011\)](#). Questions denote equivalence relations over worlds. They partition the set of worlds into blocks in which the same answers are true.
- The question word *when* combines with a sentence that is specified for aspect and has a placeholder for tense:

(27) a. When did Mary kiss John? (N&F, p. 16)

b. $\llbracket \text{when} \rrbracket = \lambda P \lambda I (?e[\text{time}(e) \subseteq I \ \& \ P(\text{time}(e))])$

c. $\llbracket \text{when} \rrbracket(\llbracket \text{Mary kissed John} \rrbracket) =$
 $= \llbracket \text{when} \rrbracket(\lambda P \lambda I (\exists e(\text{KISS}(m, j)(e) \ \& \ \text{time}(e) \subseteq I) \ \& \ P(e)))$
↑ ↑
tense (placeholder) PFV aspect
 $= \lambda I [?e[\text{time}(e) \subseteq I \ \& \ \exists e'[\text{KISS}(\text{MARY}, \text{JOHN})(e') \ \& \ \text{time}(e') \subseteq \text{time}(e)]]]$

The interval *I*, called the “time of interest”/“toi”, is left unspecified. The idea is that *I* is constrained by tense (p. 8), but N&F do not address the question of how this works.³

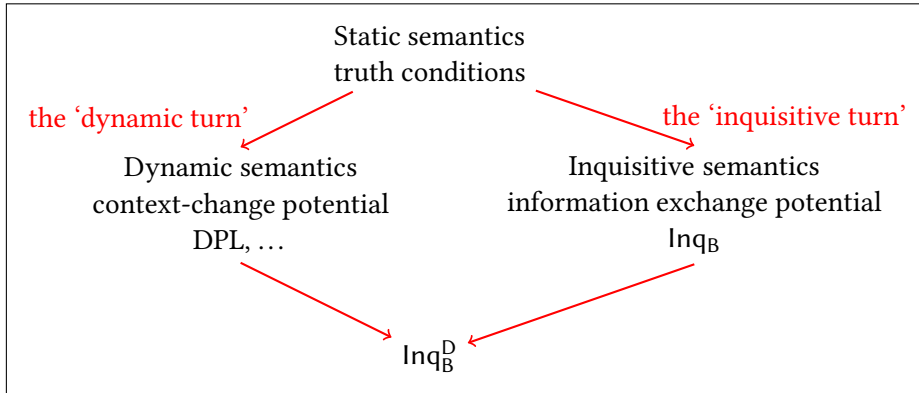
Since Inquisitive Semantics is a recent framework and under active development, I will explore two approaches to implementing tense in the framework:

1. The compositional typed approach to Inq_B ([Ciardelli et al. 2017](#)).
2. Dynamic inquisitive semantics, Inq_B^D ([Dotlačil and Roelofsen 2019](#)).

³The representation in (27) makes *when*-questions “ask for” events, not time intervals.

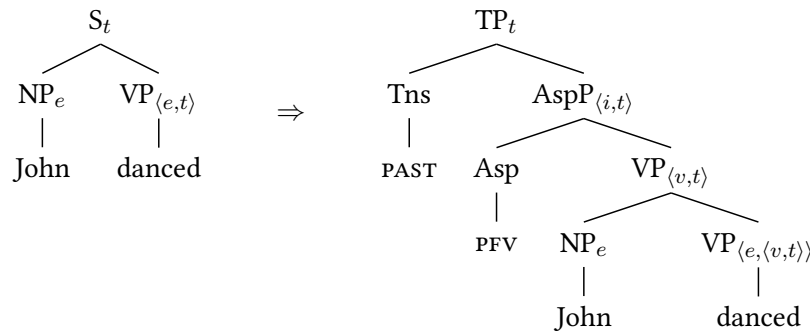
- (i) When did Mary call?
 - a. When John was cooking dinner.
 - b. During the meeting.

According to N&F, an argument to use events instead of time intervals, is that the time scale is dense, but we only have a limited number of linguistic expressions referring to time intervals.



4.4 *Typed inquisitive semantics*

- In a classical non-temporal framework, we can add tense and aspect operators by adding times (type i) and events (type v) to the ontology:



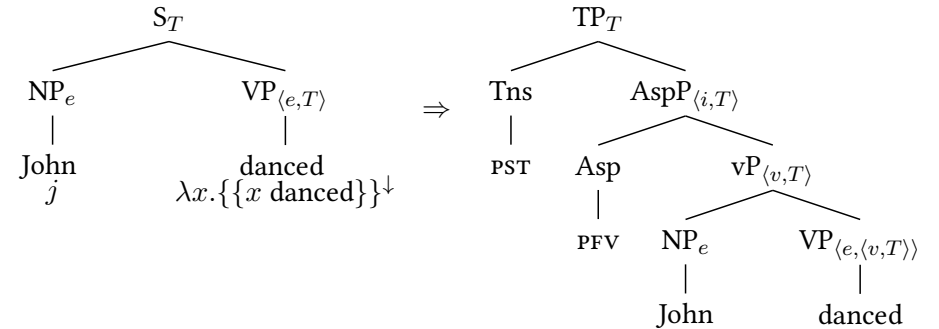
- Aspectual operators introduce existential quantification over events:

(28) a. $\llbracket \text{PFV} \rrbracket = \lambda P \lambda t. \exists e (P(e) \ \& \ \tau(e) \subseteq t)$
 b. $\llbracket \text{IMP} \rrbracket = \lambda P \lambda t. \exists e (P(e) \ \& \ t \subseteq \tau(e))$

The tense operator anchors the time property of the event on the timeline:

(29) $\llbracket \text{PST} \rrbracket = \lambda P. \exists t (t \prec n \ \& \ P(t))$

- We can mimic this process in the typed version of inquisitive semantics:



This raises the question of whether the Tns and Asp operators should be inquisitive quantifiers or not.

(30) a. $\llbracket \text{PFV} \rrbracket = \lambda P_{\langle v,T \rangle} \lambda t_i. \bigcup_{e: \tau(e) \subseteq t} P(e)$ (type $\langle \langle v, T \rangle, \langle i, T \rangle \rangle$)
 $= \lambda P_{\langle v,T \rangle} \lambda t_i. \{s \mid s \in P(e) \text{ for some } e \text{ such that } \tau(e) \subseteq t\}$

b. $\llbracket \text{PST} \rrbracket = \lambda P_{\langle i,T \rangle}. \bigcup_{t: t \prec n} P(t)$

(31) $\llbracket \text{WHEN} \rrbracket = \lambda P_{\langle i,T \rangle} \bigcup_{t \in D_i} P(t)$

(For comparison, the definition of $\llbracket \text{WHO} \rrbracket$ is $\lambda P_{\langle e,T \rangle} \bigcup_{x \in D_e} P(x)$ in Ciardelli et al. 2017: 20)⁴

- Problem 1: overgeneration of inquisitive content.
 - If tense operators (and WHEN) are inquisitive operators, every sentence becomes inquisitive. The original contrast between inquisitive operators (disjunction, indefinites), and non-inquisitive operators is crucial, for example in Anderbois's (2014) account of sluicing.

⁴For the shorthand in (30a), note

$$\llbracket \text{who } P \rrbracket = \bigcup_{x \in D_e} P x := \{s \mid s \in P(x) \text{ for some } x \in D_e\}.$$

- Many utterances now have multiple inquisitive operators, for example questions:

(32) Did John read a book?
 ⇒ should represent an issue with two alternatives, not an issue about the time of John’s book-reading

The behavior of multiple inquisitive operators can to some extent be managed with the help of the issue-cancelling projection operator !. This however introduces a number of complications, see Appendix C.

- Problem 2: the relation between inquisitiveness and “raising issues”. In an intuitive sense, the use of tense operators by itself does not raise an issue of “when?” into the discourse. However, inquisitive operators have typically been considered as issue-introducing operators.

Side note: raising issues

- Originally, inquisitive content was equated to issue raising:

“If a proposition consists of two or more possibilities, it is *inquisitive*: it invites the other participants to respond in a way that will lead to a cooperative choice between the proposed alternatives. In this sense, inquisitive propositions raise an issue” (Groenendijk and Roelofsen 2009)
- For example, ignorance implicatures in disjunctions and modified numerals (Coppock and Brochhagen 2013) are treated as issues raised by inquisitive propositions.
- Later, different perspectives have been taken on the relation between inquisitiveness and issue raising (see e.g. Ciardelli et al. 2012: 42).
- More recently, the dynamic perspective on Inquisitive Semantics has taken a different perspective (see below).

The dynamic version of inquisitive semantics may provide a way to address these problems: Inq_B^D separates inquisitiveness from discourse reference, and Inq_B^D has a different perspective on how inquisitiveness is related to issue raising.

4.5 Inq_B^D

- Dynamic inquisitive semantics, Inq_B^D (Dotlačil and Roelofsen 2019), separates inquisitiveness and dynamicity, combining insights from Inquisitive Semantics and classic theories of dynamic semantics such as DPL (Groenendijk and Stokhof 1991).
- Technically, an information state is now a set of world-assignment function pairs $\langle w, g \rangle$. A context is (still) a non-empty downward closed set of information states.
- Existential quantification is inquisitive in Inq_B , but in Inq_B^D it is broken down into two operations: first adding a discourse referent x , and then updating with φ .

$$(33) C[\exists x\varphi] = C[x][\varphi]$$

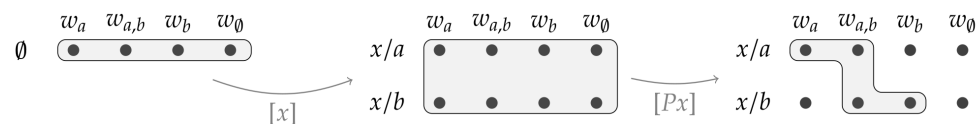


Figure 1: Update with $\exists xPx$. Figure taken from Dotlačil and Roelofsen (2019: 9).

- An operator $?x$ is introduced that “raises an issue about the identity of discourse referent x ”. (Don’t confuse $?x$ and $?\varphi$.)

$$(34) C[?x] = \{s \in C \mid \text{for all } \langle w, g \rangle, \langle w', g' \rangle \in s : g(x) = g'(x)\}$$

(D&R, p. 11)

- Sentences with indefinite expressions are broken down into $\exists x$ and $?x$:

- (35) Someone laughed.
- Inq_B : $\exists x(Lx) = \{\text{M laughed, J laughed, B laughed}\}$
 - Inq_B^D : $!\exists x(?x \wedge Lx)$ (non-inquisitive)

$\exists x$ activates a discourse referent, whereas $?x$ raises an issue about the identity of x . The result is a non-inquisitive context (if the input context is non-inquisitive), but with an active discourse referent x .

- In Inq_B^D all declaratives are closed off with $!$. $?x$ can take local or global scope:

- (36)
- | | | | |
|----|------------------------|--------------------|----------------------------|
| a. | Declarative indefinite | ‘Someone laughs’ | $!\exists x(?x \wedge Lx)$ |
| b. | <i>wh</i> -question | ‘Who laughs?’ | $!\exists x(Lx) \wedge ?x$ |
| c. | Polar question | ‘Does Mary laugh?’ | $?!Lm$ |

- There is a striking similarity between $!\exists x(Lx) \wedge ?x$ and sluicing: a sluice also introduces some individual in the antecedent, and then raises an issue about its identity.
- In order to add tense to the system, we can add discourse referents for times and events. They are introduced in a parallel fashion to individuals ($C[t]$, $C[e]$).

- (37)
- | | | | |
|----|------------------------|--------------------|---------------------------------------|
| a. | ‘John left’ | \rightsquigarrow | $!\exists t < t_0[?t \wedge L(j, t)]$ |
| b. | ‘When did John leave?’ | \rightsquigarrow | $!\exists t < t_0[L(j, t)] \wedge ?t$ |

Comparison of the two variants of Inquisitive Semantics

- Taking the dynamic perspective straightforwardly accounts for temporal anaphora:

- (38) John^{*x*} left^{*t*}. He_{*x*} went_{*t*} home.

- Moreover, it makes the relation between event/time quantification and individual quantification clear, without making everything inquisitive.
- Many (recent) works on the present perfect (and tense/aspect generally) use a DRT framework in which events and times are introduced as discourse referents (de Swart 2007; Rothstein 2008; Nishiyama and Koenig 2010; Kamp et al. 2015). Inq_B^D connects better to this approach in the literature, as it preserves the notion of a discourse referent.
- On the other hand, the typed version of Inq_B with a “traditional” approach of adding functional Tense/Aspect syntactic projections is perhaps more familiar to linguists working with the Heim&Kratzer-style approach to the syntax-semantics interface. There is no typed, compositional version of Inq_B^D available (yet).

5 Conclusion and future work

- A semantic theory of questions needs to take tense seriously.
- I proposed a pragmatic account for tense restrictions in WHEN-questions.
- Implementing tense/aspect in Inquisitive Semantics is not straightforward: a choice between a more classic approach (typed, compositional Inq_B), or a dynamic approach (allowing a discourse dimension for tense).

Future work

- Analysis of other temporal questions than just WHEN-questions, see the list in (1).
- Investigation of tense restrictions in embedded WHEN-questions; a first exploration suggests they differ from those in root questions (see Appendix B). This also relates to temporal sluices.

- What is the relation between question word **WHEN**, and complementizer **WHEN**? Are the present perfect restrictions (**When Mary has left, John was happy*, fine in French and German) related?
- Formal details of tense implementation in Inquisitive Semantics, addressing the technical challenges outlined in the talk. This includes an account of tense anaphora and temporal adverbials.
- Analysis of the non-temporal **WHEN**-questions, with *since when* and *even* (recall (7) and (8) from section 2.1).
- Compare **WHEN**-questions in other languages (Spanish and Swedish are prime candidates under consideration in our research project).

Appendices

A Dutch simple past

- Generally speaking, Dutch **WHEN**-questions with eventive predicates cannot have the simple past, but must use the present perfect.

(39) a. *Wanneer **las** je dat boek?
 when read(PAST) you that book?
 intended: ‘When did you read the book?’

b. Wanneer **heb** je dat boek **gelezen**? (=5)
 when have you that book read?
 ‘When did you read that book?’

- This is reminiscent of a restriction of the Dutch simple past in declarative sentences. The Dutch simple past is mostly unavailable in discourse-initial positions. It is sometimes thought that this is due to the simple past’s ‘definite’ character (i.e. requiring an antecedent, cf. Kratzer 1998; Hoeks 2017), although the full distribution of the Dutch past is not yet well understood.

- Corpus findings suggest that the distribution of Dutch simple pasts in **WHEN**-questions is not the same as in declarative sentences. Simple past *wanneer*-questions are typically found with change-of-state verbs (40a) and punctual/achievement verbs (40b), among others, or in questions targeting for a specific single time at which an event happened (first/last time) (40c):⁵

(40) a. Wanneer **begon** het?
 when began it

‘When did it start?’

b. Wanneer **beseft** u dat u ziek was?
 when realized you that you sick were

‘When did you realize you were sick?’

c. Wanneer stond Tsjechië **voor het laatst** in de EK-finale?
 when stood Czechia for the last in the EC-final

‘When was the last time Czechia was in the European Championship finals?’

These are not, however, the precise same contexts that allow the simple past in declaratives. The distribution of the Dutch simple past is work in progress in our research project *Time in Translation*.

B Tense restrictions in sluices

- Do temporal sluices show the same tense restrictions as temporal root questions? Under the ellipsis account, temporal sluices contain an embedded *when*-clause:

(41) John went home, but I don’t know when ~~John went home~~.

⁵Data taken from the OpenSoNaR corpus (<http://opensonar.clarin.inl.nl/>), a Dutch corpus containing both spoken and written texts.

- Embedded *when*-clauses appear to allow the present perfect more widely than root *when*-questions do. Below are some data from the iWeb corpus:

- (42) a. We will let you know when it has arrived.
 b. They hold each other’s gaze, and Ray can not remember when he has loved her so much.
 c. Almost anyone can see when he has created a decadent cooking masterpiece.
 d. The only way the camera can know when it has found the best possible focus is to go slightly out of focus.
 e. When you break a bone, doctors know when it has healed.
 f. I recognize the Queen’s suit but don’t know if it is by Angela Kelly or another designer, nor do I know when it has been worn.

Problem: what is the syntactic status of the *when*-clause? (complement of the verb, or temporal adjunct?)

- Hoeks (2017: 10) reports that present perfect temporal sluices are fine in English.

C Multiple inquisitive operators and ! in Inq_B

- Inquisitive Semantics comes with the issue-cancelling projection operator !:

$$\begin{aligned} !\varphi &= \mathcal{P}(\text{info}(\varphi)) && \text{(semantically)} \\ !\varphi &= \neg\neg\varphi && \text{(syntactically)} \end{aligned}$$

- The following sentence has two inquisitive operators (polar question and disjunction), but with the given intonation, it only raises a polar question issue (John-or-Bill comes vs. $\neg(\text{John-or-Bill comes})$). The alternatives generated by the disjunctive clause are closed off with !:

- (43) a. Will John-or-Bill[↑] come?
 b. ?!(John come \vee Bill come) (Ciardelli et al. 2018)

- One can apply this idea in a tensed version of Inq_B, in order to deal with problematic sentences such as the past tense question in (32), repeated below:

- (44) a. Did John come?
 b. ?! PST PFV (John come)

- However, the syntactic nature of ! leads to complications when the two inquisitive operators stand in a different scope relation. Consider (45):

- (45) a. Someone laughed.
 b. !PST PFV **someone laugh** \Leftarrow suppresses *all* alternatives
 c. **someone** λx !PST PFV x **laugh**

(45b) (incorrectly) closes off all alternatives, including those of the indefinite. Instead, the generalized quantifier has to raise above ! in order to retain its inquisitive contribution, (45c).

- As a general method of dealing with tense operators, the procedure of inserting !-operators at appropriate places seems too complicated, and lacking independent empirical support. This is especially true when syntactically more complicated sentences with several inquisitive operators are considered.

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