Javanese veridicality mismatches:
Q-to-P reduction amid uniformity[*]

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Abstract This paper examines a surprising counterexample to the Spector & Egré's (2015) generalization that interrogative and declarative complements of responsive verbs match in veridicality: Javanese predicates *ngêrti* 'know' and *kèlingan* 'remember' are veridical with respect to the interrogative CPs, but not with respect to declaratives. I propose that this pattern is problematic for P-to-Q and Uniformity approaches that bake in the answerhood operator (ANS) into the meaning of the embedding verb, and propose an account that derives the Javanese pattern by maintaining the uniformity of semantic types, yet mimicking the Q-to-P reduction.

Keywords: clausal embedding, interrogatives, veridicality mismatches, Javanese

1 Introduction

One big question about *responsive verbs*—verbs that can take both declarative and interrogative clauses—is is how the meanings of the two kinds of clauses that they combine with relate to each other. Spector & Egré (2015) proposed a generalization that restricts possible meaning pairs **<V + *declarative, V + interrogative*>**:

(1)   **Spector & Egré's (2015) Generalization**
        A responsive predicate is veridical with respect to its interrogative complement (like *know* + question = knowing the true answer to the question) if and only if it is veridical with respect to its declarative complements as well (*know* + declarative entails – in fact presupposes – that the declarative is true). (Spector & Egré 2015: 1732)

        Formulating constraints like this is an important step towards establishing what the universal restrictions on denotations of responsive predicates are. While there are many lexical entries for clause-embedding verbs that we could in principle conceive

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of, many logical possibilities do not in fact seem to be attested, and this is something that we should aim to explain. Spector & Egré (2015) entertain a hypothetical verb *shknow*, (2), which has the meaning of *know* with declarative clauses and the meaning of *wonder* with interrogative ones:

(2) $[\![shknow]\!] = <\lambda p_{st}.\lambda x.x$ knows $p, \lambda Q_{st,t}.\lambda x.x$ wonders $Q>$

    a. John *shknows* that it is raining
      = John knows that it is raining.

    b. John *shknows* whether it is raining
      = John wonders whether it is raining.

If verbs like *shknow* don't exist in natural languages, why not? Spector & Egré (2015) propose a theory where the meaning of the *V + interrogative* construction is derived in terms of the meaning of the *V + declarative* construction, thereby providing an account of why the generalization in (1) would hold.

There is however still a question of whether the generalization in (1) is empirically adequate across different languages and verbs: is it indeed true that veridicality of declarative embedding always matches veridicality of interrogative embedding? Some counterexamples to the Spector & Egré's (2015) generalization have been noted in the literature (Elliott, Klinedinst, Sudo & Uegaki 2017; Theiler, Roelofsen & Aloni 2018; Roelofsen & Uegaki 2021; Özyıldız 2019; Uegaki 2022; Özyıldız & Uegaki 2023, 2024). For example, Elliott et al. (2017) discuss *relevance predicates*, which seem to exhibit veridical inference with declarative embedding but not with interrogative embedding, as is illustrated in (3).

(3)   a. Mary cares that John left.   ***veridical***
        ⤳John left.

    b. Mary cares which student left.   ***non-veridical***
        ⤳̸ Mary believes a true answer to the question *"Which student left?"*.

They use this veridicality mismatch to argue for the view that *V + interrogative* is the primary construction with responsive verbs, and *V + declarative* is derivative—in the sense that the declarative clause is type-shifted to a question-meaning (singleton set containing just one proposition) in order to compose with the verb. This view has been called ***Proposition-to-Question (P-to-Q)*** reduction approach (Uegaki 2015b,a, 2019), in opposition to the ***Question-to-Proposition (Q-to-P)*** reduction approach which assumes that responsive verbs are inherently proposition-taking, and the *V + interrogative* is the derived case involving some mechanism of extracting a proposition out of the meaning of the interrogative CP (Karttunen 1977; Heim 1994; Dayal 1996; Beck & Rullmann 1999; Lahiri 2002; Spector & Egré 2015; Cremers 2016).

In this paper I discuss a new case of veridicality mismatch found in the Surakarta dialect of Javanese (Austronesian family).[1] The verbs *ngêrti* 'think/know' and *kèlingan* 'remember' in this language exhibit a veridicality mismatch in the opposite direction compared to the predicates of relevance discussed above: as we will see in section 2, they are non-veridical with respect to the declarative embedding, but are veridical with respect to the interrogative embedding, (4).

(4) **Veridicality mismatches in Javanese**
with verbs *ngêrti* 'think/know' and *kèlingan* 'remember'

a. $V + P \nrightarrow P$ is true in the actual world;   ***non-veridical***

b. $V + Q \rightarrow$ know/remember the true answer to Q.   ***veridical***

In this paper I make a proposal about how such a mismatch in veridicality arises, and discuss its implications for our understanding of how responsive verbs compose with embedded clauses, and how veridical inferences are derived. I will argue for an approach to interrogative embedding that marries certain features of the Q-to-P reduction approach with the **uniformity approach** (Ciardelli & Roelofsen 2015; Theiler 2014; Theiler et al. 2018), according to which both declarative and interrogative clauses denote sets of propositions. In doing so, I will make crucial use of the ideas that veridicality can be introduced independently from the verb by an answerhood operator (Dayal 1996), and that veridicality needs to be relativized to an argument of a predicate—either an individual argument or an event argument (cf. Bondarenko 2022; Uegaki 2022; Özyıldız & Uegaki 2023, 2024, a.o.).

2   The Puzzle: Veridicality Mismatches in Javanese

Both declarative and interrogative clauses in Surakarta Javanese are introduced by the same two complementizers: *nèk* and *yèn*. While the choice between the two has certain syntactic consequences, I have found no difference between them when it comes to veridicality inferences. A declarative CP with *nèk/yèn* is illustrated in (5).

(5)   Djoko ngêrti [**nèk/yèn** Esti ménang pêrtandhingané].
       Djoko know **COMP**   Esti win   race.DEF
       'Djoko knows that Esti won the race.'

There are two strategies of forming polar questions, both of which make use of the question particle *apa* (lit. 'what, or'). The first strategy places this particle right before the complementizer, (6a). The second strategy places *apa* at the end of the

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1 All the data in this paper have been collected in Boston via in-person elicitations with Ismartilah Drummond, a native speaker of Javanese, during the 2019-2023 years.

embedded clause accompanied by negation *ora*, (6b). These strategies do not show any differences with respect to the veridicality inferences.

(6) a. Djoko ngêrti [**apa nèk/yèn** Èsti ménang pêrtandhingané].
     Djoko know **Q**   **COMP** Esti win   race.DEF
     'Djoko knows whether Esti won the race.'

    b. Djoko ngêrti [**nèk/yèn** Èsti ménang pêrtandhingané **apa ora**].
     Djoko know **COMP** Esti win   race.DEF   **Q** **NEG**
     'Djoko knows whether Esti won the race or not.'

Embedded *wh*-questions can be formed by keeping the *wh*-phrase in situ, (7), and this is the strategy I will be using throughout the paper.[2]

(7) a. Tuti ngêrti [**nèk/yèn** aku tuku **apa**].
     Tuti know **COMP** I   buy **what**
     'Tuti knows what I bought.'

    b. Djoko ngêrti [**nèk/yèn sapa** (sing) éntuk hadiyahé].
     Djoko know **COMP**   **who** (REL) got   prize.DEF
     'Djoko knows who got the prize.'

2.1   *Nèk/yèn*-clauses ≠ English *if*-clauses

One curious thing about embedded *nèk/yèn*-clauses is that they are homophonous with conditional clauses, as is illustrated in (8).

(8) a. [Yèn/nèk Parto tuku sapi], aku sênêng.
     COMP   Parto buy cow I   happy
     'If Parto buys a cow, I will be happy.'

    b. Aku sênêng, [yèn/nèk Parto tuku sapi].
     I   happy COMP   Parto buy cow
     'If Parto buys a cow, I will be happy.'

This raises the possibility that *nèk/yèn*-clauses are actually never declarative, but are a special type of polar questions, similar to English *if*-clauses. I would like to argue that without question particles or *wh*-phrases, *nèk/yèn*-CPs can only be declarative. First, these clauses cannot compose with prototypically rogative verbs like *ask*—the question particle *apa* is obligatory, (9a), but they can compose with prototypically anti-rogative verbs like *think*, (9b); cf. English *if*-CPs in (10).

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2 *Wh*-phrases can also move to the left periphery, often accompanied by the passivization of the embedded verb. This process often affects the choice of the complementizer, so I set such cases aside.

(9)   a. Djoko takon [*(**apa**) nèk/yèn aku wis   makani asuné].
       Djoko asked **Q**   COMP I   already feed   dog.DEF
       'Djoko asked whether I already fed the dog.'

       b. aku ngira [nèk/yèn djoko nggambar gunung].
       I   think COMP   Djoko climb   mountain
       'I think that Djoko climbed a mountain.'

(10)   a. Djoko asked if/*that I already fed the dog.

       b. Djoko thinks that/*if I already fed the dog.

Second, *nèk/yèn*-clauses are infelicitous in contexts in which interrogative would
be true and the declarative false. Consider (11), where Tuti is searching for a person
who knows the answer to the question of whether Esti won. If Budi knows the
answer, and the answer is negative, he can truthfully utter use an interrogative clause
(*nèk/yèn Esti won the race apa ora*) to assert that he is knowledgeable about what
the answer to this question is. This is not possible with "bare" *nèk/yèn*-CPs.

(11)   **Context:** Tuti wants to find a person who knows the answer to her question.

       a. **Tuti:** sapa ngêrti [nèk   Èsti ménang pêrtandhingané apa ora]?
          who know COMP Esti win   race.DEF   or not
          'Who knows if Esti won the race or not?'

       b. **Budi:** aku ngêrti [nèk/yèn Èsti ménang pêrtandhingané #(**apa ora**)].
          I   know COMP   Esti win   race.DEF   **Q**   **or**
          dhèwèké ora ménang!
          3SG   not win

          'I know if Esti won the race or not. She didn't win it!'

Finally, interpretation of NPI-like items in "bare" *nèk/yèn*-CPs patterns with their
interpretation in Upward-Entailing contexts. Reduplication of the word *apa* 'what/or'
in Javanese creates an item *apa-apa* ('what-what') which means 'everything' in pos-
itive contexts, (12), but 'anything' in Strawson Downward-Entailing contexts, (13).

(12)   Èsti mêcahaké apa-apa.   (13)   Èsti ora mêcahaké apa-apa.
       Esti break   what-what   Esti NEG break   what-what
       a. 'Esti broke everything.'   a. *'Esti broke everything.'
       b. *'Esti didn't break anything.'   b. 'Esti didn't break anything.'

If *nèk/yèn*-clauses were polar questions, we would have expected them to be
Strawson Downward-Entailing environments and license the existential interpreta-
tion of *apa-apa* in them (cf. *Budi knows if Esti broke anything*). However, this is not

the case: only the same interpretation as in Upward-Entailing contexts is available in "bare" *nèk/yèn*-CPs, (14), suggesting that they are not questions.

(14) Budi ngira [nèk/yèn Èsti mêcahaké apa-apa].
Budi think COMP   Esti break   what-what

    a. 'Budi thinks that Esti broke everything.'
    b. *'Budi thinks that Esti broke something.'

Thus, while there is an interesting question of why embedded clauses and conditional clauses take the same shape, we cannot draw parallels between "bare" *nèk/yèn*-clauses and English *if*-CPs—the latter can be interpreted as polar questions, but the former permit only declarative uses in the absence of additional morphology.

2.2 Non-veridical readings with declaratives

Factive verbs like English *know* and *remember* usually presuppose the truth of their complement. This makes their use illicit in the ignorant speaker scenario:

(15) #I don't know whether Djoko drew mountains or not,
but Parto knows/remembers that Djoko drew mountains.

In Javanese no such effect arises when matrix verbs *ngêrti* 'know' and *kèlingan* 'remember' take *nèk/yèn*-clauses:

(16) aku ora ngêrti [nèk djoko nggambar gunung   apa ora], ning parto
I   NEG know COMP Djoko draw   mountain or not but Parto
ngêrti/kèlingan   [nèk/yèn djoko nggambar gunung].
know/remember COMP   Djoko draw   mountain

'I don't know whether Djoko drew mountains or not, but Parto knows/remembers that Djoko drew mountains.'

The fact that factive verbs presuppose their complements also normally makes it illicit to assert that someone knows *p*, while another person knows *not p*:

(17) #Djoko knows that Esti won the race,
but Budi knows that Esti didn't win the race.

No such infelicity arises with Javanese 'know' and 'remember'. For example, in (18) we see that Wita is able to describe contradictory opinions of Djoko and Esti with the verb *ngêrti* without it giving rise to a contradiction.

(18) **Context:** Neither Heni nor Wita have been at the race. Heni is searching for someone who knows whether Esti won the race or not, and he asks Wita.

    a. **Heni:** aku arêp nggolèki wongé   sapa [sing ngêrti [nèk Èsti
        I   want find   person.DEF who REL know COMP Esti
        ménang pêrtandhingané apa ora]]. apa kowé ngêrti [nèk Èsti
        win   race.DEF   or not Q you know COMP Esti
        ménang pêrtandhingané apa ora]?
        win   race.DEF   or not

   'I want to find a person who knows whether Esti won the race or not.
   Do you know if Esti won the race or not?'

    b. **Wita:** aku ora ngêrti, aku ora nonton (pêrtandhingané). ning Djoko
        I   not know I   not watch (race.the)   but Djoko
        ngêrti [nèk Èsti ménang pêrtandhingané], déné Budi ngêrti
        know COMP Esti win   race.DEF   CONJ Budi know
        [nèk Èsti ora ménang pêrtandhingané].
        COMP Esti not win   race.DEF

   'I don't know, I didn't watch (the race). But Djoko knows that Esti won
   the race, and Budi knows that Esti didn't win the race.'
   (So maybe we should ask someone else.)

Perhaps even more surprisingly, the speaker can be one of the individuals holding
contradictory opinions: the speaker can "know" that Esti ate the cake while Djoko
"knows/remembers" that she didn't eat it, (19):

(19)   aku ngêrti [yèn Èsti mangan kuwéhé], ning Djoko ngêrti/kèlingan
        I   know COMP Esti eat   cake   but Djoko know/remember
        [nèk/yèn Èsti ora mangan kuwéhé].
        COMP   Esti not eat   cake.

    'I know that Esti ate the cake,
    but Djoko knows/remembers that Esti did not eat the cake.'

Thus, we can conclude that Javanese verbs *ngêrti* 'know' and *kèlingan* 'remem-
ber' are non-veridical with respect to the declarative embedding. For *ngêrti*, this
raises a question of why one would translate this verb as 'know' as opposed to 'think'.
Section 5 discusses this issue, arguing that while *ngêrti* is not veridical with declar-
ative clauses, it nevertheless carries a (weaker) presupposition that 'think' lacks.

2.3 Veridical readings with questions

We might have expected that given the lack of veridicality with declarative embed-
ding, interrogative embeddings with *ngêrti* and *kèlingan* will be non-veridical too:

(20) **Expectation (not borne out):**

a. *ngêrti* 'know' + Q = believe some answer to Q

b. *kèlingan* 'remember' + Q = recall some answer to Q

However, this is not borne out: only the "true answer" readings are available with interrogative clauses. First, saying that the attiude holder stands in a *ngêrti* or *kèlingan* relationship to the question is incompatible with the true answer to this question being unknown. This is illustrated by the infelicity of (21).

(21) *#No one knows the true answer to Q, but S Vs Q.*

#Saka pitakoné   [Èsti mangan apa], ora ana   sing ngêrti/kèlingan
from question.DEF Esti eat   what NEG there.is REL know/remember
jawabané   [sing bênêr], Budi ngêrti/kèlingan [nèk Èsti mangan apa].
answer.DEF REL true   Budi know/remember COMP Esti eat   what
Intended: 'No one knows/remembers the true answer to the question *"What did Esti eat?"*, Budi knows/remembers (some answer to) what Esti ate.'

Second, saying that the attiude holder stands in a *ngêrti* or *kèlingan* relationship to a question is incompatible with them not standing in that same relationship to the true answer to this question—they must believe/remember the true answer, (22).

(22) *#S Vs Q, but S doesn't know the true answer to Q.*

#Budi ngêrti/kèlingan [nèk Èsti mangan apa], ning Budi ora ngêrti
 Budi know/remember COMP Esti what   ate but Budi NEG know
/kèlingan [jawabané   sing bênêr saka pitakoné [nèk Èsti mangan apa]].
/remember answer.DEF REL true   from question COMP Esti eat   what
Intended: 'B. knows/remembers (some answer to) what E. ate, but B. doesn't know/remember the true answer to the question *"What did Esti eat?"*.'

Yet another illustration of veridicality with questions is provided in (23). We see that once *Esti ate the cake* is asserted and becomes part of the common ground, saying that Djoko remembers what Esti ate is incompatible with Djoko having wrong recollection according to which Esti didn't eat the cake.

(23) *#P. S Vs Q, but S Vs ¬P.*

#Esti mangan kuwéhé. Djoko kèlingan   [yèn Èsti mangan apa], ning
Esti eat   cake   Djoko remember COMP Esti eat   what but
Djoko kèlingan   [yèn Èsti ora mangan kuwéhé].
Djoko remember COMP Esti not eat   cake
Intended: 'Esti ate the cake. Djoko remembers what Esti ate (= some answer to what Esti ate), but Djko remembers that Esti didn't eat the cake.'

Polar embedded questions with *ngêrti* and *kèlingan* show the same behavior as *wh*-questions: they must be veridical. Compare the sentences with polar embedded questions in (25) and with declaratives in (26) in the context in (24).

(24) **Context for (25) and (26):**
Esti participated in a race; I (the speaker) don't know its result, but know that Djoko thinks that E. won the race, and Budi thinks that E. didn't win the race.

(25) *Polar Question CP*

#Djoko ngêrti/kèlingan [apa nèk Èsti ménang pêrtandhingané], lan
Djoko know/remember Q COMP Esti win race.DEF CONJ

Budi ngêrti/kèlingan (uga) [apa nèk Èsti ménang pêrtandhingané],
Budi know/remember (too) Q COMP Esti win race.DEF

bocahé sing siji salah.
child.DEF REL one wrong

Intended: 'Djoko knows/remembers (some answer to) whether Esti won the race, and Budi also knows/remembers (some answer to) whether Esti won the race, one of the boys is wrong.'

(26) *Declarative CP*

Djoko ngêrti/kèlingan [nèk Èsti ménang pêrtandhingané], ning
Djoko know/remember COMP Esti win race.DEF CONJ

Budi ngêrti/kèlingan [nèk Èsti ora ménang pêrtandhingané],
Budi know/remember COMP Esti NEG win race.DEF,

bocahé sing siji salah.
boy.DEF REL one wrong

'According to what Djoko knows/remembers, Esti won the race, according to what Budi knows/remembers, Esti did not win the race, one of the boys is wrong.'

Because declarative embedding is non-veridical, the sentence in (26) is felicitous in the provided context: Djoko and Budi can have the opposite opinions about Esti winning the race. But we cannot report that both of them stand in the *ngêrti/kèlingan* relationship to the polar question of whether Esti won the race: the sentence in (25) is infelicitous, because if the two individuals have the opposite opinions, they can't both know/remember the true answer to the question—one of them must be wrong.

To sum up, we have seen that both *wh*-questions and polar questions with the verbs *ngêrti* and *kèlingan* result in veridical sentences despite the fact that declarative CPs are non-veridical with these verbs. Thus, these attitude verbs violate the Spector & Egré's (2015) generalization about responsive predicates.

3 Proposal

I propose that the pattern of veridicality mismatches that we observe in Javanese, summarized again below in (27), arises because verbs like *ngêrti* and *kèlingan* are inherently "proposition-taking" and require an answerhood operator (ANS) to be inserted into the structure in order to compose with questions. While the verbs themselves place no veridicality-related restrictions on the propositional content associated with them,[3] leading to non-veridical readings with declaratives, the answerhood operator extracts from the question set the maximally informative proposition true in the world of evaluation, leading to veridical readings with interrogative clauses.

(27)   **Veridicality mismatches in Javanese**
       with verbs *ngêrti* 'think/know' and *kèlingan* 'remember'

   a. $V + P \nrightarrow P$ is true in the actual world;   ***non-veridical***

   b. $V + Q \rightarrow$ know/remember the true answer to Q.   ***veridical***

Thus, my proposal is a version of the ***Q-to-P approach*** to responsive predicates (Karttunen 1977; Heim 1994; Dayal 1996; Beck & Rullmann 1999; Lahiri 2002; Spector & Egré 2015; Cremers 2016). However, unlike many Q-to-P implementations, I will not assume that responsive verbs semantically select for propositions. Unless we are willing to postulate ambiguity, such an assumption would make a strong prediction that whenever certain presupposition is present with a declarative clause, it should also be present with an interrogative clause—which is wrong for example for the aforementioned predicates of relevance like *care* (Elliott et al. 2017). Moreover, we will see in section 4 that there is evidence that Javanese *nèk/yèn*-clauses do not behave like "true" arguments of verbs but rather like verbal modifiers, making an account that treats them as semantic arguments of verbs implausible.

Instead, I will assume the decompositional approach to the semantics of clausal embedding (Kratzer 2006; Moulton 2009; Bogal-Allbritten 2016; Elliott 2020; Bondarenko 2022). On this view, clause-embedding verbs neither directly select for declarative meanings (propositions) nor directly select for interrogative meanings (sets of propositions); they denote simple predicates of events. I propose that *nèk/yèn*-clauses are modifiers of embedding verbs specifying the content associated with the mental state/event (cf. Bogal-Allbritten 2016; Kratzer 2016; Elliott 2020; Bochnak & Hanink 2021; Bondarenko 2022; Özyıldız & Uegaki 2024, a.o.), and this content can in principle be both "declarative" and "interrogative" (Elliott 2020). I model this in the following way: I assume that eventualities (events & states, D_v) are particulars which are a subset of the domain of individuals ($D_v \subset D_e$), and that some of the individuals are entities with propositional content (Moltmann 1989; Kratzer

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3 This is not completely true for *ngêrti* 'know', as we will see in section 5.

2006; Moulton 2009; Moltmann 2013, 2014; Moulton 2015; Bogal-Allbritten 2016; Kratzer 2016; Elliott 2020; Moltmann 2020, a.o.). The CONT(ENT) function is a partial function that when applied to an individual with propositional content returns the set of propositions associated with that individual:

(28)　CONT(ENT) FUNCTION (after Elliott 2020):
CONT is a partial function that takes an entity $x \in D_e$ (where $D_v \subset D_e$) and returns x's unique content $Q \in D_{st,t}$.

I propose that the complementizers *nèk/yèn* always have the meaning in (29): they take a set of propositions P as their argument and return the set of events whose propositional content equals that set. Note that this denotation brings into my proposal the key feature of the **uniformity approach** (Ciardelli & Roelofsen 2015; Theiler 2014; Theiler et al. 2018): having declarative and interrogative content be of the same semantic type—the type of a question (<st,t>).

(29)　$[\![nèk/yèn]\!]^w = \lambda P_{st,t}.\lambda e.\ \text{CONT}(e) = P$

Thus, all embedded clauses, (30-32), receive a uniform treatment: they are all predicates of events whose content is a set of propositions.

(30)　$[\![nèk/yèn\ \text{Esti won}]\!]^w =$
$\lambda e.\ \text{CONT}(e) = \{\{w': \text{Esti won the race in } w'\}\}$

(31)　*Polar Question*
$[\![nèk/yèn\ Q\ \text{Esti won}]\!]^w =$
$\lambda e.\text{CONT}(e) = \{\{w': \text{E. won the race in } w'\}, \{w': \text{E. didn't win the race in } w'\}\}$

(32)　*WH-Question*
$[\![nèk/yèn\ \text{Esti ate what}]\!]^w =$
$\lambda e.\text{CONT}(e) = \{\{w': \text{E. ate the cake in } w'\}, \{w': \text{E. ate the mango in } w'\}...\}$
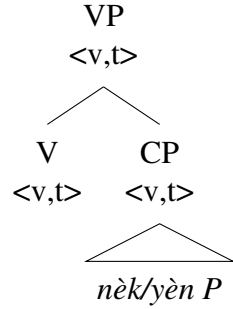
The difference between the declaratives and interrogatives has to do with the number of propositions that CONT returns. In case of declaratives, it returns a singleton set, e.g., the set containing just the proposition *Esti won the race*, (30). In case of interrogatives, CONT will return a set with multiple members—the set will contain all possible answers to the question, (31-32).

In the system where clauses are not true semantic arguments of the verb, selectional requirements of verbs must be introduced indirectly, via restrictions imposed on the eventuality argument of the verb. I propose that the property of being inherently "proposition-taking" manifests itself as the presupposition that the CONT function returns a singleton set when applied to the eventuality described by the verb. Thus, *ngêrti* and *kèlingan* will have the denotations in (33a) and (33b) respectively.

(33) a. $[\![ng\hat{e}rti]\!]^w = \lambda e: \exists!p[p \in \text{CONT}(e)].\ \text{think}(e)_w$

b. $[\![k\grave{e}lingan]\!]^w = \lambda e: \exists!p[p \in \text{CONT}(e)].\ \text{remember}(e)_w$

Verbs will always combine with clauses by Predicate Modification, and the result will be a predicate of events described by the verb whose CONTENT is the set of propositions P contributed by the embedded clause:

(34) $[\![VP]\!] = \lambda e.[\![V]\!](e) \wedge \text{CONT}(e){=}P$

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          VP
         <v,t>

      /        \

    V            CP
   <v,t>        <v,t>

          /        \
        nèk/yèn  P
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Due to the presupposition that the CONTENT of their eventuality is a singleton set, verbs like *ngêrti* 'know' and *kèlingan* 'remember' will not be able to combine with questions directly: the meaning of the VP in (36) will always denote an empty set.
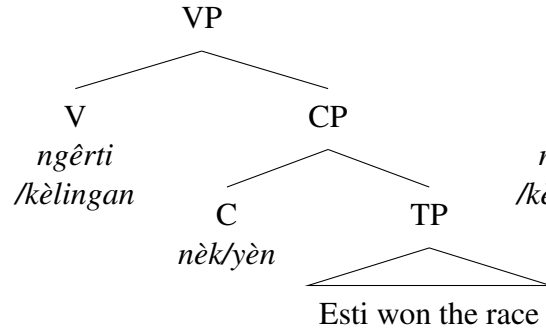
(35) $[\![ng\hat{e}rti/k\grave{e}lingan\ n\grave{e}k/y\grave{e}n\ Q\ \text{Esti won the race}]\!]^w =$
$\lambda e: \exists!p[p \in \text{CONT}(e)].\ \text{think/remember}(e)_w \wedge \text{CONT}(e) =$
$\{\{w': \text{E. won the race in w'}\},\{w': \text{E. didn't win the race in w'}\}\} = \varnothing$

(36)
```
                    VP

        /                    \

      V                        CP
   ngêrti
   /kèlingan
                      /            \
                    C                QP
                 nèk/yèn

                            /            \
                         Q Esti won the race
```
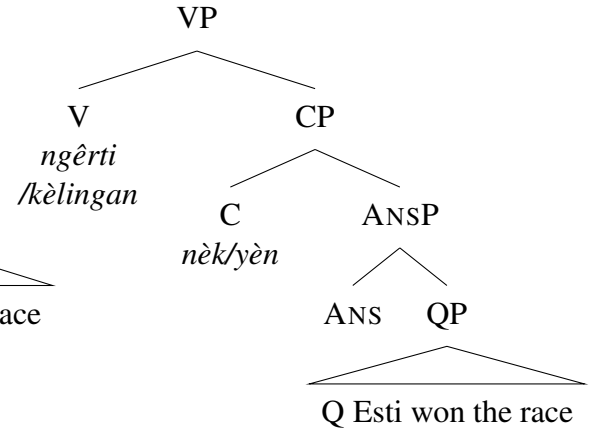
I assume that the fact that the meaning in (35) is always semantically deviant results in ungrammaticality of sentences that contain VPs such as in (36).

The selectional restriction of *ngêrti* and *kelingan* will thus force insertion of the ANS operator in cases of question-embedding, (38). I propose that this operator is the source of veridicality inferences. The lack of ANS in structures with declarative embedding, (37), (its insertion is not needed since declaratives already satisfy the presupposition of the verb) and its presence in cases of interrogative embedding is what creates the observed veridicality mismatch in Javanese.

(37) **Declarative Embedding**
no ANS, non-veridical

```
              VP
           /      \
          V        CP
       ngêrti     /   \
      /kèlingan  C      TP
              nèk/yèn   /\
                   Esti won the race
```

(38) **Interrogative Embedding**
ANS, veridical

```
              VP
           /      \
          V        CP
       ngêrti     /    \
      /kèlingan  C      ANSP
              nèk/yèn   /   \
                     ANS     QP
                            /\
                      Q Esti won the race
```

I follow Dayal (1996), a.m.o., in assuming that the answerhood operator returns the maximally informative answer to the question. I propose that ANS has the denotation in (39), where MAX-ANS is defined as in (40).

(39) $[\![\text{ANS}]\!]^w = \lambda Q_{st,t}.\lambda p_{st}.\ p=\text{MAX-ANS}(Q,w)$

(40) $\text{MAX-ANS}(Q,w) =_{def}$
the unique $p \in Q\ [p(w) \wedge \forall q \in Q\ [q(w) \rightarrow p{\subseteq}q]]$

Note that ANS does not change the semantic type of the constituent it combines with: it takes a set of propositions as its argument, and returns a set of propositions—the singleton set containing the unique proposition such that it is true in the world of evaluation, it is in the question set, and all other true propositions in the question set are entailed by it. The complementizer will then combine with the ANSP, returning the set of events whose propositional content is the singleton set containing the most informative true answer to the embedded question:

(41) **Polar Question with ANS**
$[\![\textit{nèk/yèn}\ \text{ANS Q Esti won the race}]\!]^s =$
$\lambda e.\ \text{CONT}(e) = \lambda p_{st}.\ p=\text{MAX-ANS}(\text{Q Esti won the race},w)$
$= \lambda e.\ \text{CONT}(e) = \{\text{MAX-ANS}(\text{Q Esti won the race},w)\}$

(42) *WH*-**Question with ANS**
$[\![\textit{nèk/yèn}\ \text{ANS Esti ate what}]\!]^s =$
$\lambda e.\ \text{CONT}(e) = \lambda p_{st}.\ p=\text{MAX-ANS}(\text{Esti ate what},w)$
$= \lambda e.\ \text{CONT}(e) = \{\text{MAX-ANS}(\text{Esti ate what},w)\}$

The clauses in (41-42) will now be able to compose with verbs like *ngêrti* and *kelingan*, as they do not contradict the presupposition of these verbs that requires the propositional content to be a singleton set.

Let us now see how this proposal derives the mismatch in veridicality. I illustrate the interrogative case with the polar question in (43).

(43) ⟦Parto *ngêrti/kelingan nèk/yèn* ANS Q Esti won the race⟧^{w} = 1 iff

    a. $\exists e$[think/remember(e)$_s$ $\wedge$ HOLDER(e)=Parto $\wedge$
       CONT(e)={{w': Esti won the race in w'}}]
    if in w it is true that Esti won the race

    b. $\exists e$[think/remember(e')$_w$ $\wedge$ HOLDER(e)=Parto $\wedge$
       CONT(e)={{w': Esti didn't win the race in w'}}]
    if in w it is not true that Esti won the race

We see that the truth-conditions of this sentence depend on the state of affairs in the world of evaluation. If in that world Esti won the race, the sentence will be true if Parto thinks/remembers that Esti won the race. If in that world Esti didn't win the race, then it will be true if Parto thinks/remembers that Esti didn't win the race. In other words, we arrive at the veridical inference: Parto must stand in the *ngêrti/kelingan* relationship to the true answer to the embedded question.

Declarative embedding on the other hand will not be veridical: the truth-conditions in (44) do not depend on the world of evaluation. It is sufficient for Parto to have a thought/recollection whose propositional content is the proposition *Esti won the race* for this sentence to be true. No veridicality inference is predicted.

(44) ⟦Parto *ngêrti/kelingan nèk/yèn* Esti won the race⟧^{w} = 1 iff
    $\exists e$[think/remember(e)$_w$ $\wedge$ HOLDER(e)=Parto $\wedge$
    CONT(e)={{w': Esti won the race in w'}}]
    (no matter what the state of affairs in the world w is)

Thus, the Javanese veridicality mismatch with responsive predicates is derived by adopting the following two assumptions about the answerhood operator: (i) ANS is severed from the verb; (ii) ANS is a source of veridicality presuppositions. Note that this account does not force all interrogative embedded clauses to be veridical: if a verb allows its propositional content to be a set with multiple propositions, it could combine with an interrogative clause without the help of ANS, and hence without the veridicality presupposition that it introduces.

4 Supporting evidence

I have proposed that *nèk/yèn*-CPs are not true arguments of verbs, but are their modifiers. In this section I would like to discuss some distributional evidence in support

of this analysis. In section 2.1 we have already noted that complement *nèk/yèn*-CPs looks exactly like the conditional adverbial clauses in the language. Other similarities to verbal modifiers involve the following: (i) they cannot be subjects; (ii) they cannot be substituted by nominal proforms; (iii) they can occur in predicative positions of copular constructions; and (iv) they can co-occur with internal arguments. In all of these respects there are no differenes between declarative and interrogative *nèk/yèn*-clauses. Consider (45-46), which show that *nèk/yèn*-CPs can't be subjects.

(45) *[Nèk/yèn Èsti sing kudu mènèhi cêramah]   wis   jêlas.
         COMP   Esti REL must give   presentation already clear

Intended: That Esti should be the one to present is already clear.

(46) *[Nèk/yèn muridé   sing êndi sing kudu mènèhi   cêramah]
         COMP   student.DEF REL WH REL must presentation give

wis   jêlas.
already clear

Intended: 'Which student should give the presentation is already clear.'

The predicate *jêlas* 'clear' can take individuals with content (e.g., *masalahé* 'the problem') as its subjects. But *nèk/yèn*-CPs are impossible subjects, which would follow from the view that they are predicates of events that modify the verb.

Javanese has a proform *iki* 'this', which can refer back to DP arguments with verbs *ngêrti* and *kelingan*, but it cannot be used when the antecedent is an embedded clause, (47), suggesting that the embedded clause does not combine as a (nominal) argument of the verb (cf. grammaticality of the English translation).

(47) a. [A:] Apa Budi ngêrti [nèk   Esti ménang pêrtandingané]?
              Q   Budi know COMP Esti win   race.DEF

Does Budi know that Esti won the race?

b. [B:] Ya, Budi ngêrti (*iki).
          yes Budi knows (this)

'Yes, Budi knows this.'

The fact that these clauses can appear in post-copular position, (48), also argues against them being arguments: Grimshaw (1990) observed that this position in copular sentences can be occupied by a variety of predicates but not by arguments.

(48) a. idé-né   Èsti [yèn   dhèwèké gawé eksperimen].
          idea-DEF Esti COMP they   did   experiment

Esti's idea is that they did an experiment.

b. pitakona-né Èsti [apa yèn   dhèwèké gawé eksperimen].
question-DEF Esti Q   COMP they   did   experiment
'Esti's question was whether they did an experiment.'

Finally, *nèk/yèn*-clauses can co-occur with DPs that are internal arguments of the verb: e.g. we see in (49) that they can describe the content of the explanation (*explanans*) that was given for some situation (*explanandum*); cf. (Elliott 2016).

(49) **Context:** We come in and see people celebrating, and wonder why is everyone so happy. Budi explains: Esti won the race.
Budi n-êrang-aké   [situasi-né] [nèk Èsti ménang pêrtandingan-é].
Budi ACT-clear-CAUS situation-DEF COMP Esti win   race-DEF
'Budi explained the situation (of people celebrating),
(saying) that Esti won the race.'

All of these data suggest that *nèk/yèn*-clauses have distribution similar to other verbal modifiers and distinct from verbal arguments. It has been proposed in the literature that embedded clauses can combine with verbs in two distinct ways: as (nominalized) arguments and as modifiers (Özyıldız 2020; Roberts 2020; Bochnak & Hanink 2021; Bondarenko 2022; Uegaki 2022; Özyıldız & Uegaki 2024, a.o.), and furthermore that the difference in the path of composition can result in veridicality mismatches between two types of clauses combining with the same verb, as they contribute information about different arguments of the verb (the internal argument vs. the event argument) and are thus subject to different restrictions. Note that this line of explanation does not seem to be extendable to the Javanese veridicality mismatches discussed in this paper: there is no evidence that declarative and interrogative clauses compose with the verb in distinct ways. Both have similar morphosyntax—occur with the complementizers *nèk* and *yèn*, and both have distribution of verbal modifiers, as we've seen above. So while we are still dealing with a structural difference leading to a veridicality mismatch, it is not a difference in argument structure, but a difference in the presence/absence of the ANS head.

5   The presupposition of 'know'

So far we have treated the verb *ngêrti* as not having any presuppositions related to veridicality. This however is not quite accurate: while this verb does not exhibit a veridical presupposition, its meaning is not the same as that of *ngira* 'think', which indeed lacks any presuppositions. It turns out that *ngêrti* has a very weak presupposition about its complement P: P should not be excluded in the Common Ground.

(50) **Presupposition of *ngêrti* P**
The Common Ground must not contain ¬P.

This presupposition makes it impossible to assert that *P* is true, and then say that someone stands in a *ngêrti* relationship to ¬*P*; cf. *ngira* and *kèlingan*, (51-52).

(51) Èsti mangan kuwéhé, ning Djoko **ngira /#ngêrti**
      Esti eat   cake.DEF but   Djoko **think /know**
      [nèk/yèn Èsti ora   mangan kuwéhé].
      COMP   Esti NEG eat   cake.DEF
      'Esti ate the cake, but Djoko thinks/#knows that Esti didn't eat the cake.'

(52) Djoko munggah gunung,   ning Budi **kèlingan**
      Djoko climb   mountain but   Budi **remember**
      [yèn   Djoko ora   munggah gunung].
      COMP Djoko NEG climb   mountain
      'Djoko climbed the mountain, but Budi remembers that Djoko didn't climb the mountain.'

Adding an epistemic modal saves the sentence with *ngêrti*: as soon as *P* is not totally settled, it is possible to stand in the *ngêrti* relationship to ¬*P*, (53).

(53) **Mbokmênawa** Èsti mangan kuwéhé, ning Djoko **ngêrti**
      possibly   Esti eat   cake   but Djoko **know**
      [nèk/yèn Èsti ora mangan kuwéhé].
      COMP   Esti not eat   cake.
      'Esti possibly ate the cake, but Djoko knows that Esti didn't eat the cake.'

This inference that *P* is possible—not excluded in the Common Ground—behaves like a presupposition. It projects above other semantic operators, which is illustrated in (54) with projection from the antecedent of a conditional.

(54) Èsti mangan kuwéhé.
      Esti eat   cake.DEF

      nèk   Djoko **ngira /#ngêrti** [nèk Èsti ora   mangan kuwéhé], Budi sênêng.
      COMP Djoko **think /know**   if   Esti NEG eat   cake.DEF Budi happy
      'Esti ate the cake. If Djoko thinks/#knows that Esti didn't eat the cake, then Budi is happy.'

If it has been accepted that Esti ate the cake, and this proposition became part of the Common Ground, *[ngêrti Esti didn't eat the cake]* cannot occur in the antecedent of the conditional. This infelicity arises because the presupposition of *ngêrti* projects and imposes on the Common Ground a requirement that it should not contain the proposition *Esti ate the cake*—there have to be some worlds compatible with the Common Ground in which Esti didn't eat the cake. We can then update our entry for *ngêrti* to include this restriction in the following way:

(55) $[\![ng\hat{e}rti]\!]^{w,c} =$
$\lambda e: \exists!p[p \in \text{CONT}(e)] \wedge \underline{c \cap \iota p(p \in \text{CONT}(e)) \neq \varnothing}$. think$(e)_w$,
where c is the **context set**:
the intersection of all propositions in the Common Ground

The interpretation function in (55) is relativized to the context set c—the set of all worlds compatible with the joint knowledge of conversation participants. And now in addition to presupposing that the Content of its event is a singleton set, *ngêrti* also presupposes that the intersection of the context set and the unique proposition in CONT(E) is not empty—in other words, that the content associated with e is not known to be false. This presupposition is why *ngêrti* is usually translated as 'know'.

6 Concluding remarks

Javanese veridicality mismatches are a problem for ***the P-to-Q approach***: because it assumes that responsive verbs select for questions, ANS has to be part of the meaning of the verb, e.g. (56), making it impossible to avoid veridicality in declarative cases.

(56) $[\![ng\hat{e}rti]\!]^{w} = \lambda Q_{st,t}.\lambda e.$ think$(e)_w \wedge$ CONT$(e) =$ MAX-ANS(Q,w).

My proposal for Javanese veridicality mismatches married ***the Q-to-P*** and ***the uniformity*** approaches: it is both true that many responsive verbs are inherently "proposition-taking" (the singleton set presupposition) and that the propositional content described by embedded CPs is always of the same semantic type (<st,t>). Note however that nothing in the system requires that *all* responsive verbs are "proposition-taking" in this sense: the presupposition that the CONT(e) is a singleton set could be absent. This allows us to adapt the analysis in Elliott et al. (2017) for *care* to our system, explaining the reverse case of mismatch: the verb in (57) will be factive with declaratives (singleton sets), but non-veridical with interrogatives.

(57) $[\![care]\!]^{w} = \lambda e: \exists p \in$ CONT(e) $[p(w)=1]$. care$(e)_w$

We might wonder why the mismatches observed in Javanese seem to be cross-linguistically rare. I would like to suggest that the fact that *nèk/yèn*-CPs show exclusively behavior of verbal modifiers might play a role here. While verbs often impose restrictions resulting in veridicality on their internal arguments, they tend to not impose these types of restrictions on their event arguments. This fact in itself is a mystery, as we can define such entries: e.g., the fictional verb *shngêrti* in (58), is a factive version of *ngêrti*: the CP combining as a modifier in (58) would be veridical.

(58) $[\![shng\hat{e}rti]\!]^{s,c} = \lambda e: \exists!p[p \in$ CONT$(e)] \wedge \iota p(p \in$ CONT$(e))(w)=1$. think$(e)_w$

For whatever reason, we don't seem to find entries like (58), and in their absence a language like Javanese, where it seems that all CPs combine as modifiers, allows us to observe the contribution of the ANS operator—that it contributes veridicality.

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