Composing with gerunds and QC clauses: A case of factivity alternation in Bangla

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Abstract

This paper deals with a Bangla attitude verb, *viz.* b^hab- 'think' which displays both factive and non-factive readings on the basis of the type of the items it combines with. It turns out to be factive with a gerundial DP, while it is not factive with QC clauses. This is a clear case of factivity alternation. I argue that this kind of alternation is caused mainly due to different compositional routes which this concerned attitude verb selects while composing with these two types of items. In case of the QC clauses, the composition happens by modifying the eventuality argument of the verb, which does not cause any sort of factive interpretation. Instead, the compositional route is of argumenthood which along with the *pre-existence presupposition* (Bondarenko 2020a) associated with the internal argument of this verb leads us to having factive inferences with gerundial complements.

1 Introduction

Factivity alternation refers to the phenomenon where attitude verbs exhibit both factive and non-factive readings on the basis of the type of the items they compose with (Moulton 2009, Abrusán 2011, Özyıldız 2017, Lee 2019, Bondarenko 2020a). This paper hones in on a Bangla (a.k.a. Bengali; Indo-Aryan) attitude verb, *viz.* b^hab- 'think' that displays non-factive interpretation while composing with clauses that bear quotative complementizer (QC), and factive interpretation while taking gerundial complements. I argue that this kind of alternation mainly stems from different compositional routes which the matrix verb takes while composing with these two types of phrases in concern. In the former case, the compositional path being *modification* does not attest any sort of necessary factive interpretation to it. Instead, the compositional path is of *argumenthood* which along with the *pre-existence presupposition* (Bondarenko 2020a) associated with the internal argument of this verb leads us to getting factivity in the latter case.

§2 provides us with the empirical landscape which shows the phenomenon of factivity alternation associated with this verb. I delve into the details of Bangla QC clauses in §3. §4 dedicates itself to dealing with the nitty-gritty of Bangla gerunds and its interaction with classifiers. The derivation of non-factivity with QC clauses is discussed in §5, while §6 contains the derivation of factive reading with gerundial complements. Lastly, §7 concludes the paper.

2 Empirical overview

In this section, I present the data that are sufficient to establish the factivity alternation phenomenon associated with this verb. See the following cotrast between (1a) and (1b):

(1) Context: *Due to severe dementia, Rabi cannot recall stuff properly. He was saying he recalls that Anu and Mina used to get back home together from university. But knowing his mental illness, everyone doubts if they indeed used to do so.*

a. robi [onu ar mina ækʃat̪ʰe baɽi pʰ iɾt̪o bol-e] bʰabʧʰilo.
Rabi Anu and Mina together home.LOC return.HAB.PST.3 say-PTCP think.PROG.PST.3
'Rabi was **thinking/imagining** that Anu and Mina used to return home together.'

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b. #robi [onu ar mina=r ækʃat̪ʰe baɽi pʰer-a-gulo] bʰabʧʰilo.
Rabi Anu and Mina=GEN together home.LOC return-GER-CLF$_G$ think.PROG.PST.3
#'Rabi was **thinking of/recalling** Anu and Mina's returns to their house together.'

Given the above dementia-context, the utterance of (1a) seems felicitous, whereas uttering (1b) turns out to be inappropriate. It seems that a construction like (1b) is not felicitous in the context where no one is sure if Anu and Mina actually used to return home together. This is because the complement is presupposed to be true here. Thus, it will be felicitous only in the context where Anu and Mina had in fact returned home together more than once, and Rabi had noticed that. The presupposed status of the gerundial complement in (1b) can be shown by executing von Fintel's (2004) *Hey! wait a minute* (HWAM) test. Consider the following conversation between A and B:

A: robi [onu ar mina=r ækʃat̪ʰe baɽi pʰer-a-gulo] bʰabʧʰilo.
Rabi Anu and Mina=GEN together home.LOC return-GER-CLF$_G$ think.PROG.PST.3
'Rabi was **thinking of/recalling** Anu and Mina's returns to their house together.'

B: æk miniʈ d̪ãɽa! ami ʤanṯam na ʤe ora ækʃat̪ʰe pʰirt̪o.
one minute wait I know.HAB.PST.1 NEG that they together return.HAB.PST.3
'Hey! wait a minute, I did not know that they used to return together.'

B's response to what A said sounds appropriate, since one can be ignorant about a fact, *i.e.* what is presupposed to be true in actual reality. As opposed to it, this particular response of B would have been infelicitous if A uttered (1a) instead of (1b). It provides us the footing to assume that the *bole*-clause is not presupposed to be true in (1a). Thus, a projection is got in the second case, while the first sentence lacks it. This projection, I argue, is nothing but presupposition, since it is retained under the scope of the entailment-cancelling possibility modal operator. See the contrast below, between (2) and (3):

(2) robi hɔjt̪o [onu ar mina ækʃat̪ʰe baɽi pʰ irt̪o bol-e]
Rabi possibly Anu and Mina together home.LOC return.HAB.PST.3 say-PTCP
bʰabʧʰilo.
think.PROG.PST.3
'Rabi was **possibly** thinking/imagining that Anu and Mina used to return home together.'
⋡ Anu and Mina used to return home together.

(3) robi hɔjt̪o [onu ar mina=r ækʃat̪ʰe baɽi pʰer-a-gulo] bʰabʧʰilo.
Rabi possibly Anu and Mina=GEN together home.LOC return-GER-CLF$_G$ think.PROG.PST.3
'Rabi was **possibly** thinking of/recalling Anu and Mina's returns to their house together.'
≫ Anu and Mina used to return home together.

Due to the projected presupposition in case of the gerundial complement, (4) is weird after (1b), while (1a) sounds fine followed by it.

(4) kint̪u, ora konod̪ino ækʃat̪ʰe baɽi pʰer-e ni.
but they ever together home.LOC return-3 PST.PRF.NEG
'But, they never returned home together.' [✓ after (1a); # after (1b)]

Thus, it is empirically proven quite well that this concerned attitude verb is factive with a gerundial complement, while it comes up with a non-factive report when it takes a QC clause. In a nutshell, the following generalization can be chalked out as below in Table 1:

$b^h ab$-	*Factive*	*Non-factive*
QC clause	no	yes
Gerundial complement	yes	no

Table 1: Factivity alternation of $b^h ab$- with two different items

3 On Bangla QC clauses

So far, I have shown the empirical evidence, citing the main research objective. I discussed two different types of items that $b^h ab$- 'think' takes, exhibiting an intriguing case of factivity alternation. In this section, I will focus on the Bangla QC clauses. Bangla, like many Indo-Aryan languages (*e.g.* Oriya, Assamese, *etc.*), has a hybrid complementizer system, *i.e.* it involves both clause-initial and clause-final complementizers (Singh 1980, Bayer 1996, 1999, 2001, Bayer et al. 2005, a.m.o.). The clause-final complementizer is most likely transmitted from the Dravidian family. Table 2 consists of the complementizer system of some South Asian Languages, taken from Bayer (2001: 13):

Language	*Final complementizer*	*Initial complementizer*
Telugu	*ani* (QUOT)	-
Tamil	*anru* (QUOT)	-
Kannada	*anta* (QUOT)	-
Malayalam	*ennu* (QUOT)	-
Bengali	*bole* (QUOT)	*je* (OP)
Oriya	*boli* (QUOT)	*je* (OP)
Assamese	*buli* (QUOT)	*je* (OP)
Marathi	*mhaNUn* (QUOT), *asa* ('thus', QUOT), *te* (pronominal)	*ki* (?OP)
Dakkhini H.-U.	*bolke* (QUOT), *ki* (OP)	-

Table 2: Complementizer system of selected South Asian Languages

This section focuses only on the quotative (QUOT) clause-final one in Bangla, *viz. bole* which looks like the adverbial form of the verb 'say' (*i.e.* the verbal root *bɔl*- 'say' and the participle -*e*). It retains a lot of its lexical source, *say*. This kind of *verby embedders* is prevalent in other Indo-Aryan and Dravidian[2] languages. Following Bayer (2001) and many others, *bole* is quotative in nature because it seems to set the preceding discourse within quote.[3] This adverbial-like QC clause, because of the nature of the complementizer, can neither get modified by content nouns, nor have a DP-correlate (see also Bayer et al. 2005, Moulton 2019, a.m.o.). See (5) and (6) below:

(5) *ami [ei kɔt̪^{h}a-ʈa]$_i$ [onu ar mina ækʃat̪^{h}e baɽi p^h irt̪o bol-e]$_i$
I DEM talk-CLF Anu and Mina together home.LOC return.HAB.PST.3 say-PTCP
ʤani.
know.PRS.1
Intended: 'I know this talk/news/story that Anu and Mina used to return home together.'
[✗ modification by content noun]

(6) *ami [eʈa]$_i$ [onu ar mina ækʃat̪^{h}e baɽi p^h irt̪o bol-e]$_i$ ʤani.
I this Anu and Mina together home.LOC return.HAB.PST.3 say-PTCP know.PRS.1

[2]See Balusu (2020) to get a fair amount of discussion on Dravidian QC.

[3]There are several reports on conversion of verbs of saying into quotative complementizers (Lord 1976, Crowley 1989, Klamer 2000, a.m.o.).

Intended: 'I know that Anu and Mina used to return home together.'
[✗ DP-correlate]

These above two instances suffice to lead us to assuming that Bangla QC clauses are not predicates of contentful individuals (cf. Moulton 2019). According to Kratzer (2013), apart from the embedders built on contentful individuals, there are some clausal embedders that are based on contentful eventualities (Hacquard 2006, Moulton 2008, Elliott 2018). Follwoing Moulton (2019), like Korean *ko-*, Japanese *to-*, Zulu *ukuthi*, this verby embedder *bole* is built on contentful eventualities instead of on contentful individuals. The denotation of it is formulated in (7), where it takes a propositional variable of type *st* and returns the set of eventualities such that content (CONT) of them is identical to the proposition. The function CONT is a partial one which is only defined for entities that determine intentional content.[4] As a result, the denotation of the QC clause in (1a) will be like (8), given any world w and assignment function g.

(7) $[\![\text{bole/QC}]\!]^{w,g} = \lambda p_{st} \lambda e_e.\text{CONT}_w(e) = p$[5]

(8) $[\![\text{Anu and Mina used to return home together QC}]\!]^{w,g} = \lambda e_e.\text{CONT}_w(e) =$ Anu and Mina used to return home together

It denotes the set of e-type contentful events whose content in w is the proposition that Anu and Mina used to return home together.

4 Unwrapping Bangla gerunds

Unfurling the nature of Bangla QC clauses in §3, now I dive into focusing on the semantics of Bangla gerundial structures in this section. I follow Grimm and McNally (2015) in assuming that verbal *-ing* forms denote event kinds. For example, *singing*, which comes under the verbal *-ing* dynasty, can have more than one instances, *i.e.* event tokens. The bare gerund[6] in (1b), *viz. onu ar minar ækʃat̪ʰe baɽi pʰera* 'Anu and Mina's returning home together' also stands for a kind-level entity, because there can be many instances of them returning home together at different times and from different places. Therefore, (9) can reasonably account for its interpretation:

(9) $[\![\text{onu ar minar ækʃat̪ʰe baɽi pʰera}]\!]^{w,g} = \lambda e_k.[^{\cup}\mathbf{returning}_w(e_k) \wedge \mathbf{ag}_w(\mathbf{a} \oplus \mathbf{m}, e_k) \wedge \mathbf{loc}_w(\mathbf{h}, e_k) \wedge \mathbf{together}_w(e_k)]$[7]

The predicativizing $\cup$ operator (after Cheirchia 1998), of type $\langle e_k, e_k t \rangle$, is acted on the kind-level event to incorporate arguments and other modifiers (à la Grimm and McNally 2015).

Up until now, Bangla bare gerunds are similar to English verbal *-ing* forms. But, things get interesting when classifiers get into the scenario. English lacks classifiers, unlike Bangla. I will exhibit how classifiers can be productively used with this type of *-ing* forms in Bangla, and how they influence their semantics. The following part deals with this in detail.

4.1 Gerund-classifier interaction

Note that the gerundial complement in (1b) contains the plural classifier *-gulo*. It is quite a well-known fact in the literature that Bangla is a classifier language. The following in (10) is a sketch of the classifier system in Bangla:

(10) (Dayal 2012: 196)

[4] See also *content modality* from Kratzer (2013).

[5] Throughout the paper, I follow Lasersohn (1995), Elliott (2017) in maintaining no type distinction between events and individuals. Both belong to the set of entities, *i.e.* D_e. Both are entities of type e.

[6] The term *bare gerund* is used when no classifier is clubbed to it.

[7] $\oplus$ stands for the *sum* operator after Link (2002).

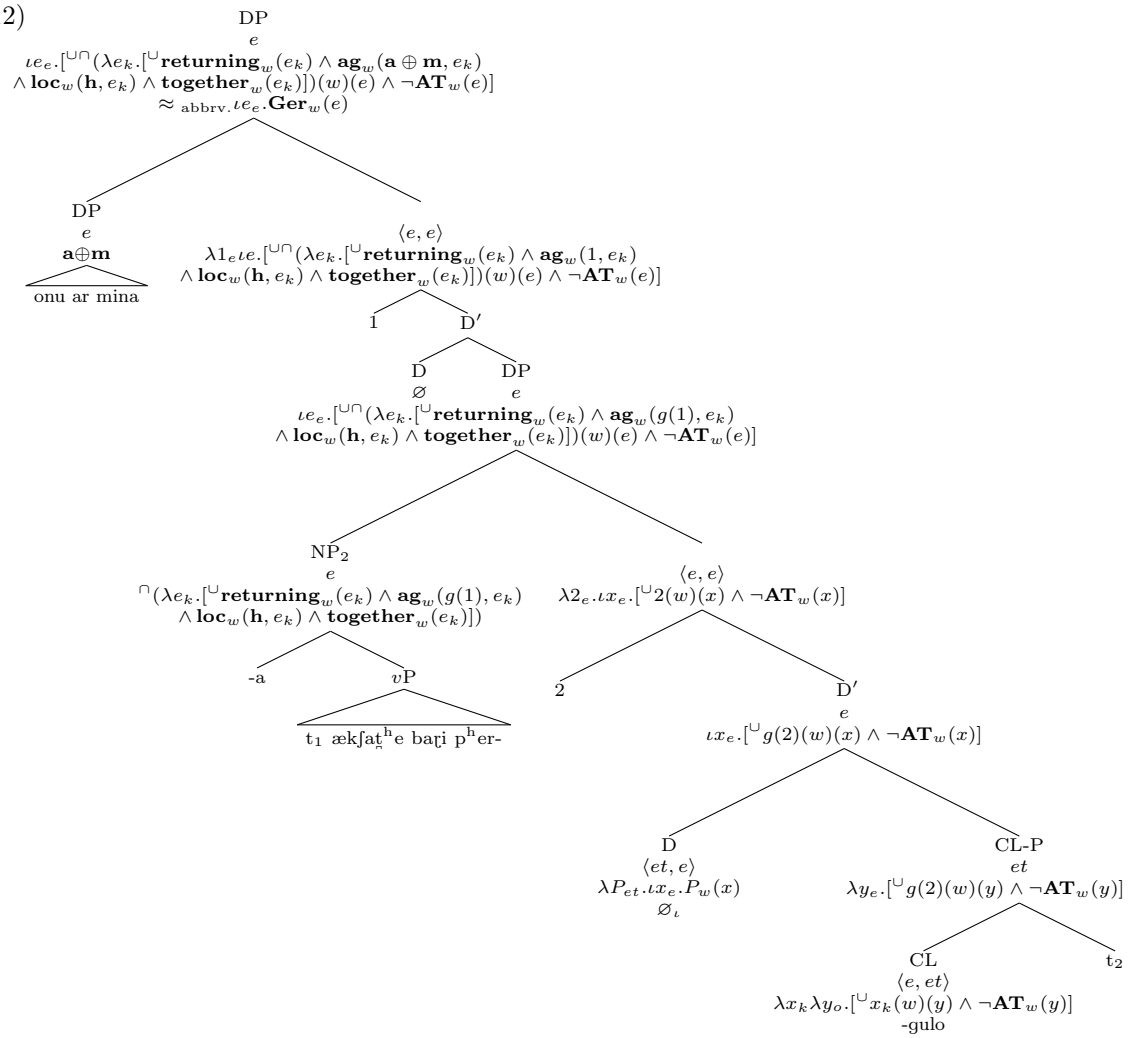
a.-ʈa/ʈo/ʈe	general classifier for count nouns
b.-jɔn	classifier restricted to humans
c.-k^{h}ana	classifier restricted to inanimate count nouns
d.-ra	number-neutral classifier restricted to animate nouns
e.-gulo	plural classifier applicable to all count and mass nouns
f.-k^{h}ani	classifier restricted to mass nouns

Since gerunds are nominalized, nothing prevents classifiers from attaching to them. It is worth mentioning in this discussion that only *-ʈa* and *-gulo* out of these above six can add to Bangla gerunds. Here I embrace Dayal's (2012, 2014) insight in viewing *-gulo* as the one that looks for an e-type kind-level entity as its first argument. Following Dayal, the semantics of it is in (11):

(11) $[\![\text{-gulo}]\!]^{w,g} = \lambda x_k \lambda y_o.[^{\cup} x_k(w)(y) \wedge \neg \mathbf{AT}_w(y)]$

It takes a kind-level entity of type e and returns those entity tokens, sub-scripted as o, which are not atomic in nature. In this section, I apply this semantics to the bare gerund which also denotes a kind-level entity. The LF of the complement gerund-classifier combo in (1b), I propose, is in (12):

(12)



As is seen above, the bare gerund NP_2 moves from its base-generated position, which is the complement of CL, to the specifier position of DP to check the [+def] feature that is carried by the lower D head. It creates a binder that binds the trace t_2. The lower D is marked for definiteness, because here the maximal, unique plurality of Anu and Mina's returning events is meant. The collection, Anu and Mina is the agent of the plurality of the returning events. This collection base-generates at [Spec vP], and moves to the top [Spec DP] slot to get the Genitive Case which is supplied by the empty head D (the higher one). This movement also creates a binder that binds t_1. Basing on this constituency, the step-by-step semantics of each node is derived compositionally. Since the bare gerund has moved from its base position leaving a trace of type e, the CL head composes with this contextually valued trace variable by Functional Application, resulting in the denotation of CL-P as shown in (12). As mentioned earlier, the null D carries an interpreted definiteness feature which is reflected semantically by introducing the ι-operator. It takes a predicate P of type et and returns the unique, maximal entity that has the property P. By Functional Application, it composes with the CL-P and gives us the denotation of D$'$. Now, due to the binder 2, Lambda Abstraction occurs to abstract over the t_2. The resultant, which will now get composed with the bare gerund, is of type $\langle e, e\rangle$ as is shown in the LF. Since the bare gerund is property of type $\langle e, t\rangle$, I tap into Cheirchia's (1998) *nom* $\cap$ operator to avoid the type-mismatch. $\cap$, acting on (9) yields an expression like $^{\cap}(\lambda e_k.[^{\cup}\mathbf{returning}_w(e_k) \wedge \mathbf{ag}_w(g(1), e_k) \wedge \mathbf{loc}_w(\mathbf{h}, e_k) \wedge \mathbf{together}_w(e_k)])$ which is of type e. Thus, the e-type interpretation of the lower DP is arrived at by Functional Application between NP_2 and 2+D$'$. For the sake of simplicity, I assume that the genitive *-r* marker is semantically vacuous here, thus the interpretation of DP passes up to the higher D$'$. Again, another Lambda Abstraction happens and the variable that is abstracted over is saturated by the subject of the gerund, *viz.* Anu and Mina ($\mathbf{a}\oplus\mathbf{m}$). Consequently, the bare gerund-classifier combo ends up having the e-type denotation formulated for the top DP node. Hence, the gerundial complement in (1b) denotes the unique, maximal, and non-atomic event token of Anu and Mina returning home together in w. In other words, it indicates the maximal plurality of their returning events. For the sake of further convenience, I abbreviated it as $\iota e_e.\mathbf{Ger}_w(e)$.

As said earlier, another classifer *-ʈa* can also attach to Bangla bare gerunds. This general classifier is typically used for canonical count nouns and certain mass nouns (Bhattacharya 1999, Dayal 2012, Simpson and Biswas 2016). Unlike *-gulo*, this *-ʈa* points towards the maximal atomic entity. Following (Dayal 2012, 2014), it has the denotation like (13) where it takes a kind-level entity and gives us the set of atomic tokens. See (13) below:

(13) $[\![\text{-ʈa}]\!]^{w,g} = \lambda x_k \lambda y_o.[^{\cup}x_k(w)(y) \wedge \mathbf{AT}_w(y)]$

Now, see (14) where *-ʈa* is attached to the bare gerund complement:

(14) Context: *Anu and Mina had returned home together in one rainy evening, and Rabi witnessed that. After a day or two, that event suddenly came to his mind.*

a. robi [onu ar mina=r ækʃat̪^{h}e baɽi p^{h}er-a-**ʈa**] b^{h}abʧ^{h}ilo.
Rabi Anu and Mina=GEN together home.LOC return-GER-CLF think.PROG.PST.3
'Rabi was **thinking of/recalling** Anu and Mina's return to their house together.'

Due to the presence of *-ʈa*, the unique atomic event of their returning home together is meant in the above context.

4.2 Does *-gulo* attach to all sorts of gerunds?

It can be noted that this plural classifier *-gulo* does not and cannot append to all types of bare gerunds. For example, consider the following bare gerund + *-gulo* structure in (15) which is completely ruled out:

(15) mina=r mara ʤa-wa*(**-gulo**)
Mina=GEN die go-GER-CLF$_G$
*'The events of Mina's dying'

This construction is ungrammatical, because an individual cannot die more than once in her/his lifetime. Thus, the bare gerund, *viz. minar mara ʤawa* 'Mina's dying' cannot qualify to be a kind-level element ever. I assume that *-gulo* strictly looks for a kind-level entity, and because of that it cannot compose with this bare gerundial form.[8] Hence, ungrammaticality occurs.

In §3 and §4, I discussed two different things which b^hab- 'think' takes, exhibiting factivity alternation. Now, I will turn to how both the non-factive and factive readings emerge with these two types. The next section will address how the non-factive reading with QC clauses comes to the fore.

5 The non-factive reading with QC clauses

In §2, I presented sufficient empirical evidence which are enough to establish that this Bangla attitude verb has a non-factive avatar while composing with QC clauses. As shown in §3, Bangla QC clauses are predicates of eventualities, but not individuals. For convenience, let's repeat the denotation of the QC clause in (8) below:

(8) $[\![$Anu and Mina used to return home together QC$]\!]^{w,g} = \lambda e_e.\textsc{cont}_w(e) =$ Anu and Mina used to return home together

In this paper, I embrace a neo-Davidsonian approach (Castañeda 1967, Parsons 1990) in viewing the attitude predicate, following the decompositional approach towards the semantics of attitude verbs (Kratzer 2006, Bogal-Allbritten 2015, Elliott 2017, Bondarenko 2020a,b). Since a neo-Davidsonian approach is followed, all the arguments of the verb are assumed to be introduced by separate functional heads. Relative to w, the denotation of b^hab- 'think' will be as in (16):

(16) $[\![\text{b}^\text{h}\text{ab-}]\!]^{w,g} = \lambda e_e.\textbf{think}_w(e)$

It denotes the set of thinking events in w. Let me assume that the QC clause composes with the attitude verb simply by modifying the eventuality argument of it.[9] But, if I look into the possibility of wh-extraction out of QC-clauses, it might seem that they are arguments. See (17) below:

(17) kake$_i$ t̪umi [t$_i$ snan kɔrano hɔ-be bole] b$^\text{h}$abʧ$^\text{h}$o?
whom you bath do.CAUS.GER be-will BOLE think.PROG.PRS.2
'Who are you thinking will be getting a bath?'

Though the above wh-extraction out of the QC-clause might lead us to thinking that the QC-P is not an adjunct, I follow Truswell (2011) at this point in assuming that not all verbal modifiers are islands for wh-extraction. For example, see (18) and (19), in contrast to the ungrammatical (20):

[8] Contrarily, *-ʈa* can attach to this particular bare gerund. See the following:

(i) mina=r mara ʤa-wa**-ʈa**
Mina=GEN die go-GER-CLF
'The event of Mina's dying'

This seems quite intriguing to me, because the grammaticality in this case opens up the possibility to assume that -ʈa sometimes can compose with token-level events apart from the kind-level ones. I assume that this -ʈa is more like a semantically vacuous particle rather than a classifier. The fact that *-ʈa* can have a particle-like avatar is mentioned in Bayer and Obenauer (2011). In this paper, I would not go much deeper into this discussion. I leave this issue for my future investigation in a more detailed way.

[9] A similar kind of phenomenon is reported in Buryat *gəžə*-clause (Bondarenko 2020a) and Turkish *diye*-clause (Özyıldız 2019).

(18) What did John drive Mary crazy [whistling _____]? (Truswell 2011: 38)

(19) What did John die [whistling _____]? (*ibid.*)

(20) *What does John work [whistling _____]? (*ibid.*)

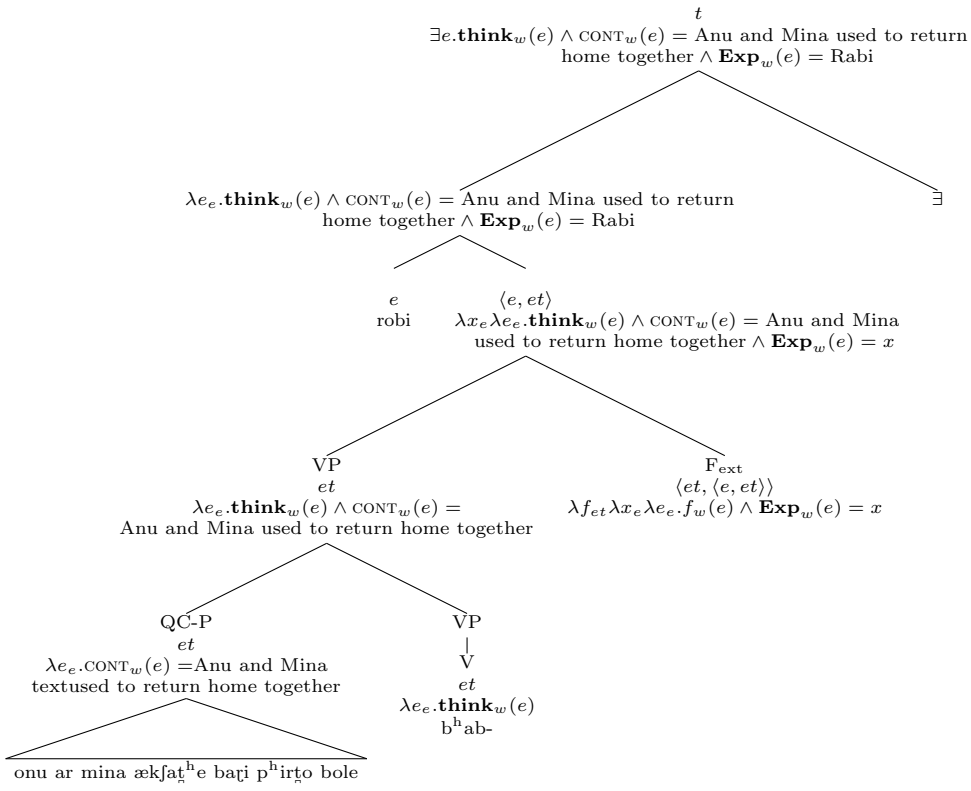
As espoused by Truswell, the driving-Mary-crazy event and the whistling event in (18) are construed as a single event of John driving Mary crazy whistling. Likewise, in (19) the event of dying and the event of whistling are jointly construed as a single event of John dying whistling. But, in the case of (20) the working event and the whistling event cannot be claimed to be jointly construed. In this regard, Truswell offers the following condition as in (21):

(21) **The Single Event Condition**:
An instance of wh-movement is legitimate only if the minimal constituent containing the head and the foot of the chain can be construed as describing a single event. (*ibid.*)

It tells us that wh-words can be moved out of an adjunct domain if the adjunct event can be conjoined with the matrix event, referring to a single event unit. Conforming to this condition, the grammaticality of (18) and (19) can be easily accounted for. Now, take the case of the QC-clause which provides the propositional content of the matrix event. Therefore, it seems feasible to consider QC-clauses as good applicants to qualify the single event condition. This is why, I argue, extraction out of its domain sounds fine.[10]

Thus, I consider QC-clauses as modifiers of the attitude verbs, but not their direct arguments. And, this type of modifiers follows the above-mentioned single event condition. Now, I am in a position to propose the following LF of (1a), as shown in (22):

(22)



[10] A similar line of argumentation is taken by Bondarenko (to appear) in claiming Russian CU-CPs as clausal adjuncts instead of arguments.

As is seen in (22), the QC-P is syntactically adjoined to the verbal domain. This *et*-type clausal adjunct composes with the *et*-type verb, modifying the event argument of it by Predicate Modification to arrive at the interpretation of the higher VP. It now composes with an external argument-introducing functional head, *viz.* F_{ext}[11] by Functional Application. F_{ext} takes a predicate f of type et, an individual x of type e, and an e-type event variable as its arguments. It returns true iff the event has the property f and experiencer of it is x. The resultant which is derived by composing VP and F_{ext} denotes an $\langle e, et\rangle$-type expression whose individual variable is saturated by the attitude subject. As a result, we get a set of thinking events whose content is the proposition that Anu and Mina used to return home together, and Rabi is the experiencer of the event. Lastly, this eventuality argument is existentially closed-off to arrive at the denotation of type t as shown in (22). Thus, the sentence (1a) becomes true iff there exists an event of thinking whose content denotes the proposition that Anu and Mina used to return home together, and Rabi is the experiencer of this thinking event. Since content of an eventuality might not hold true in the actual world, (1a) does not carry any factive inference. Therefore, no presupposition projection is noted.

6 Deriving the factive reading

b^h*ab-* projects a factive inference with a gerundial complement as shown in (1b). A natural question that arises at this point is whether the complement gerund does export factivity by itself. But, this does not seem to be the case. Non-factives like *aʃa kɔr-* 'hope' can take gerundial complements without having any sort of factive inference. See (23) below:

(23) robi [onu ar mina=r ækʃat̪^{h}e baṛi p^{h}er-a-ṭa] aʃa koreʧ^{h}ilo, kint̪u
Rabi Anu and Mina=GEN together home.LOC return-GER-CLF hope do.PRF.PST.3 but
d̪urb^{h}aggokrɔme ora ʃedd̪in ækʃat̪^{h}e p^{h}er-e ni.
unfortunately they that day together return-3 PRF.PST.NEG
'Rabi hoped that Anu and Mina would return home together, but unfortunately they did not do so that day.'

I will argue that the gerundial complement, due to being nominalized in nature, composes with the verb *b*^{h}*ab-* via its internal argument which encodes *pre-existence presupposition* in itself (cf. Bondarenko 2020a). This compositional route along with the pre-existence presupposition leads us to having a factive inference in cases like (1b). I formulate the semantics of the internal argument of *b*^{h}*ab-* as in (24):

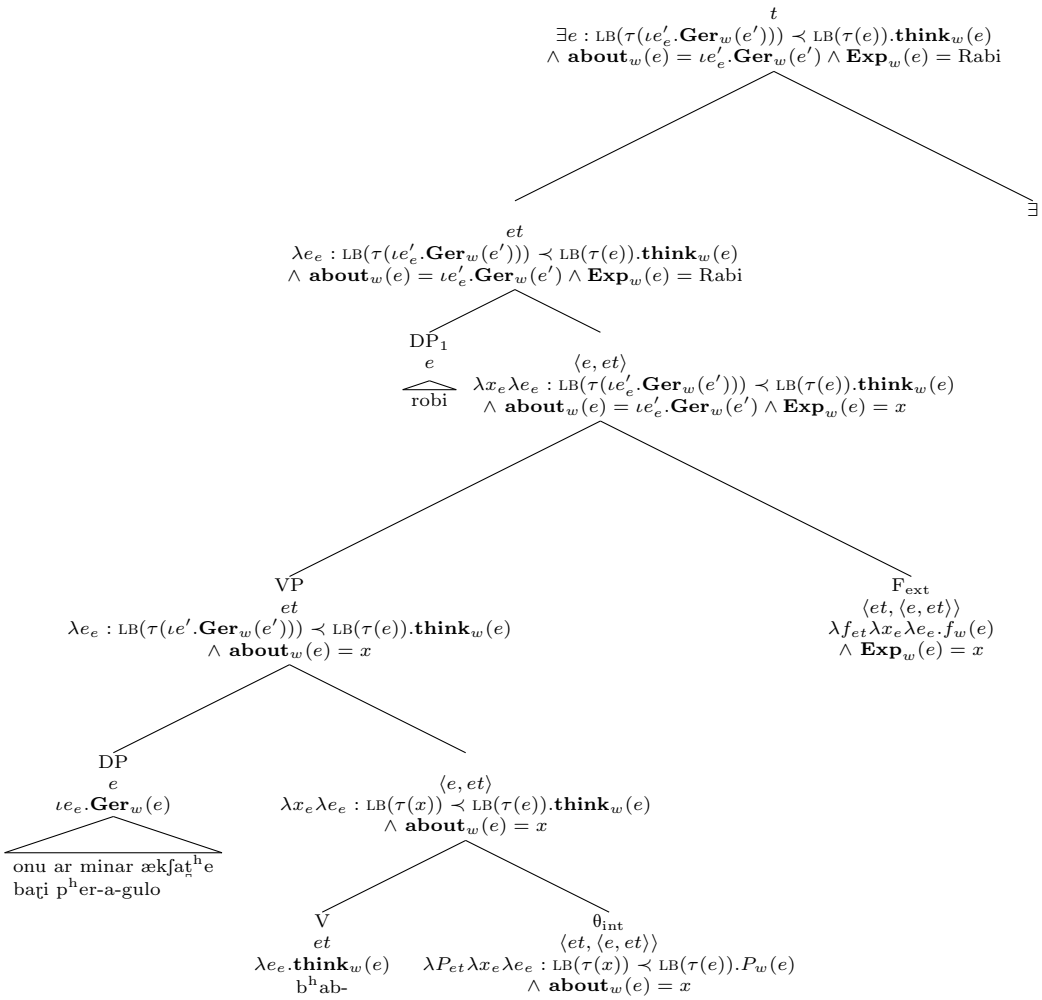
(24) $[\![\theta_{int}]\!]^{w,g} = \lambda P_{et}\lambda x_e\lambda e_e : \text{LB}(\tau(x)) \prec \text{LB}(\tau(e)).P_w(e) \wedge \textbf{about}_w(e) = x$

In the above formulation, τ is the *temporal trace function* (Krifka 1989, 1992, 1998) that selects a member from D_e and gives us its lifespan. (24) says that the internal argument of this concerned verb takes a predicate P of type et, an e-type individual, and an e-type eventuality argument. It is defined if the left boundary (LB) of the interval denoting the existence of x precedes[12] ($\prec$) that of the running time of e. The assertion part of (24) tells us that e has the property P and topic of it is x. In other words, θ_{int} introduces the *res-* or *about*-argument of the attitude verb. The *res* denotes the topic of the attitude in concern (Heim 1994, Moulton 2009, Rawlins 2013, Deal 2018). The gerundial complement, I argue, composes with this verb via its internal argument, *i.e.* θ_{int}. The following in (25) represents the LF of (1b):

[11] Terminology and interpretation are adapted from Elliott (2017).

[12] Note that the *precedence* does not necessitate factivity, because pre-existence cannot guarantee the truth. For example, consider the case of *response stance verbs* (Cattell 1978) like *deny*, *admit*, *etc.* whose complements are presupposed but not necessarily true in the actual world.

(25)



The gerund-classifier complex being nominal in nature combines with the verb as its internal argument. The step-by-step compositional derivation is shown above. As is clear from (25), the assertion component of the top-most node tells us that there exists an event of thinking in w whose topic is the unique non-atomic gerundive event, *i.e.* the maximal plurality of events of Anu and Mina returning home together in w, and Rabi is the experiencer of the event of thinking in w. And, the presupposition component of it indicates that this maximal plurality of Anu and Mina's returning events pre-exists the event of Rabi's thinking. Therefore, a factive inference comes to the fore in (1b) with the sense of *recall*.

7 Conclusion

To sum up, this paper focuses on a Bangla attitude verb b^hab- 'think' which exhibits factivity alternation, depending on the type of the items it takes. Here I select two different kinds of items, *i.e.* QC clauses and gerunds. In case of the former, this verb comes up with non-factive interpretation while in case of the latter, b^hab- turns out to be a factive one. I argue that the adverbial-like QC clause composes with this verb by modifying only the eventuality argument of it, showing

up with the sense of non-factive *think*. In other words, Bangla QC clauses act as modifiers of attitude predicates. As opposed to it, a gerundial complement acts as an argument of the verb. It combines with the predicate via its internal argument which encodes the *pre-existence presupposition* (Bondarenko 2020a) in its semantics. I showed how this path of composition steers us to having a factive inference with the meaning of *recall*. The view that factive inference is built into the denotation of the predicate (Hintikka 1962, Percus 2006) or into the denotation of the nominalized complement (Kastner 2015, Hanink and Bochnak 2017) gets challenged in this paper. Instead, this paper endorses the standpoint which suggests that factivity is something which is derived compositionally (à la Özyıldız 2017, Bondarenko 2020a).

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