



Factive Complements are Not Always Unique Entities: A Case Study with Bangla *remember*

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Abstract. There are many approaches regarding the emergence of factivity in literature. Some of them who are proponents of the view that factive inferences are exported from complements, attribute it to the definiteness feature of the complements [28, 29, 35]. This definiteness feature can be realized covertly via a semantically-sensitive definite determiner Δ [35], or via an overt marker (e.g., *ge* in Washo) [28]. Although [14] later revised their claim by calling this *ge* a marker of familiarity, not that of definiteness, they did not provide any evidence where the D in factive nominalized complements is not definite. This paper provides evidence from Bangla (/Bengali; an Indo-Aryan language) where an attitude verb *mone pora* ‘remember’ can embed nominalized complements that can be interpreted indefinitely but still remains factive. In this paper, we provide a formal compositional analysis that can account for this.

Keywords: Attitude verbs · Factive complements · Definiteness · Compositionality · Definedness condition · Familiarity · Bangla

1 Setting the Stage

A statement $P\varphi$ is called a factive attitude report if the proposition φ is presupposed to be true [34, 37]. Instantiating from natural language, verbs like *regret*, *resent*, *know*, *remember*, etc. presuppose (») the truth of their complements. See the following:

- (1) John knows that Bill passed the test. » Bill passed the test.
- (2) John regrets that he misbehaved with Sue. » he misbehaved with Sue.

Both the sentences are factive reports because the verbs *know* and *regret* presuppose the truth of their complement clauses. There are three standpoints regarding the emergence of factivity in literature. Some associate this with verbs [33, 56] and some with complements ([35, 37, 40] a.m.o). The third group denies either of these options and describes it as a compositional offspring [17]. Those who envisage that factivity is exported from complements often attribute it to the definiteness feature of the complements [28, 29, 35]. We argue that this type of

linking is not so obvious across the board (cf. [16, 17]). In this paper, we provide evidence from Bangla (alternatively, Bengali) in which an attitude verb *mone pora* ‘remember’ can embed nominalized complements that are not obligatorily interpreted in a definite way, but it still remains factive (cf. [13]).¹ Consider the following:

- (3) Context: *Mary visited Delhi three times.*

John-er [Mary-r Delhi ja-wa] mone pore.
John-GEN Mary-GEN Delhi go-GER in memory fall.PRS.3

‘John remembers Mary visiting Delhi.’

In (3), the Bangla counterpart of *remember* embeds a nominalized complement or a gerund, *viz.* *Mary-r Delhi ja-wa* ‘Mary’s visiting Delhi’. Here the attitude report can pick out any one of the three visiting events, not necessarily any particular event of her visiting Delhi. Hence, by intuition, one can argue that the nominalized complement can feasibly refer to an indefinite event here. In order to establish it in a more concrete way, we conform to [17]’s insight which can tell us about the lack of its obligatory definiteness in the following way:

- (4) John-er [Mary-r Delhi ja-wa] mone pore, Bill-er
John-GEN Mary-GEN Delhi go-GER in memory fall.PRS.3 Bill-GEN
[Mary-r Delhi ja-wa] mone pore, Sam-er [Mary-r
Mary-GEN Delhi go-GER in memory fall.PRS.3 Sam-GEN Mary-GEN
Delhi ja-wa] mone pore.
Delhi go-GER in memory fall.PRS.3

Context 1: *Mary visited Delhi three times.*

✓John, Bill, and Sam remember different events of Mary visiting Delhi.

Context 2: *Mary visited Delhi once.*

✓John, Bill, and Sam remember the same event of Mary visiting Delhi.

As noted, the first context points us to the fact that the gerundial complement is referring to different events of Mary visiting Delhi, whereas the second one refers to a single event. Hence, no obligatory sense of definiteness can be attached to the gerundial complement in this case.

Now, the task is to show that truth of the content of this complement is presupposed, *i.e.*, the attitude report is factive. Since presuppositions are non-defeasible, the following *but*-clause which contradicts the content of the complement sounds pragmatically weird (marked with the # symbol) after (3):

- (5) kintu, Mary konodino Delhi ja-e ni.
but Mary ever Delhi go-3 PST.PRF.NEG
'But, Mary did not visit Delhi ever.' [# after (3)]

¹ To give an answer to one of the anonymous reviewers, we mention that not only this one verb but there are other verbs in Bangla like *mone ach-* ‘have in memory’, *mone rakha* ‘keep in memory’, *bhule jawa* ‘forget’ that behave alike. In this paper, we will restrict ourselves to zooming in on the case of *mone pora* only. We would like to keep open the possibility of the semantics of these other verbs being different from it.

The presupposed status of the nominalized complement can be shown if we negate the sentence in (3) because presuppositions survive negation. The negation of (3) still entails (\Vdash) that Mary visited Delhi.

- (6) John-er [Mary-r Delhi ja-wa] mone pore na.
 John-GEN Mary-GEN Delhi go-GER in memory fall.PRS.3 NEG
 ‘John does not remember Mary visiting Delhi.’ \Vdash Mary visited Delhi.

Alternatively, one can execute the ‘Hey! wait a minute’ test [26] to check the presupposition projection. In a conversational setting, the following can be a good response to (3):

- (7) ei! ek minute dnara, ami jantam na je Mary Delhi
 Hey! one minute wait I know.1 NEG that Mary delhi
 gechilo.
 go.PRF.PST.3
 ‘Hey! wait a minute, I did not know that Mary had visited Delhi.’
 [\checkmark in response to (3)]

(7) sounds perfectly okay as a response to (3) because one can be ignorant about something which is already a fact. Therefore, it is quite established that the nominalized complement in (3) is presupposed to be true but does not need to be read in a definite way always. Hence, it challenges the view that assimilates factivity into definiteness of the complement [28, 29, 35]. In this paper, we account for this phenomenon in a compositional way at the syntax-semantic interface.

The next section discusses the approaches that relate factivity to the definiteness feature of complements. Section 3 explores if the verb in concern can be seen as lexically factive and contends that it cannot be so. Section 4 sheds light on how to view this verb and discusses its internal structure. Section 5 deals with how factive inferences can be compositionally inferred in the case of an indefinite nominalized complement. Lastly, Sect. 6 concludes the paper with a note on future work.

2 Existing Approaches Relating Factivity to Definiteness

That definite nominalization is liable for the rise of factive inferences is propagated in [35]. This is supported by the work of [28] on Washo language – in their work, it is shown that definiteness is the core feature in giving rise to factivity. [35]’s standpoint results in the following syntactic representations:

- (8) a. Presuppositional: VP b. Non-presuppositional: VP
- | | |
|--|---|
| $\begin{array}{c} \widehat{V} \quad \widehat{DP} \\ \diagdown \quad \diagup \\ D \quad CP \\ \Delta \quad \widehat{\dots} \end{array}$ | $\begin{array}{c} \widehat{V} \quad \widehat{CP} \\ \diagdown \quad \diagup \\ \dots \end{array}$ |
|--|---|

[35] classifies clauses into two classes, *i.e.*, PRESUPPOSITIONAL and NON-PRESUPPOSITIONAL rooting back to what [20] pioneered about STANCE VERBS. The following is the famous classification of stance verbs [20, 30, 31]:

- a. NON-STANCE (factive): *know, remember, realize, notice, regret*, etc.
- b. RESPONSE STANCE: *accept, deny, agree, admit, verify, confirm*, etc.
- c. VOLUNTEERED STANCE (non-factive): *think, believe, suppose, claim, suspect, assume*, etc.

[35] groups the first two clusters into the PRESUPPOSITIONAL class since they presuppose the existence of their complements, while the VOLUNTEERED STANCE class refers to the non-factives because of being non-presuppositional in nature. Though the former two classes are presuppositional, truth is guaranteed in the case of non-stance predicates only. Let us consider the following:

- (9) John regrets that he studied linguistics.
 (10) John denied that he studied linguistics.

In the former example, it is presupposed that John studied linguistics, and the truth of it is certified. Thus, *regret* is a NON-STANCE or factive. But, in (10) the complement clause is not verified to be true even if it exists beforehand in the COMMON GROUND (CG) [61]. If it did not exist in the context before, the question of denying it would not come to the scenario. So both in non-stance and response stance predicates, the existence of presupposed complements in the CG is noted, but in the non-stance class, the truth of them is guaranteed additionally. The following captures the notion:

- a. Non-stance: Existence of presupposed complement p in CG + The truth of p
- b. Response stance: Existence of presupposed complement p in CG
- c. Factives \subset Presuppositional verbs

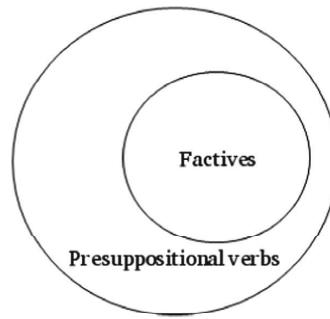


Fig. 1. Factives and presuppositional verbs

As evident from Fig. 1, the set of factives is a proper subset of presuppositional verbs. That means all factives are presuppositional verbs, but not vice-versa.

By contrast, volunteered stance verbs do not select for any complement which already exists in the CG. At this point, [35] proposes that presuppositional verbs pick up definite DPs from the CG, while non-presuppositional ones simply opt for CPs. And, as [35] propounds, the D head of definite DPs in English is occupied by a covert Δ which invokes the definiteness. This Δ in turn takes the clause as its complement. Follow the structure in (8a) where presuppositional verbs select for a semantically-sensitive definite D, *viz.* Δ . He assimilates factivity into the definiteness of nominalized complements. [28], following [55], mention that this D slot is filled with definite *-gi/ge* morpheme in clausal nominalizations in Washo. In their recent work, [14] revised their standpoint advancing that this *-gi/-ge* morpheme stands for mere familiarity under *idx* head in Washo, but not for definiteness, and mentioned that familiarity alone cannot explain factivity. However, they did not provide any evidence showing us an indefinite use of nominalized complements embedded under factive predicates.

This paper has discussed such a case in Bangla where we can find indefinite use of eventualities embedded under a factive report. Not only in Bangla but this kind of observation is also noted in Barguzin Buryat (a Mongolic language) by [17]. We will account for this phenomenon in Bangla in a compositional manner in this paper. Prior to getting into that, we need to address why the verb *mone pora* ‘remember’ cannot be claimed factive lexically. Let us look at this in the following section.

3 Is Bangla *remember* Lexically Factive?

At this point, the reader might ask why we do not ascribe factivity lexically to *mone pora* ‘remember’. Technically, why don’t we formulate the following semantics of it relative to a world w and a variable assignment function g , where it is presupposed that the $\langle s, t \rangle$ -type propositional argument is presupposed to be true in w ?

$$(11) \quad \llbracket mone pora \rrbracket^{w,g} = \lambda p_{\langle s,t \rangle} \lambda x_e : p(w) = 1. \text{remember}_w(p)(x)$$

(11) denotes a partial function – this concerned verb is said to be defined if its argument holds true in the actual world, otherwise undefined. However, in (12) we are getting a hallucination context with *mone pora*, which is purely non-factive in nature.

- (12) Context: Eight-year-old Rahul is remembering some stuff that did not happen ever. His father gets tensed and visits a doctor. The following conversation is under such a circumstance.

Father: Doctor, Rahul-er majhe majhe [amra US gechilam bol-e]
 Doctor Rahul-GEN at times we US go.PRF.PST.1 say-PTCP
 mone pore, kintu amra kokhono US ja-i
 mind.LOC fall.PRS.3 but we ever US.LOC go-1
 ni.
 PRF.PST.NEG

'Doctor, Rahul at times hallucinates/imagines that we went to the US, but, we never went to the US.'

Doctor: In fact, Rahul is suffering from false memory syndrome.

In this above example, the verb *mone pora* is embedding a finite clause whose propositional content is not true in the actual world. Hence, if the verb would have been factive *per se* and carried a semantics as in (11), it would presuppose that the proposition – 'we went to the US' – is true in the actual world, but which is certainly not the case in actual reality, as seen in (12). Thus, factivity in (3) cannot be exported from the verb itself. So, how should the logical translation of this concerned Bangla verb be? We will deal with this issue in the next section.

4 How to View Bangla *remember*

Drawing reference from the previous section, one could argue for having two different avatars of *mone pora* – one is factive, and the other is non-factive. But, viewing it as lexically ambiguous would be less economical for the lexicon than proposing a single semantics that accounts for both readings. In other words, a single semantics of *mone pora* which can take care of both factive and non-factive readings will undoubtedly increase the delicacy of our formal system.

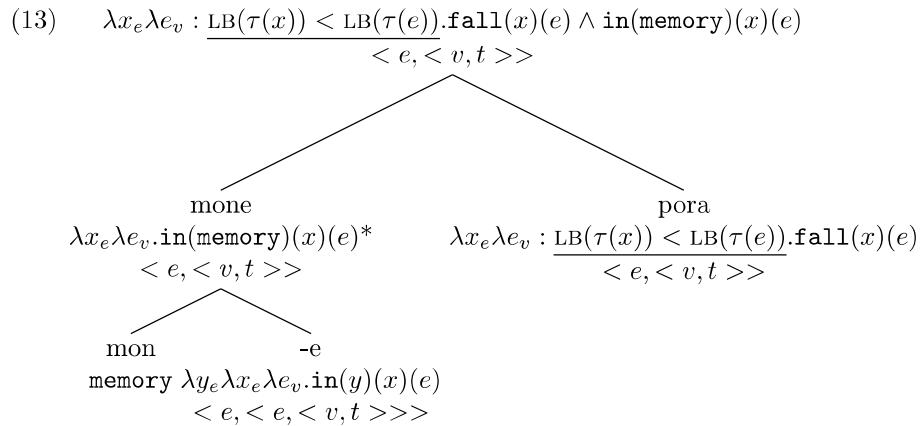
In the above data examples, the interlinear glosses reflect that Bangla *remember* is a complex predicate² where the preverb is *mone* 'in memory/mind' and the light verb is *pora* 'to fall' (see [18, 19], a.m.o.). The preverb mostly provides the semantic content of the complex predicate [47] and the light verb adds some extra colors to it. This attitude verb in concern is a composite that literally means 'to fall in memory'. Another interesting fact is that the subject of this verb is in the Genitive case instead of the regular Nominative one.³ Follow the *-r* marker on the attitude subject, which is the morphological realization of the Genitive case in Bangla. This type of construction draws our attention to some diachronic processes that Bangla has undergone. Genitive subject constructions of the verbs or predicates denoting mental activities and psychological states have a long history. [38] mentioned that subjects of these predicates in Middle Bangla used to occur in Genitive, Locative, and Objective cases. As mentioned in [51], the most frequent pattern among them was:

Genitive NP + body part (L) + sensation/feeling (NOM)+
be/become/happen

² According to [19], a complex predicate consists of a main predicational element (noun, verb, or adjective) and a light verb that is usually the syntactic head of the construction. Complex predicates are composed of more than one grammatical element, each of which contributes part of the information ordinarily associated with a head [2]. As [3] echoes [46], they exhibit word-like properties in terms of argument structure composition and sometimes in having lexicalized meanings.

³ cf. [21] who called it an Indirect Case that is not too far removed from the Dative subjects. He mentioned that it is morphologically a Genitive, but has features that are Dative-like.

[51] also mentioned that the Genitive NP originally referred to the inalienable possessor of the body part. Eventually, the Experiencer/Patient status of the possessor was focused on and it got the subject status. In Modern Bangla, predicates like *mon-e pora* still retain the Locative NP referring to a body part, where *-e* denotes the Locative marker and the NP that denotes the body part is *mon* or ‘memory/mind’. Thus, in present-day Bangla, the original possessor of the memory has faded away and it acquired the status of a subject who is experiencing the mental state. In other words, the apparent Genitive NP is no more the possessor now, rather it is the subject of the mental predicate. Now, getting back to the literal form of *mon-e pora*, we propose the following compositional structure of it where there is no possessor of **memory**.⁴



*It is a short for ‘ $\lambda x_e \lambda e_v. \exists y [\text{memory}(y) \wedge \text{in}(y)(x)(e)]$ ’. We actually introduced a type shifter having the form ‘ $\lambda R_{<e, <e, <v, t>>>} \lambda P_{<e, t>} \lambda x_e \lambda e_v. \exists y. P(y) \wedge R(y)(x)(e)$ ’ which shifts the type of the Locative marker *-e* to the type $<< e, t >, < e, < v, t >>>$, so that the Locative *-e* can combine with the $< e, t >$ -type one-place predicate **memory**.

In (13), the semantics of *fall* encodes a definedness condition which says that the left boundary (LB) of the interval denoting the life-span of the object of falling precedes ($<$) that of the interval referring to the running time of the falling event *e*. This is the PRE-EXISTENCE PRESUPPOSITION [15, 16] associated with the internal argument of *fall*. In a nutshell, the object of falling must pre-exist the starting point of the falling event. In the definedness condition, τ denotes the TEMPORAL TRACE FUNCTION [43–45]. Such restrictions on the arguments of verbs are noted by [24]. See the following:

- (14) John broke the glass. → The glass was there before the event of breaking.

⁴ Thanks to one of the reviewers for questioning the logic behind not introducing the possessor as one of the arguments of **memory**. It is due to the historical reason which tells us how the possessor status of the body part had lost its focus diachronically. That is why we treated **memory** as a one-place predicate, but not a two-place one.

- (15) John wrote an essay. $\not\rightarrow$ The essay existed before the event of writing.

In the same way we can show that the object of *pora* ‘fall’ exists before the start of the falling event and hence the pre-existence restriction gets associated with its object or theme (cf. [7, 8]). Consider the following:

- (16) gach theke apel-ta porlo, #kintu gach-e kono apel chilo na.
 tree from apple-CLF fall.PST.3 but tree-LOC any apple was NEG
 ‘The apple fell from the tree, #but there was no apple in the tree.’
 \Rightarrow The apple existed before the falling event started.

In (13), we defined the locative suffix *-e* as a transitive predicate that takes two arguments *y* and *x* and returns us the set of eventualities *e* such that *x* is *e*-ing in *y*. Now, in order to compose *mone*, of type $< e, < v, t >>$ -type, with the $< e, < v, t >>$ -type *pora*, we resort to the Generalized Conjunction [54] rule which is stated below:

- (17) **Generalized Conjunction:**

Pointwise definition of \sqcap [54]

$X \sqcap Y =$

a. $= X \wedge Y$ if both *X* and *Y* are truth values

b. $= \{< z, x \sqcap y > : < z, x > \in X \text{ and } < z, y > \in Y\}$ if *X* and *Y* are functions

Via this composition, the event argument of *in* gets identified with the event of falling (cf. [39]). Hence, the root node in (13) refers to a function-valued function that takes an individual *x* and an event argument *e*. It is defined if *x* pre-exists *e*, if defined then it returns 1 iff *e* is the event of falling whose object is *x* and *x* is falling in memory.

We argue that this composite gets lexicalized with the meaning of remembering or recalling over time. Intriguingly, this phenomenon is not specific to Bangla. It can be noted cross-linguistically in many related and unrelated languages. To convey the sense of remembering, languages like Assamese and Odia (both are Indo-Aryan) have the verbal forms *monot pelua* and *mone pokila*, respectively, which literally mean ‘falling in memory’ just like Bangla. As noted by [17], a Balkar language that is family-wise very much distant from Bangla lexicalizes *remember* as ‘dropping in memory’. Now, once the complex form in (13) gets lexicalized with the meaning of remembering, it can accommodate another argument that acts as the subject of the concerned event. Recall that the possessor of the memory (*i.e.*, the body part) lost its Possessor status and evolved as an Experiencer historically, occurring as the external argument of *remember* and bearing the quirky Case⁵. The presence of this quirky Genitive Case on the subject is reminiscent of the fact that once it used to carry the status of a Possessor of the

⁵ Quirky Case is something which is linked to the theta grid of a particular predicate. A Genitive/Indirect experiencer subject is directly linked to the theta grid of the verb *mone pora*.

body part. Additionally, we argue, Bangla *remember* retains the pre-existence presupposition which comes from the light verb *fall* in its interpretation (cf. [7]). Consider the following:

$$(18) \quad [\![\text{mone pora}]\!]^{w,g} = \lambda x \in D_e \cup D_v. \lambda z \in D_e. \lambda e \in D_v : \underline{\text{LB}(\tau(x)) < \text{LB}(\tau(e))}. \\ \text{remember}_w(x)(z)(e)$$

The transition from (13) to (18) should not be understood synchronically, rather this transition covers a huge time period between Middle and Modern Bengali. Thus, it is a long historical process that is at play behind this type of transition.⁶ In (18), we followed a Davidsonian representation [22] in viewing the verbal semantics where an event variable is introduced along with all its arguments. (18) tells us that it takes two arguments x and z and an event argument e , and is defined if x pre-exists e . If defined then it returns true iff e is the event of remembering and z is remembering x . An interesting thing to note about (18) is that the internal argument of *mone pora* can be picked out either from the domain of individuals or from the domain of eventualities. That means this verb can take either an entity or an event as its argument. If we take gerunds as events (see Sect. 5), then (3) is an example of this attitude verb taking eventualities. However, apart from the eventualities, it can take e -type entities too, both contentful and non-contentful.⁷ See the following:

(19) Contentful DP

amar golpo-ta mone pore.
I.GEN story-CLF mind.LOC fall.PRS.3

'I remember the story.'

(20) Non-contentful DP

amar John-ke mone pore.
I.GEN John-ACC mind.LOC fall.PRS.3

'I remember John.'

In the former example, the object of *mone pora* is some particular story that refers to propositional content. However, in the latter one, we get a proper name as the theme or object, which is purely non-contentful in nature. The way we defined the nature of the internal argument of *mone pora* in (18) can feasibly take care of (3) along with (19, 20).

Now, we are set with everything before we get into how the factive interpretation is inferred while it embeds a nominalized complement that is indefinite in nature. The following section deals with it.

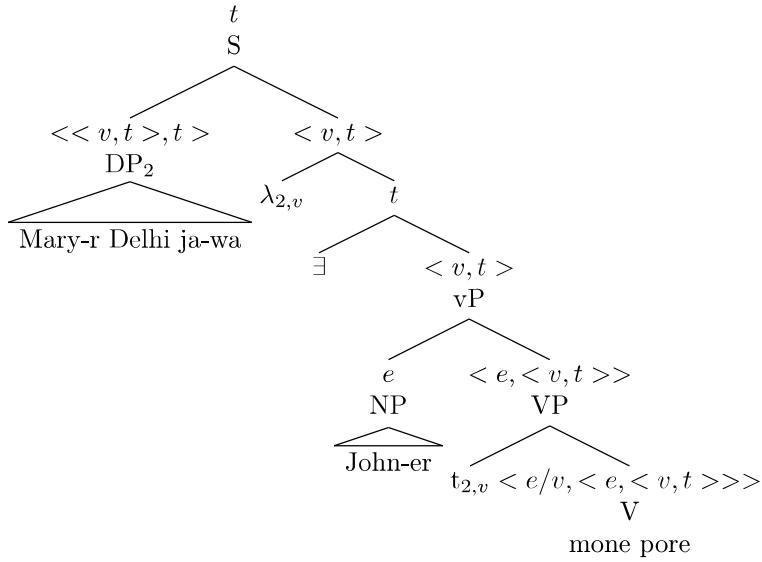
⁶ Thanks to one of the anonymous reviewers for the suggestion to account for the leap from the semantics in (13) to that in (18).

⁷ Contentful entities are those which are associated with propositional contents [48]. For example, entities like *news*, *story*, etc. are contentful. On the other hand, entities like proper names are non-contentful because they are not associated with any sort of propositional element.

5 Accounting for the Factive Reading with an Indefinite Nominalized Complement

From the data above in (3), we postulate that Bangla POSS-ing gerunds⁸ can be indefinite unlike English ones that are, as per [57, 59], definite. We propose the following LF (logical form) of (3):

(21)



We assume that gerunds denote sets of eventualities [58, 59]. Thus, the POSS-ing complement in (3) will have the interpretation as in (22), relative to a world w and an assignment function g .

$$(22) \quad \llbracket \text{DP} \rrbracket^{w,g} = \lambda e_v. \text{visiting}_w(\text{Delhi})(\text{Mary})(e)$$

It denotes the set of v -type events such that they are events of Mary visiting Delhi. Since the concerned POSS-ing is interpreted indefinitely in (3), we can tap into [53]'s type shifter **A** that maps a predicate onto a quantifier.⁹ Thus, applying it on the POSS-ing DP would yield the following translation:

$$(23) \quad \mathbf{A}(\llbracket \text{DP} \rrbracket^{w,g}) = \lambda Q_{< v, t >}. \exists e' [\text{visiting}_w(\text{Delhi})(\text{Mary})(e') \wedge Q(e')] \\ \text{[via Functional Application (FA)]}$$

Consequently, a type-mismatch happens while composing it with the attitude verb which looks for an argument of type e or v . See the interpretation in (18).

⁸ [1] discussed four types of gerunds in English – POSS-ing (*e.g.* John's visiting NY), ACC-ing (*e.g.* John visiting NY), PRO-ing (*e.g.* visiting NY), and Ing-of (*e.g.* visiting of John).

⁹ [53] originally defined this type shifter over the domain of entities of type e . But, if we extend [53]'s **A** to the domain of eventualities (D_v), nothing plays as a hindrance for us. This **A** will then have the semantics as follows: $\lambda P_{< v, t >}. \lambda Q_{< v, t >}. \exists e' [P(e') \wedge Q(e')]$.

In order to avoid this type-mismatch, we perform a covert Quantifier Raising (QR) movement, due to which the DP moves to a higher position in the tree leaving a v -type trace t_2 and creating a λ -binder that binds the trace. The compositional steps are the following:

- a. $\llbracket \text{VP} \rrbracket^{w,g} = \lambda z_e. \lambda e_v : \underline{\text{LB}(\tau(g(2))) < \text{LB}(\tau(e))} \cdot \text{remember}_w(g(2))(z)(e)$ [via FA, V & $t_{2,v}$]
- b. $\llbracket \text{NP} \rrbracket^{w,g} = \text{John}$
- c. $\llbracket \text{vP} \rrbracket^{w,g} = \lambda e_v : \underline{\text{LB}(\tau(g(2))) < \text{LB}(\tau(e))} \cdot \text{remember}_w(g(2))(\text{John})(e)$ [via FA, NP & VP]
- d. $\llbracket \exists \rrbracket = \lambda R_{<v,t>}. \exists e. R(e)$ (existential closure over events)
- e. $\llbracket \exists + \text{vP} \rrbracket^{w,g} = \exists e : \underline{\text{LB}(\tau(g(2))) < \text{LB}(\tau(e))} \cdot \text{remember}_w(g(2))(\text{John})(e)$
- f. $\llbracket \lambda_{2,v+}(e.) \rrbracket^{w,g} = \lambda u_v. \exists e : \underline{\text{LB}(\tau(u)) < \text{LB}(\tau(e))} \cdot \text{remember}_w(u)(\text{John})(e)$ [via Predicate Abstraction]
- g. $\llbracket \text{S} \rrbracket^{w,g} = \exists e' \exists e : \underline{\text{LB}(\tau(e')) < \text{LB}(\tau(e))} \cdot \text{remember}_w(e')(\text{John})(e) \wedge \text{visiting}_w(e')(\text{Delhi})(\text{Mary})(e')$ [via FA, (f.) & (23)]

Thus, at the topmost node S we get the reading that there already exists an event of Mary visiting Delhi before John remembers it. In other words, there is a pre-existing event of Mary visiting Delhi and this event is the object of John's remembering. Hence, a factive reading comes to the fore.

6 Summary and Future Work

Overall, in this paper, we show that factivity is not a subject to be exported from the definiteness or uniqueness of the complements. It is only familiarity, not uniqueness, which is linked to the factive nominalized complements in this case. However, unlike Washo, this familiarity is not morphologically encoded in Bangla nominalizations, rather it is derived compositionally through the definedness condition associated with the concerned attitude verb, which says that its internal argument or theme/object pre-exists the main attitude event. One anonymous reviewer mentioned that [35]'s familiarity can be equated with [16]'s PRE-EXISTENCE PRESUPPOSITION in that both of them make references to old discourse referents. We completely agree with this intuition, however, we argue that the basic difference between these two approaches lies in the presence or absence of definiteness. The advantage of embracing the pre-existence presupposition is that it allows us to get rid of the obligatory definiteness condition linked to the factive complements.

Apart from gerundial complements, there appears another clausal complementation pattern where *mone pora* gives rise to factivity: when it embeds a finite *je*-clause (see [9, 11], a.m.o.) and bears the main sentential stress (denoted by the capital letters in the following), it gives rise to factive inferences [6]. See the following:

- (24) Rahul-*er* MONE PORE *je* Mary Delhi giyechilo.
Rahul-GEN mind.LOC fall.PRS.3 that Mary Delhi go.PRF.PST.3
 ‘Rahul remembers that Mary went to Delhi.’ » Mary went to Delhi.

It is also experimentally reported in [6] that if the main stress docks on the matrix subject instead of the matrix verb, the attitude report does not anymore entail the truth of the complement clause. We leave this puzzle for future work.

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Appendix 1

An accompanying question might arise regarding the source of factivity – can factivity be built into nominalization? The answer would be - ‘no’. See the following example in (25) where the contradictory *but*-conjunct is compatible with the preceding clause. Hence, no factive inference is drawn. This observation converges with other languages too, *e.g.* Turkish [52], Buryat [17], and so on.

- (25) John [Bill-er bhot-e jet-a] asha korechilo, ✓kintu,
 John Bill-GEN election-LOC win-GER hope do.PRF.PST.3 but
 durbhagyoboshoto Bill konodino bhot-e je-te ni.
 unfortunately Bill ever election-LOC win-3 PRF.PST.NEG
 ‘John hoped for Bill winning elections, ✓but unfortunately he did not
 ever win any.’

Now, there can be questions about the compositional path in (25) – should we take the path of argumenthood here as well? That means, should we take the nominalized complement to compose as the internal argument of *hope*? The answer would be - ‘no!’. If it would have been the path of argumenthood, we would end up having a veridical¹⁰ report which is certainly not the case in (25). We argue that the complement denotes the **content of hope, but not the object of it**.¹¹ Content of hope might be false in actual reality. Along this line of intuition, we assert that the complement here is not a DP, but rather some eventive projection, ϵ P in disguise where the ϵ head takes the gerundial DP as its argument. The semantics of ϵ is given below:

$$(26) \quad [\epsilon]^{w,g} = \lambda P_{<v,t>} \lambda e_v. \text{CONT}_w(e) = \lambda w'. \exists e'. P(e') \text{ in } w'$$

The *CONT* is a function that takes entities that have intensional content. For example, entities like *story*, *gossip*, etc. are contentful as mentioned in Sect. 4.

¹⁰ A statement $P\varphi$ is a veridical report if the truth of φ is entailed, *e.g.* verbs like *prove* are veridical predicates.

¹¹ Thanks to Tatiana Bondarenko for a discussion on this issue. Thanks are also due to Ankana Saha, Diti Bhadra, Kousani Banerjee, Nirnimesh Bhattacharjee, Sadhwı Srinivas, and Ushasi Banerjee for their insights. It is noteworthy that [17] reported a Case-shift phenomenon in the case of Buryat where nominalized complements of *hope*, *believe* are Dative marked, not Accusative marked (see [17]). However, Bangla does not show us any such Case-changing phenomenon morphologically.

Events can also be contentful though [25, 48, 49] (e.g. *belief*, *saying event* etc.). But, the event of running is not contentful at all. For any element a , $\text{CONT}(a) = \{w : w \text{ is compatible with the intensional content determined by } a \text{ in } w\}$ [42].

When the ϵ head gets composed with the nominalized DP by FA, it will yield the ϵP projection which is a function of type $\langle v, t \rangle$. This would not compose with the verb via its internal argument. Instead, it only modifies the eventuality argument of the matrix verb *hope* whose content will then be denoted by the proposition that Bill would win the election/vote. See the following composition:

$$(27) \quad \lambda y \lambda x \lambda e. \text{hope}(y)(x)(e) \wedge \text{CONT}(e) = \lambda w'. \exists e'. \text{win}_{w'}(\text{vote})(\text{Bill})(e')$$

$$\quad \quad \quad < e, < e, < v, t >>>$$

$$\quad \quad \quad \text{VP}$$

$$\quad \quad \quad \lambda e. \text{CONT}(e) = \lambda w'. \exists e'. \text{win}_{w'}(\text{vote})(\text{Bill})(e') \quad \lambda y \lambda x \lambda e. \text{hope}(y)(x)(e)$$

$$\quad \quad \quad < v, t > \quad < e, < e, < v, t >>>$$

$$\quad \quad \quad \epsilon P \quad \quad \quad \text{V}$$

$$\quad \quad \quad \text{Bill-er bhot-e jet-a} \quad \quad \quad \text{asha korechilo}$$

We used the rule Modified Predicate Modification [15] for the composition. The rule is stated below:

(28) **Modified Predicate Modification:** [15]

If α is a branching node and $\{\beta, \gamma\}$ is the set of its daughters, then, for any assignment g and world w , α is in the domain of $\llbracket \alpha \rrbracket^{w,g}$ if both β and γ are, and if $\llbracket \beta \rrbracket^{w,g}$ is a predicate $P\beta$ of type $\langle \sigma_1, \langle \sigma_2, \dots \langle \sigma_k, \dots \langle \sigma_n, t \rangle \dots \rangle \dots \rangle \dots \rangle$ and $\llbracket \gamma \rrbracket^{w,g}$ is a predicate $P\gamma$ of type $\langle \sigma_k, t \rangle$. In this case, $\llbracket \alpha \rrbracket^{w,g} = \lambda x_1 \lambda x_2 \dots \lambda x_k \dots \lambda x_n : x_1 \dots x_n$ are in the domain of $\llbracket \beta \rrbracket^{w,g}$ and x_k is also in the domain of $\llbracket \gamma \rrbracket^{w,g}$. $P\beta(x_1)(x_2) \dots (x_k) \dots (x_n) \& P\gamma(x_k) = 1$.

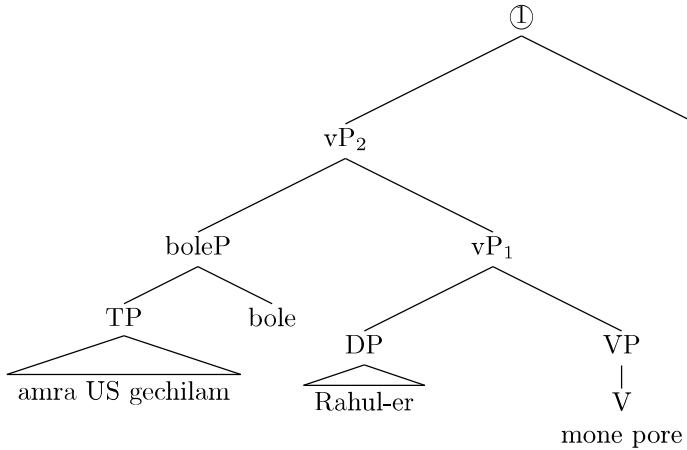
(28) “allows a modifier of a type $\langle \sigma_k, t \rangle$ to modify any σ_k -type variable of a predicate.” Following this, we arrive at the root note in (27) which shows us that the content of *hope* becomes the proposition ‘Bill would win the election’. Therefore, the truth of it will not be guaranteed because the content of an attitude event might be false in the actual scenario.

Appendix 2

The reviewers have suggested addressing the question of how the semantics in (18) can account for the non-factive reading in (12). Earlier, we argued that the semantics in (11) fails to account for any non-factive reading because the semantics as stated in (11) would require the embedded proposition to be always true in the actual world. However, we will show that the proposed semantics in (18) can do so. The embedded clause involved in (12) is a finite clause with the VERBY EMBEDDER *bole* which is a SAY-based complementizer [9–12, 50, 60].

This kind of embedded clause is not even the complement to the verb, rather it sits outside of the main clause and adjoins to the vP domain [4, 5, 23, 36]. Thus, the structure will be like this:

(29)



We assume that Bangla *bole* complementizer is an overt realization of the covert reportative modal [SAY] which can denote mental states and is built on contentful eventualities, but not individuals [41, 50].¹² Not only Bangla *bole*, there exist SAY-based complementizers in other languages too, e.g., Korean *ko*, Japanese *to*, Zulu *ukuthi*, etc. that are also built on contentful eventualities [48]. Following [50], the semantics of *bole* is the following where it takes a propositional argument p and returns the set of contentful eventualities whose intensional content is denoted by p :

$$(30) \quad [\![bole]\!]^{w,g} = \lambda p_{<s,t>} \lambda e_v. \text{CONT}_w(e) = p$$

$$(31) \quad [\![boleP]\!]^{w,g} = \lambda e_v. \text{CONT}_w(e) = \lambda w'. \text{we went to US in } w' \text{ [via Intensional FA, } [\![TP]\!]^g_{\mathbb{C}} \text{ & 'bole']}]$$

Now, what is important to note is the type of the *bole*-clause, which is $< v, t >$. And, it neither modifies nor saturates the internal argument of the verb. What does it do then? It combines with vP_1 via Predicate Conjunction, by modifying the matrix event only. Below we write down the semantic computations:

$$(32) \quad [\![vP_1]\!]^{w,g} = \lambda e_v \exists x : \underline{\text{LB}(\tau(x)) < \text{LB}(\tau(e))}. \text{remember}_w(x)(\text{Rahul})(e)^{13}$$

$$(33) \quad [\![vP_2]\!]^{w,g} = \lambda e_v \exists x : \underline{\text{LB}(\tau(x)) < \text{LB}(\tau(e))}. \text{remember}_w(x)(\text{Rahul})(e) \wedge \text{CONT}_w(e) = \lambda w'. \text{we went to US in } w'$$

Now, another existential closure will be executed to close off the matrix event argument. Though the pre-existence presupposition is present here, we do not

¹² English complementizer *that* is built on contentful individuals ([48], a.m.o.).

¹³ In spite of the fact that there is no theme argument of V in (29), we do not want to leave this slot unsaturated or open. That is why we proceed by existentially closing the internal argument of the verb so that it can compose it with its subject by FA.

find any lexical correlate of x . Thus, it should not bother us. The important thing is – we have the subordinate proposition as the content (but not the object) of *remember*, which might be false in the actual world. This is the crux of getting non-factivity in (12). One of the reviewers also pointed to the non-factive readings with English *remember* too. This is a very interesting point that [48] has already discussed. [48] mentioned that we get examples like *Martha remembered John to be bald, but he wasn't* where *remember* is used in a non-factive manner. Here, he proposed a null embedder F_{Dox} which acts like *bole/ko/to*.

Technical Notes

- i. In this paper, we used the tools of formal semantics such as lambda calculus, restricted lambda for introducing definedness conditions, and compositional rules like Functional Application, Predicate Modification, Predicate Abstraction, Trace rule, etc. Readers are requested to follow [32] for all these.
- ii. We considered the following *types*:
 - a. e for entities/individuals
 - b. t for truth values
 - c. v for events
 - d. s for the worlds
 We viewed propositions as functions from worlds to truth values. In other words, a proposition is a set of those worlds where it holds true. Readers are advised to follow [27].
- iii. For the reference of the readers, a full picture of [53]'s type shifters is given below:
- iv. For interlinear glossing of the non-English data, we followed the Leipzig convention for glossing: <https://www.eva.mpg.de/lingua/pdf/Glossing-Rules.pdf> (Fig. 2).

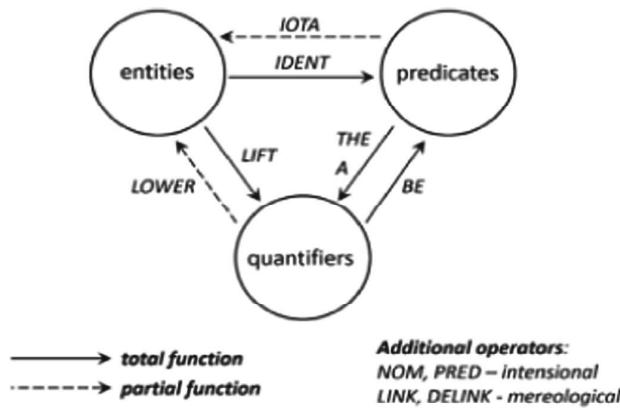


Fig. 2. Partee's type shifters (taken from [62])

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