

Factive complements are not always unique entities: a case study with Bangla *remember*

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Overview on factive predicates

An attitude report $P\varphi$ is **FACTIVE** if the proposition φ is presupposed (\gg) to be true. The predicate P is said to be a factive predicate.

Natural language examples:

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

Predicates like *know*, *regret*, *remember*, *forget*, etc. are factive predicates because they presuppose the truth of their complements.



How is factivity exported?

There are three standpoints regarding the emergence of factivity in literature.

- a. Some associate factivity with verbs ([Hintikka, 1962](#); [Percus, 2006](#)).
- b. Some export it via complements ([Kiparsky and Kiparsky, 1970](#); [Kastner, 2015](#)).
- c. Some say it is a compositional offspring ([Bondarenko, 2020](#)).

Those who envisage that factivity is exported from complements often attribute it to the definiteness feature of the complements ([Kastner, 2015](#); [Hanink and Bochnak, 2017a,b](#)).

See [Kratzer \(2006\)](#)'s factive *that*:

$$(3) \quad \llbracket that_F \rrbracket = \lambda p \lambda e. \text{exemplifies}(p)(e) \text{ or } \lambda p. i.e \text{ exemplifies } (p)(e)$$

She also accommodates the option of directly inserting ι in the complementizer semantics.

Our departure

In this talk, 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.

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 today's talk, we will restrict ourselves to zooming in on the case of *mone pora* only.

Consider the following:

- (4) 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 an event of Mary visiting Delhi.'

Proof for lack of definiteness

In (4), 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.

In order to establish it in a more concrete way, we conform to [Bondarenko \(2020\)](#)'s insight which can tell us about the lack of its obligatory definiteness in the following way:

- (5) 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.

Proof for factivity

Survival under negation, yes/no question

The presupposed status of the nominalized complement can be shown if we negate the sentence in (4) because presuppositions survive negation. The negation of (4) still entails (\models) 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 an event of Mary visiting Delhi.'
 \models Mary visited Delhi.

Same inferential pattern while forming a yes/no question:

- (7) John-er ki [Mary-r Delhi ja-wa] mone pore?
 John-GEN POL.Q Mary-GEN Delhi go-GER in memory fall.PRS.3
 'Does John remember an event of Mary visiting Delhi?'
 \models Mary visited Delhi.

Proof for factivity

von Fintel (2004)'s 'Hey! wait a minute' test

One can execute the 'Hey! wait a minute' test [von Fintel \(2004\)](#) to check the presupposition projection. In a conversational setting, the following can be a good response to (4):

- (8) 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.'
 [✓in response to (4)]

(8) sounds perfectly okay as a response to (4) because one can be ignorant about something which is already a fact.

Factive reports pass the 'Hey! wait a minute' test.

Observational summary

Therefore, it is quite established that the nominalized complement in (4) 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 ([Kastner, 2015](#); [Hanink and Bochnak, 2017a,b](#)).

In this talk, we account for this phenomenon in a compositional way at the syntax-semantic interface.

Approaches that equate factivity with definiteness

That definite nominalization is liable for the rise of factive inferences is propagated in [Kastner \(2015\)](#).

This is supported by the work of [Hanink and Bochnak \(2017a\)](#) on Washo language – in their work, it is shown that definiteness is the core feature in giving rise to factivity.

[Kastner \(2015\)](#) classifies clauses into two classes, *i.e.*, PRESUPPOSITIONAL and NON-PRESUPPOSITIONAL rooting back to what [Cattell \(1978\)](#) pioneered about STANCE VERBS. The following is the famous classification of stance verbs ([Cattell, 1978](#); [Hegarty, 1990, 1992](#)):

- 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.*

[Kastner \(2015\)](#) 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.

Factives guarantee the truth

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.

In (10) the complement clause is not verified to be true even if it exists beforehand in the COMMON GROUND (CG) (Stalnaker, 2002). 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, the existence of presupposed complements in the CG is noted, but in non-stance the truth of them is guaranteed additionally.

Factives form smaller set within presuppositionals

- 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 presuppositionals verbs

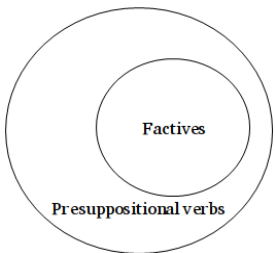
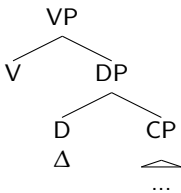


Figure 1: Factives and presuppositional verbs

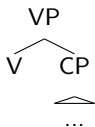
Selectional differences

Kastner (2015)'s standpoint results in the following representations:

(11) a. Presuppositional:



b. Non-presuppositional:



Look at (11a). Kastner (2015) propounds that 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. Presuppositional verbs select for a semantically-sensitive definite Δ .

On the other hand, non-presuppositional verbs select for bare CPs.

Validating cross-linguistically

[Hanink and Bochnak \(2017a\)](#) mention that this D slot is filled with definite *-gi/ge* morpheme in clausal nominalizations in Washo.

In their recent work, [Bochnak and Hanink \(2022\)](#) 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.

Our novelty:

We discuss such a case in Bangla where we can find indefinite use of eventualities embedded under a factive report. Thus, the agenda of 'factivity = definiteness' is at stake. Not only in Bangla, but this kind of observation is also noted in Barguzin Buryat (a Mongolic language) by [Bondarenko \(2020\)](#).

We will account for this phenomenon in Bangla in a compositional manner.

Is Bangla *remember* lexically factive?

Why don't we formulate the following semantics of *mone pora* relative to a world w and a variable assignment function g ?

$$(12) \quad \llbracket \text{mone pora} \rrbracket^{w,g} = \lambda p_{\langle s,t \rangle} \lambda x_e : \underline{p(w) = 1} . \mathbf{remember}_w(p)(x)$$

(12) denotes a partial function – this concerned verb is said to be defined if its argument holds true in the actual world, otherwise undefined.

However ...

- (13) 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
 Doctor Rahul-GEN at times we US go.PRF.PST.1
 bol-e] mone pore, kintu amra kokhono US ja-i
 say-PTCP 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.

If the semantics like (12) is followed, it would not account for the above data where the verb *mone pora* is combining with such a CP that is not true in the actual reality.

Verdict: It is not lexically factive.

How to view Bangla *mone pora* 'remember'

A brief historical tour

We propose such a semantics of it which can account for both factive and non-factive readings mentioned above.

Bangla *remember* is a complex predicate where the preverb is *mone* 'in memory/mind' and the light verb is *pora* 'to fall' (see [Butt, 2003, 2005](#), a.m.o.). It literally means 'falling in memory'. See also Balkar 'dropping in memory' ([Bondarenko, 2020](#)).

Another interesting fact is that the subject of this verb is in the Genitive case instead of the regular Nominative one. Follow the Genitive *-r* marker on the attitude subject in (4).

Genitive subject constructions of the verbs or predicates denoting mental activities and psychological states have a long history ([Onishi, 2001](#)). [Onishi](#) mentioned that subjects of these predicates in Middle Bangla used to occur in Genitive, Locative, and Objective cases.

Most prominent pattern:

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

Onishi (2001) 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.

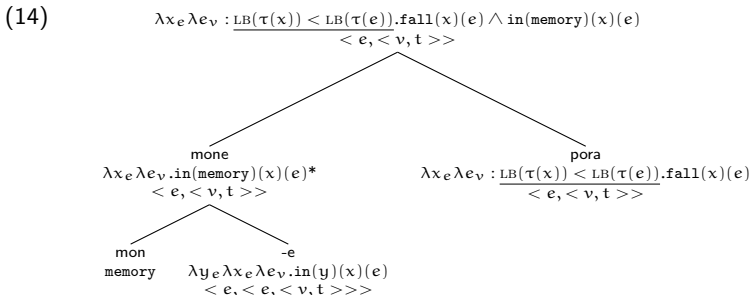
In Modern Bangla, predicates like *mon-e pora* still retain the Locative NP referring to a body part, where *-e* denotes the Locative marker and the NP that denotes the body part is *mon* or 'memory/mind'.

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.

How to view Bangla *remember*

Zooming on its compositional structure

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:



*It is a short for ' $\lambda x_e \lambda e_v . \exists y [memory(y) \wedge in(y)(x)(e)]$ '. 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 (14), 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 (Bondarenko, 2019b,a) associated with the internal argument of *fall*. In a nutshell, the object of falling must pre-exist the starting point of the falling event.

Such restrictions on the arguments of verbs are noted by Diesing (1992). See the following:

- (15) John broke the glass. → The glass was there before the event of breaking.
- (16) John wrote an essay. ✗ The essay existed before the event of writing.
- (17) gach theke apel-ta porlo, #kintu gach-e kono apel chilo na.
tree from apple-CLF fell but tree-LOC any apple was NEG
'The apple fell from the tree, #but there was no apple in the tree.'
⇒ The apple existed before the falling event started.

Thus, 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. Banerjee et al., 2019; Banerjee and Karmakar, 2020).

In order to compose *mone*, of type $\langle e, \langle v, t \rangle \rangle$ -type, with the $\langle e, \langle v, t \rangle \rangle$ -type *pora*, we resort to the Generalized Conjunction [Partee and Rooth \(1983\)](#) rule which is stated below:

(18) **Generalized Conjunction:**

Pointwise definition of \sqcap [Partee and Rooth \(1983\)](#)

$X \sqcap Y =$

- a. $= X \wedge Y$ if both X and Y are truth values
- b. $= \{ \langle z, x \sqcap y \rangle : \langle z, x \rangle \in X \text{ and } \langle z, y \rangle \in Y \}$ if X and Y are functions

Via this composition, the event argument of *in* gets identified with the event of falling (cf. [Kratzer, 1996](#)). Hence, the root node in (14) 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.

Formulating the semantics of *mone pora* 'remember'

We argue that this composite gets lexicalized with the meaning of remembering or recalling over time.

Once the complex form in (14) 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*.

We argue, Bangla *remember* retains the pre-existence presupposition which comes from the light verb *fall* in its interpretation (cf. [Banerjee and Karmakar, 2020](#)). Consider the following:

$$(19) \quad \llbracket \text{mone pora} \rrbracket^{w,g} = \lambda x \in D_e \cup D_v. \lambda z \in D_e. \lambda e \in D_v : \text{LB}(\tau(x)) < \text{LB}(\tau(e)). \text{remember}_w(x)(z)(e)$$

An interesting thing to note about (19) is that the internal argument of *mone pora* can be picked out from the domain of individuals or the domain of eventualities. That means this verb can take an entity or an event as its argument.

While embedding gerunds, which are sets of eventualities (we will see this ahead), it takes *v*-type events as its arguments. Apart from that, it can take entities too. See below:

(20) amar John-ke mone pore.
I.GEN John-ACC mind.LOC fall.PRS.3
'I remember John.'

Proper names are entities of type *e*.

So, the possible type designations of the first argument of *mone pora*, as seen in (19), seems logical.

Accounting for factivity with an indefinite gerund

On gerund semantics

We contend that POSS-ing gerunds (see [Abney, 1987](#)) in Bangla can be indefinite unlike English ones that are, as per [Portner \(1986, 1992\)](#), definite.

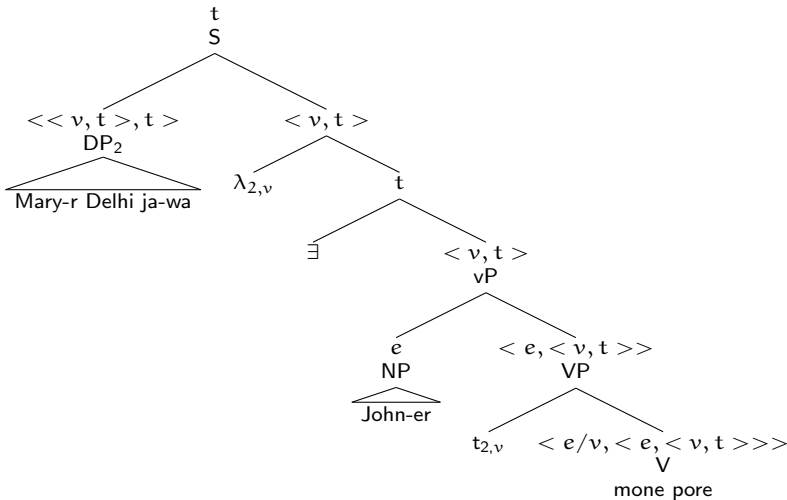
We assume that gerunds denote sets of eventualities [Portner \(1991, 1992\)](#). Thus, the POSS-ing complement in (4) will have the interpretation as in (21), relative to a world w and an assignment function g .

$$(21) \quad \llbracket \text{DP} \rrbracket^{w,g} = \lambda e_v. \text{visiting}_w(\text{Delhi})(\text{Mary})(e)$$

It denotes the set of v -type events such that they are events of Mary visiting Delhi.

Accounting for factivity with an indefinite gerund

Compositional tree



Accounting for factivity with an indefinite gerund

Important compositional steps

Since the concerned POSS-ing is interpreted indefinitely in (4), we can tap into Partee (1987)'s type shifter **A** that maps a predicate onto a quantified nominal.

$$(22) \quad \llbracket \mathbf{A} \rrbracket = \lambda P_{\langle v, t \rangle} \lambda Q_{\langle v, t \rangle} . \exists e' [P(e') \wedge Q(e')]$$

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

A type mismatch occurs between verb and the complement. Hence, QR happens, creating a λ -binder that binds the trace t_2 . Eventually, the root node gets the following denotation:

$$(24) \quad \llbracket \text{S} \rrbracket^{w, g} = \exists e' \exists e : \text{LB}(\tau(e')) < \text{LB}(\tau(e)) . \text{remember}_w(e')(\text{John})(e) \wedge \\ \text{visiting}_w(e')(\text{Delhi})(\text{Mary})(e')$$

It is a factive report – an event of Mary visiting Delhi pre-exists the event of John's remembering this.

Summary & future work

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.

Future work:

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 [Bayer \(1996, 2001\)](#), a.m.o.) and bears the main sentential stress (denoted by the capital letters in the following), it gives rise to factive inferences [Banerjee et al. \(2021\)](#). See the following:

- (25) 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 [Banerjee et al. \(2021\)](#) 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.

Appendix I

Can our semantics account for the non-factive case in (13)? –YES! It successfully can.

The clause involved in (13) bears a SAY-based complementizer *bole* which is built on contentful eventualities (Kratzer, 2013; Moulton, 2019).

$$(26) \quad \llbracket \text{bole} \rrbracket^{w,g} = \lambda p_{\langle s,t \rangle} \lambda e_v. \text{CONT}_w(e) = p$$

$$(27) \quad \llbracket \text{boleP} \rrbracket^{w,g} = \lambda e_v. \text{CONT}_w(e) = \lambda w'. \text{we went to US in } w'$$

We argue it only modifies the eventuality argument of the matrix verb, resulting in the following:

$$(28) \quad \exists e \exists \chi : \frac{\text{LB}(\tau(\chi)) < \text{LB}(\tau(e))}{\text{remember}_w(\chi)(\text{Rahul})(e) \wedge \text{CONT}_w(e) = \lambda w'. \text{we went to US in } w'}$$

Though the pre-existence presupposition is present here, we do not find any lexical correlate of χ . 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 (13).

Appendix II

An accompanying question might arise regarding the source of factivity – can factivity be built into gerunds themselves? NO!

See the following non-factive report:

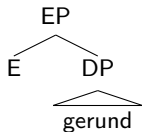
- (29) John [Bill-er bhot-e jet-a] asha korechilo, ✓kintu,
John Bill-GEN election-LOC win-GER hope do.PRF.PST.3 but
durbhagyoboshoto Bill konodino bhot-e je-te ni.
unfortunately Bill ever election-LOC win-3 PRF.PST.NEG
'John hoped for Bill winning elections, ✓but unfortunately he did not
ever win any.'

What will be the compositional path? – should we take the path of argumenthood while combing *hope* with the gerundial DP?

The answer is – NO! If it would have been the path of argumenthood, we would end up having a veridical report which is certainly not the case in (29).

Claim – the gerund is not the object of ‘hope’, instead it is content of it.

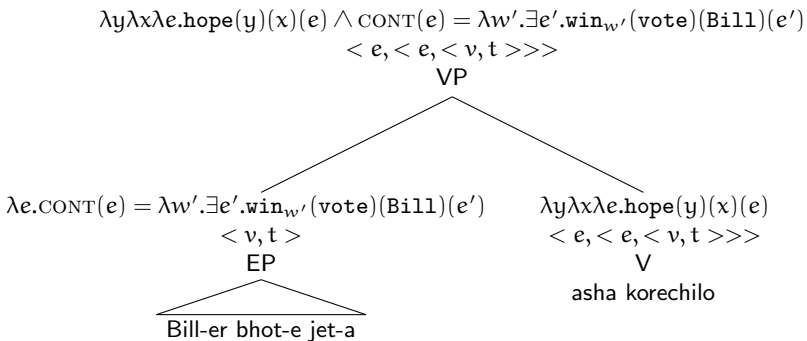
We stipulate that the gerund DP is hidden within a phonologically silent eventive projection EP. Consider something like below:



$$(30) \quad \llbracket E \rrbracket^{w,g} = \lambda P_{\langle v,t \rangle} \lambda e_v. \text{CONT}_w(e) = \lambda w'. \exists e'. P(e') \text{ in } w'$$

$$(31) \quad \llbracket EP \rrbracket^{w,g} = \lambda e_v. \text{CONT}_w(e) = \lambda w'. \exists e'. \text{win}(\text{Bill})(\text{election})(e') \text{ in } w'$$

This will only modify the eventuality argument of $\langle e, \langle e, \langle v, t \rangle \rangle$ -type *hope*, giving rise to no factive inferences.



EP does 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.

We used the rule Modified Predicate Modification [Bondarenko \(2019a\)](#) for the composition. The rule is stated below:

(32) **Modified Predicate Modification:** ([Bondarenko, 2019a](#))

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 \]^{w,g}$ if both β and γ are, and if $\llbracket \beta \rrbracket^{w,g}$ is a predicate $P\beta$ of type $\langle \sigma_1, \langle \sigma_2, \dots \langle \sigma_k, \dots \langle \sigma_n, t \rangle \rangle \rangle \rangle$ 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 $\llbracket \gamma \rrbracket^{w,g}$. $P\beta(x_1)(x_2) \dots (x_k) \dots (x_n) \ \& \ P\gamma(x_k) = 1$.

This rule “allows a modifier of a type $\langle \sigma_k, t \rangle$ to modify any σ_k -type variable of a predicate.”

Now, the object argument of VP will get \exists -closed and the external argument gets saturated. Afterward, another \exists -closure over the event argument. Now, we get the following t -type non-factive expression:

$$(33) \quad \exists y \exists e. \text{hope}(y)(\text{John})(e) \wedge \text{CONT}(e) = \lambda w'. \exists e'. \text{win}_{w'}(\text{vote})(\text{Bill})(e')$$

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