COMBINING CPS BY RESTRICT: EVIDENCE FROM BURYAT*

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1 Introduction

In this paper I compare three different approaches to semantics of attitude verbs in the light of the complementation in Barguzin Buryat, and argue that a version of the decompositional approach (Kratzer 2013, Bogal-Allbritten 2016, 2017, Elliott 2017) is a better fit for the observed data.

2 Different approaches to semantics of attitudes

Approaches to the semantics of attitude verbs differ in (i) what is the source of quantification over possible worlds (the verb or the CP); (ii) what semantic type they attribute to the CP complement; (iii) what consequences, if any, the proposed semantics has for syntax. In this paper I focus on the properties (ii) and (iii) and compare the standard Hintikkan approach to attitude verbs (henceforth, HA), (1), to two versions of decompositional approach (DA1 and DA2), in (2) and (3) respectively.

Under HA, the source of the quantifiation is the attitude verb (1a), the CP denotes a proposition and combines by Functional Application as the first argument of the verb. This approach makes almost no predictions about the morphosyntax of CPs (but see section 5 for some discussion).

(1) **The Hintikkan approach (HA)** (Hintikka 1962)
   a. Semantics of the attitude verb: $[\![\text{believe}]\!]^{w,g} = \lambda p_{st}.\lambda x_e.\forall w'[w' \in \text{DOX}_{x,w} \rightarrow p(w')]$[1]
   b. Semantics of the CP: CP denotes a proposition (type <s,t>).
   c. Syntax: no movement of CP is necessary

The first version of the decompositional approach was proposed by Kratzer(2006), and further elaborated on in (Moulton 2009, 2015). According to it, the source of quantification over possible

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[1] I assume D_e to be the domain of individuals, D_t to be the domain of truth-values, D_v to be the domain of events, and D_s to be the domain of worlds.

worlds in inside the CP, (2a), which denotes a property of contentful individuals (x): individuals such that in all worlds compatible with their content the proposition is true. The attitude verb has a content argument (x) through which the CP combines: Kratzer(2006) proposes that the CP combines via Restrict (Chung & Ladusaw 2004) followed by existential closure of the variable corresponding to the content individual, Moulton(2015) proposes that in order to avoid a type mismatch, CP undergoes leftward movement followed by the remnant movement of AspP.

(2) **Decompositional approach#1 (DA1)** (Kratzer 2006, Moulton 2015)[2]

a. Semantics of the attitude verb: $[\![\text{believe}]\!]^{w,g} = \lambda x_e.\lambda y_e.\lambda e_v.$ believe(x)(y)(e) & e is in w & $\forall$ w'[w' $\in DOX_{y,w} \rightarrow$ w' $\in$ Content(x)$_w$].

b. Semantics of the CP: CP denotes a property of individuals (type <e,t>).
$[\![$*that Badma broke the cart*$]\!]^{w,g} = \lambda x$ in D_e. $\forall$w'[w' $\in$ Content(x)$_w \rightarrow \exists$e'$_v$ [break(the cart)(e') & e' is in w' & Agent(e') = Badma]].

c. Syntax: no movement of CP is necessary: Kratzer(2006)
movement of CP is necessary: Moulton(2015)

This approach treats CPs as nominal modifiers, so it might expect them to have morphosyntax of such expressions. The two implementations of DA1 have different consequences for syntax: Moulton predicts that CPs that denote properties of contentful individuals should always undergo movement (since he does not use Restrict), Kratzer makes no such prediction.

The second version of the decompositional approach (DA2) shares with DA1 the idea that CP is the source of the modalization. However, it treats CPs not as properties of contentful individuals, but as properties of contentful events (3b). CPs combine with the attitude verb by restricting the eventuality argument of the verb. While the attitude verb might have an internal argument (x in (3a), bold brackets represent optionality), it does not have to be a contentful individual; it is not the argument "through" which complementation proceeds and whose content CPs specify.

(3) **Decompositional approach#2 (DA2)** (Kratzer 2013, Bogal-Allbritten 2017, Elliott 2017)

a. Semantics of the attitude verb: $[\![\text{believe}]\!]^{w,g} = (\lambda x_e).\lambda y_e.\lambda e_v.$ believe((x))(y)(e) & e is in w & $\forall$ w'[w' $\in DOX_{y,w} \rightarrow$ w' $\in$ Content(e)$_w$].

b. Semantics of the CP: CP denotes a property of events (type <v,t>).
$[\![$*that Badma broke the cart*$]\!]^{w,g} = \lambda e$ in D_v. $\forall$w'[w' $\in$ Content(e)$_w \rightarrow \exists$e'$_v$ [break(the cart)(e') & e' is in w' & Agent(e') = Badma]].

c. Syntax: no movement of CP is necessary

Under DA2, CPs are verbal modifiers, so one might expect them to have adverbial morphosyntax. DA2 does not predict CP movement to be necessary: CPs combine by restricting the event argument of the verb by Event Identification (Kratzer 1996) or a similiar process[3], thus no type mismatch is created that would drive CP movement. DA2 also predicts that if an attitude verb has an internal argument, it should in principle be able to co-occur with a CP, since the CP is not combining by saturating an argument of the verb. In the next sections I show that this latter approach is most compatible with the morphosyntax of complementation in Barguzin Buryat.

[2] I am using a slighly different notation than the one used in Kratzer 2006 and Moulton 2015 for the purpose of a better comparison with other theories, but I believe that all the changes are minor variations on their proposal.

[3] Modified versions of Restrict or Predicate Modification could also be used for combining the CP with the verb.

3 Morphological evidence

In order to embed propositions, Buryat uses the complementizer *gə-žə*, (4), which consists of two morphemes: the root of the verb *gə* 'say' and the converbial suffix *-žə*.

(4) **Buryat CPs and their proforms**
badma sajana bulj-a: gə-**žə** han-a:, ojuna baha **ti:-žə** /
Badma.NOM Sajana.NOM win-PST say-**CNV** think-PST Ojuna.NOM also **do.so-CNV /**
*ti:-mə / *tərən-i:jə han-a:
do.so-ADJ / that-ACC think-PST
'Badma thought that Sajana won, Ojuna also thought so.'

We also find this suffix in sentential adjuncts, (5), with restructuring verbs like 'begin', and in analytical verb forms. I suggest that the clauses that are marked by *-žə* can be viewed as modifiers of eventuality arguments of verbs.

(5) ojuna üxibü: türə-**žə**, badma əsəgə bolo-bo
Ojuna.NOM child give.birth.to-**CNV** Badma.NOM father become-PST
'By Ojuna giving birth to a child, Badma became a father.'

In (4) we also see what can serve as a proform for Buryat CPs. Buryat has a root *ti:* 'do.so', which produces different proforms by attaching different kinds of morphology. In (4) we see that the CP can be substituted by a proform that consists of the root *ti:* 'do.so' + converbial suffix *-žə*, and cannot be substituted by adverbial and nominal proforms (pronoun). Morphology and proform substitution seem to go hand in hand: clauses that are marked by *-žə* suffix are the ones subsituted by the *ti:-žə* proform.

While under HA, (1), one has no concrete expectations about the morphosyntax of the CPs, DA1 and DA2 have potentially different expectations about the morphosyntax of CPs. Under the assumption that morphosyntax reflects the semantics of CPs, DA1 would predict to find nominal / adjectival morphosyntax, while DA2 would predict to find adverbial morphosyntax. In Buryat we see that CPs morphologically look like a kind of an adverbial modifier, and also pattern as one with respect to proform substitution, suggesting that an approach that treats CPs as event modifiers is more plausible for this language.

4 Distribution of CPs in Buryat

Distribution of CPs in Buryat provides another argument in favor of treating them as event modifiers. First, CPs in Buryat, just as adverbs, cannot occupy subject positions:

(6) *[$_{CP}$ badma tərgə əmdəl-hən gə-žə] sajan-i:jə ga:ru:l-a:
Badma.NOM cart break-PFCT say-CNV Sajana-ACC angry-PST
Intended: 'That Badma broke the cart angried Sajana.'

Second, it becomes less surprising why CPs are quite free in their position in the clause and can occur in any position to the left of the verb without any detectable differences in meaning: for example, between the subject and the verb, (7a), or before the subject, (7b).

(7) a. sajana [$_{CP}$ badma jər-ə: gə-žə] mədə-nə
Sajana.NOM Badma.NOM come-PST say-CNV know-PRS
'Sajana knows that Badma came.'

b. [$_{CP}$ badma jər-ə: gə-žə] sajana mədə-nə
Badma.NOM come-PST say-CNV Sajana.NOM know-PRS
'Sajana knows that Badma came.'

This is exactly the behavior that event-modifying elements like adverbs display: [4]

(8) **Adverbial positions in Buryat** (data from Delikanova, ms)

a. **za:bol** rinčin ajaga uga:-xa
certainly Rinchin dishes wash-FUT
'Rinchin will certainly wash the dishes.'

b. žargalma **za:bol** müri:sö:n-də ila-xa
Zhargalma **certainly** competition-DAT win-FUT
'Zhargalma will certainly win the competition.'

Again, under the hypothesis that semantics of CPs correlates with their morphosyntax, the Buryat data are better accounted for under the DA2 approach that treats CPs as event modifiers.

Moulton (2015) argues that when a CP denotes a property of individuals, it needs to move in order to avoid type mismatch. One can see this movement overtly in German embedded clauses:[5]

(9) a. (Moulton 2015: 335, (101))
...weil er behaupten muss [$_{CP}$ dass er Hemingway geschlagen hat]
...because he claim must that he Hemingway beaten has
'...because he must claim that he has beaten Hemingway.'

b. weil er *[$_{CP}$...] behaupten *[$_{CP}$...] muss

(10c) shows that CPs in Buryat are property-denoting: they can combine with content nouns like 'rumor'. Buryat is also, like German, an SOV language. However, as one can see from (10a)-(10b), Buryat behaves like a mirror image of German with respect to the possible CP positions.

(10) a. badma [$_{CP}$ dugar tərgə əmdəl-ə: gə-žə] mədə-xə joho-toi bai-ga:
B.NOM D.NOM cart break-PST say-CNV know-FUT custom-COM be-PST
'Badma had to know that Dugar broke the cart.' (lit.: 'was with custom')

b. badma mədə-xə *[$_{CP}$...] joho-toi *[$_{CP}$...] bai-ga: *[$_{CP}$...]

c. [bair tərgə əmdəl-hən gə-ʒə] zuga: namajə ajlg-a:
Bair.NOM cart break-PFCT say-CNV rumor 1SG.ACC frighten-PST
'The rumour that Bair broke the cart frightened me.'

Given that there is no evidence of Buryat CPs ever undergoing obligatory movement, Buryat seems to be a counterexample to the typology of CPs sketched in (Moulton 2015: 335–336), and thus cannot be easily accounted for at least under the Moulton's version of DA1.

[4]There is a difference in acceptability between post-verbal adverbs and post-verbal CPs: while adverbs are completely ungrammatical in the post-verbal position, CPs are acceptable in some circumstances (but not in (10), for example). I leave the issue of post-verbal CPs for further research.

[5]Moulton assumes that there is a PF rule that prohibits CPs to occur inside of the verbal complex.

5 Covert hyperraising & CPs as event modifiers

Buryat CPs can have accusative subjects, which, I have argued (Bondarenko 2017), originate in the embedded clause, and undergo obligatory movement at least as high as the edge of CP. While syntax could not provide conclusive evidence for accusative subjects moving outside of CP, their interpretation indicates that they have to be above the source of the intensionalization at LF.

Evidence comes from the fact that accusative subjects must be obligatorily *de re*, as illustrated in (11): while nominative subjects can be interpreted *de dicto*, accusative ones cannot, which leads to infelicity of (11) with an ACC subject, where the speaker knows that bird Garudi doesn't exist.

(11) səsəg xan garudi **ʃubu:-n / #ʃubu:-jə** oi so:-gu:r ni:d-ə: gə-žə
Seseg.NOM HON Garudi **bird-NOM / bird-ACC** forest in-INSTR fly-PST say-CNV
han-a: xarin xan garudi ʃubu:-n gazar də:rə ügi: gə-žə mədə-nə-b
think-PST but HON Garudi bird-NOM Earth on NEG say-CNV know-PRS-1SG
'Seseg thought that bird Garudi flew through the forest, but I know that there is no bird Garudi on the Earth.'

This movement seems to target the position of the internal argument of the matrix verb: the accusative subject behaves like direct objects in its ability to undergo promotion into the subject position when the verb is passivized, (12). Given that Buryat does not have long-distance passivization (Privoznov, ms), and that ACC subjects can be inside the embedded CP at PF (Bondarenko 2017), it seems that the phenomenon of accusastive subjects in Buryat is best analyzed as covert hyperraising (see Deal 2017, 2018 for a similiar analysis of Nez Perce).[6]

(12) **Accusative subjects of CPs can be promoted into the matrix subject position**

a. badma **namajə** sajan-i:jə zura-xa gə-žə han-a:
Badma.NOM **1SG.ACC** Sajana-ACC draw-FUT say-CNV think-PST
'Badma$_k$ thought of me$_{speaker/*k}$ that I$_{speaker/*k}$ will draw Sajana.'

b. **bi**$_1$ badma-da t_1 sajan-i:jə zura-xa gə-žə hana-**gd**-a:-**b**
1SG.NOM Badma-DAT Sajana-ACC draw-FUT say-CNV think-**PASS**-PST-**1SG**
'Badma$_k$ thought of me$_{speaker/*k}$ that I$_{speaker/*k}$ will draw Sajana.'

If covert hyperraising into an argument position is indeed the syntax we need, the question then arises: which of the three approaches (HA, DA1, DA2) can provide semantics for it with least stipulations? In order to implement movement into a θ-position, we need to have an abstractor on the edge of CP rather than right below the landing site (Heim 1994, Deal 2018), as in (13).

(13) $_{VP}$[$_{DP}$[bird Garudi.ACC] ... $_{VP}$[$_{CP}$[8 $_{CP}$[t_8 flew through the forest]] $_{V}$think]]

In the discussion to follow, I will assume that the external argument is severed from the verb (Kratzer 1996), and that the matrix verb has an event argument (e), as well as a res-argument (z).

(14) Modified *res*-denotations fot the matrix verb

a. **HA (type <<e,st>,<e,<v,t>>>):** $[\![\text{think}]\!]^{w,g} = \lambda P_{<e,st>}.\lambda z_e.\lambda e_v.\ f(w) = z$ & think(e) & $\forall w'[w' \in DOX_{Exp(e),w} \rightarrow P(f(w'))(w')]$ (slightly modified version of (Deal 2018))

[6] We know that (12b) is derived from the configuration with an ACC subject because the embedded verb lacks 1st person agreement. The embedded verb does not agree with a 1/2 person subject only if it is in accusative case.

b. **DA1 (type <e,<e,<v,t>>>):** $[\![\text{think}]\!]^{w,g} = \lambda x_e.\lambda z_e.\lambda e_v.$ think(x)(z)(e) & e is in w & $\forall$ w' [w'$\in \text{DOX}_{\text{Exp(e)},w} \rightarrow$ w' $\in$ Content(x)$_w$].

c. **DA2 (type <e,<v,t>>):**
$[\![\text{think}]\!]^{w,g} = \lambda z_e.\lambda e_v.$think(z)(e) & e is in w & $\forall$w' [w' $\in \text{DOX}_{\text{Exp(e)},w} \rightarrow$ w' $\in$ Content(e)$_w$].

In Hintikka's approach, one has to give up the idea that attitude verbs always take propositions in order to implement hyperraising into the object position. One possible implementation is presented in (Deal 2018): when there is an abstractor on the edge of CP, the verb takes a function from individuals to propositions as its first argument (14a). In all worlds that are compatible with the believes of the attitude holder, this predicate is true of the individual who is the counterpart of the *res*-argument (counterpart of z) in those worlds.[7] Since hyperraising does not always occur, HA needs to either (i) posit lexical ambiguity for all verbs that allow hyperraising (*think*$_1$ takes a property, *think*$_2$ — a proposition); or (ii) have vacuous type shifting of CPs from a propositional meaning to the <e,<s,t>>meaning (followed by the existential closure of the *res*-variable).

In DA1, where CPs are properties of individuals, putting an abstractor at the CP's edge will create a function of the type <e,<e,t>>. A function of this type will no longer be able to combine with the meaning of the verb with the help of Restrict (Chung & Ladusaw 2004), irrespective of the order of the content argument and the *res*-argument. It is also not clear how to implement hyperraising in the Moulton's version of DA1: other things being equal, putting an abstractor at the CP's edge will lead to a type mismatch. To sum up, I do not see an easy way for DA1 to implement hyperraising to θ-position without abandoning the idea that CPs are always properties of individuals that combine by restricting the content argument of the verb.

In DA2, where CPs are properties of events, putting an abstractor at the edge of the CP creates a function of type <e,<v,t>> — the same type as the matrix verb. This function can easily combine with the matrix verb by a generalized Predicate Modification (15): the two individual variables are equated with each other, as well as the two event variables, resulting in (16).

(15) **Generalized Predicate Modification**
If α is a branching node, $\{\beta, \gamma\}$ is the set of α's daughters, and $[\![\beta]\!]^{w,g}$ and $[\![\gamma]\!]^{w,g}$ are in the same domain D<σ_1,<σ_2...,<σ_n,t>> (where n $\geq$ 2), then $[\![\beta]\!]^{w,g}(x_1)(x_2)...(x_n) = [\![\gamma]\!]^{w,g}(x_1)(x_2)...(x_n) = 1$.

(16) $[\![\text{think}_{\text{CP}}[\text{that Badma broke the cart}]]\!]^{w,g} =$
$\lambda \mathbf{z}_e.\lambda e_v.$think(**z**)(e) & e is in w & $\forall$w' $\in \text{DOX}_{\text{Exp(e)},w} \rightarrow$ w'$\in$Content(e)$_w$ & $\forall$w'[w' $\in$ Content(e)$_w \rightarrow \exists$e'$_v$ [break(the cart)(e') & e' is in w' & Agent(e') = **z**]].

Thus, the ACC subject will be able to saturate both the *res*-argument and the agent argument of the embedded verb at the same time. No ambiguity or type-shifting is necessary for this derivation.

6 Conclusions

The morphosyntax of CPs in Buryat argues in favor of the CPs-as-properties-of-events version of the decompositional approach (Kratzer 2013, Bogal-Allbritten 2017, Elliott 2017): Buryat CPs are morphosyntactically adverbial clauses, and they exhibit covert hyperraising, which only DA2 can naturally account for without appealing to ambiguity or type shifting.

[7] Function f provides counterparts of z in different worlds.

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