Modal-Aspect interactions in Bangla

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ABSTRACT

Bhatt (1999) observed that ability modals crosslinguistically carry an actuality entailment when they appear with the perfective aspect (e.g., the English *John was able to swim the English Channel* (on the episodic reading of the sentence) entails that John did, indeed (manage to) swim the English Channel). The imperfective counterpart, however, lacks this entailment. Hacquard (2006, 2009) showed that Bhatt's generalization is insufficiently general in that the actuality entailments appear with all root modals, not just ability modals, independently of whether they are possibility or necessity modals. This paper presents novel data from Bangla where modals can take the progressive as well as the perfective aspect morphology, and also carry an actuality entailment, that asserts the actual existence of a process rather than the culmination. I show that this can be explained on Hacquard's general account of Modal-Aspect interactions if one adopts a perspective on the semantics of the Progressive that has a component of its meaning anchored in the world of evaluation over and above its modal component. The actuality entailment with the Perfect also follows on particular assumptions about its meaning.

1   Introduction

It is well known that modal expressions (e.g., *can* and *must* in English) come in a variety of flavors, as attested by the following examples from a recent survey of Modality, viz., Hacquard (2011: 1485):

"**Epistemic modality** expresses possibilities and necessitiesgiven what is known to the speaker, based on available evidence.
e.g.: (In view of the available evidence,) John must/might/may/be the murderer.

Deontic modality expresses possibilities and necessities given a body of laws or rules, i.e., permissions or obligations.
e.g.: (In view of his parents' orders,) John may watch TV, but he must go to bed at 8 p.m.

Abilitative modality expresses possibilities given the subject's physical abilities.
e.g.: (In view of his physical abilities,) John can lift 200 lbs.

Teleological modality expresses possibilities and necessities given particular goals.
e.g.: (In view of his goal to get a Ph.D,) John must write a dissertation.

Bouletic modality expresses possibilities and necessities given particular desires.
e.g.: (In view of his desire to retire at age 50,) John should work hard now."

According to the standard accounts of modality since Kratzer (1977, 81), revised and extended in Kratzer (2012), modals involve existential (for possibility modals) or universal (for necessity modals) quantification over worlds, restricted by two contextual parameters called the modal base and the ordering source (the distinction between the two and the reasons for having two rather than one need not concern us here; both are taken to be (functions from possible worlds to) sets of propositions, i.e., sets of sets of possible worlds). Different choices of f and g yield the different flavors of modality seen above. Much recent work, following earlier work in both syntax and semantics (e.g., work by Jackendoff, Picallo, Cinque, etc.) also assumes a cut in the flavors of modality between *epistemic* and *root* or *circumstantial* modality: the former having to do with a subject's knowledge/belief states, the latter having to do with aspects of the circumstances that enter into the evaluation of modal statements (ability, deontic, teleological, etc.).

Kratzer's basic semantic analysis (with some modifications) can be stated as in (1a) and (1b) (this formulation follows von Fintel and Heim (2011):

(1a) $[[\ can \ ]]^{w, f, g} = \lambda p. \ \exists w' \in Best_{g(w)} \ (\cap f(w)): p(w') = 1$

(1b) $[[\ must \ ]]^{w, f, g} = \lambda p. \ \forall w' \in Best_{g(w)} \ (\cap f(w)): p(w') = 1$

2   Actuality Entailments

Bhatt has observed (Bhatt 1999) that ability modals in a variety of languages give rise to an "actuality" entailment (i.e., the entailment that the possibility was realized) with the Perfective, but not with the Imperfective. The following Hindi examples from Bhatt (1999) illustrate the contrast:

(2)   Ju:suf hava:i: ʤaha:z uɽa: saka: (# lekin us-ne hava:i: ʤaha:z nahĩ: uɽ- a:i:)
      Yusuf air-ship   fly can-PFV   but he   air-ship   not   fly-PFV
      "Yusuf was able to fly the airplane, but he didn't fly the airplane" (contradictory in Hindi)

(3)   Ju:suf hava:i: ʤaha:z uɽa: sakta: tʰa: (# lekin us-ne   hava:i: ʤaha:z nahĩ: uɽ- a:i)
      Yusuf air-ship   fly can-IMPFV be-PAST   but he-ERG air-ship   not   fly-PFV
      "Yusuf could fly the airplane, but he didn't fly the airplane" (not contradictory)

In e.g. (2), where the possibility/ability modal appears with the Perfective aspect, the continuation in parentheses is judged by native speakers to be contradictory. In (3), however, where the possibility/ability modal appears with the Imperfective aspect, the continuation in parentheses is judged to not be contradictory. Bhatt also observed that is pattern is very robust cross-linguistically, and can be illustrated with examples from a variety of related and unrelated languages. Bhatt's solution to this contrast was to assume that ability "modals" are not at base modal expressions, but implicative verbs that can get a modal flavor with a genericity operator derived from the imperfective, which is lacking in the perfective.

This cannot be the whole story, however. As observed by Hacquard (Hacquard 2006, 2010, 2016), this is insufficiently general, as the actuality entailments cross-linguistically are observed with all root modals with the Perfective aspect, as contrasted with the Imperfective. Hacquard provides a solution to this problem by assuming that epistemic modals differ from root modals in that whereas the former scope over tense and aspect, the latter scope under tense/aspect; and under some reasonable additional assumptions, one can derive the contrast between the way perfective and imperfective aspects behave w.r.t. actuality entailments.

The aim of this paper is to provide novel data (strictly speaking somewhat novel: some of it has been around since 2014) from Bangla that provides support for and extends Hacquard's analysis, but also points to some data that require attention.

3   Modals in Bangla: an introduction to some basic properties

We look at two modal expressions in Bangla: the verb *para* "can" (possibility modal) and the infinitive+copula construction used to express necessity. There are other modal expressions in the language, but we stick to "verbal" modal expressions (as opposed to, say, adjectival expressions) because they are only ones relevant for the tense-aspect interactions we are examining in (4)-(6).

Par-a[1]

(4)   Utpal gaɽi ʧala-ṯe   par-∅-e
      Utpal car drive-INF can-PRES-3
      "Utpal can drive a car"
      Possible flavours: epistemic, ability, teleological, bouletic, etc.

(5)   ami gaɽi ʧala-ṯe   par-∅-i
      I   car   drive-INF can-PRES-1
      "I can drive a car"
      Possible flavours: epistemic, ability, teleological, bouletic, etc.

(6)   ṯumi/ṯui   gaɽi ʧala-ṯe   par-∅-o/iʃ
      You(nonfam/fam) car   drive-INF can-PRES-2(nonfam/fam)
      "You can drive a car"
      Possible flavours: epistemic, ability, teleological, bouletic, etc.

Para can take other tense-aspect markings besides the present as well: however, here the epistemic readings disappear, leaving only the root readings, as evidenced in (7)-(12).

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[1] A note on transliteration: I have used IPA symbols to transliterate from Bangla, but have kept proper names and English loans with their conventional spelling.

Examples with the Perfective:

(7)   Utpal gaɽi ʧala-t̪e   par-∅-l-o
        Utpal car drive-INF can-PFV-PST-3
         "Utpal could drive a car"
        Possible flavours: ability, teleological, bouletic, etc.

(8)   ami gaɽi ʧala-t̪e   par-∅-l-am
        I   car drive-INF can-PFV-PST-1
        "I could drive a car"
         Possible flavours: ability, teleological, bouletic, etc.

(9)   t̪umi/t̪ui   gaɽi ʧala-t̪e   par-∅-l-e/i
        You(nonfam/fam) car drive-INF   can-PFV-PST-2(nonfam/fam)
        "You could drive a car"
        Possible flavours: ability, teleological, bouletic, etc.

Examples with the Imperfective:

(10)   Utpal gaɽi ʧala-t̪e   par-t̪-o
        Utpal car drive-INF can-IMPFV-3
        "Utpal could drive a car"
        Possible flavours: ability, teleological, bouletic, etc.

(11)   ami gaɽi ʧala-t̪e   par-t̪-am
        I   car drive-INF   can-IMPFV-1
        "I could drive a car"
        Possible flavours: ability, teleological, bouletic, etc.

(12)   t̪umi/t̪ui   gaɽi ʧala-t̪e   par-t̪-e/i
        You(nonfam/fam) car drive-INF   can-IMPFV-2(nonfam/fam)
        "You could drive a car"
        Possible flavours: ability, teleological, bouletic, etc.

With the imperfective, the sentences above ((10)-(12)) can have either a habitual or a counterfactual reading: the latter will be ignored for most of this paper.

Infinitive+Copula

In Bangla, a common way of expressing necessity is by means of an infinitive + copula construction. In this case, the flavour of modality is necessarily root modality, and cannot be interpreted as epistemic necessity. The subject of the copula is marked by the dative, and the copula can take a variety of tense-aspect markings (present, future, perfective, imperfective, etc.) as illustrated by(13)-(15):

(13)   Utpal-ke/ama-ke /t̪oma-ke/t̪o-ke   gaɽi ʧala-t̪e   hɔ-b-e
        Utpal-DAT/I-DAT/you-DAT/you-DAT car drive-INF   be-FUT-3
        "Utpal/I/you must drive a car (at some future time)"

(13')   Utpal-ke/ama-ke /t̪oma-ke/t̪o-ke   gaɽi ʧala-t̪e   hɔ-∅-e
        Utpal-DAT/I-DAT/you-DAT/you-DAT car drive-INF   be-PRES-3
        "Utpal/I/you are required to drive a car (in a habitual/characterizing sense)"

(14)   Utpal-ke/ama-ke /t̪oma-ke/t̪o-ke   gaɽi ʧala-t̪e   ho-∅-l-o
        Utpal-DAT/I-DAT/you-DAT/you-DAT car drive-INF   be-PFV-PST-3
        "Utpal/I/you had to drive a car"

(15)   Utpal-ke/ama-ke /t̪oma-ke/t̪o-ke   gaɽi ʧala-t̪e   ho-t̪-o
        Utpal-DAT/I-DAT/you-DAT/you-DAT car drive-INF   be-IMPV-3
        "Utpal/I/you had to drive a car"

(Possible flavors of modality: root, #epistemic)

Note that whereas both (14) and (15) are translated in English as "Utpal/I/you had to drive a car", they differ in meaning, and in particular w.r.t. actuality entailments, as will be discussed later.

A future-marked copula can express epistemic modality but if the preceding clause contains no overt verbal elements as seen in (16)-(19) (Banerjee 2019):

(16)   Nandita-i   ʧor
              Nandita-EMPH   thief
              "Nandita is the thief"

(17)   Nandita-i   ʧor hɔ-b-e
              Nandita-EMPH thief be-FUT-3
              "Nandita must be the thief" (Epistemic)

(18)   Nandita library-ṱe
              Nandita library-LOC
              "Nandita is in the library"

(19)   Nandita library-ṱe   hɔ-b-e
              Nandita library-LOC be-FUT-3
              "Nandita must be in the library" (Epistemic)

4   Actuality entailments in the Bangla Modals and the Perfective-Imperfective Distinction

As expected, Bangla shows the same pattern as Hindi, French, etc. w.r.t. actuality entailments: there are such entailments with the Perfective, but not with the Imperfective.

(20)   Antara naʧ-ṱe   par-∅-l-o,   (#kinṱu naʧ-∅-l-o   na)
              Antara dance-INF can-PFV-PST-3   but dance-PFV-PST-3 not
              "Antara was able to dance, (#but didn't dance)"

(21)   Antara naʧ-ṱe   par-ṱ-o,   (kinṱu naʧ-∅-l-o   na)
              Antara dance-INF can-IMPFV-3   but dance-PFV-PST-3 not
              "Antara could dance/could have danced, (but didn't dance)"

(22)   Antara-ke naʧ-ṱe   ho-∅-l-o,   (#kinṱu naʧ-∅-l-o   na)
               Antara-DAT dance-INF   be-PFV-PST-3   but dance-PFV-PST-3 not
              "Antara had to dance, (#but didn't dance)"

(23)   Antara-ke naʧ-ṱe   ho-ṱ-o,   (kinṱu naʧ-∅-l-o   na)
               Antara-DAT dance-INF   be-IMPFV-3   but dance-PFV-PST-3 not
               "Antara was required to dance, (but didn't dance)"

The continuations in (20), (22) are contradictory, the ones in (21), (23) are not (this is not adequately reflected in the English translations, because of the differences in the peculiarities of the English constructions that express modalities in the examples above). This is the expected pattern. Hacquard's solution to the problem is to assume that Aspect scopes over root modality, and this leads to the actuality entailment with a Perfective, but not with the Imperfective. Consider the LFs and the interpretations in turn. I illustrate with *para*, the possibility modal; the example with the necessity modal is exactly parallel. I am following the illustration/technical implementation in Hacquard 2016 in (24)-(25).

(24)   [TP Past [AspectP Perfective [ModP can/para [VP Antara dance]]]]

(25a)   [[*para*]]$^{w, f, g, c}$ = $\lambda P_{<s, vt>} \lambda e_v \exists w' \in Best(\cap f(w)): P(e)(w')$

(25b)   [[PFV]]$^{w, f, g, c}$ = $\lambda P_{<vt>} \lambda t. \exists e[e$ in w & $\tau(e) \subseteq t$ & $P(e)]$

(25c) $[[\ past\ ]]^{w, f, g, c}$ = defined iff c provides time $t < t_c$, if defined = t

(25d) $[[\ 24\ ]]^{w, f, g, c}$ = defined iff c provides time $t < t_c$, if defined, true iff
$\exists e[e$ in w & $\tau(e) \subseteq t$ & $\exists w' \in Best(\cap f(w))$: Antara-dance(e)(w')], i.e., iff
There is a past event in w₀ *such that in some world w' compatible with the circumstances in w₀, e is an event of Antara dancing.*

Note that (25d) alone doesn't yield the entailment we are after: we need something more, and Hacquard (2009) proposes the following default principle (*Preservation of Event Descriptions across worlds, PED*):

(26) **For all worlds w₁ and w₂, if e₁ occurs in w₁ and w₂, and e₁ is a P-event in w₁, e₁ is a P-event in w₂ as well. (Hacquard 2009: 298)**

Basically, a crying event in one world is a crying event in all worlds in which it exists; a singing event is a singing event in every world in which it exists, and so on. So while Utpal might be a linguist in one possible world and a plumber in another, such freedom is not available for events. This might appear somewhat stipulative, but is not unreasonable, since events are characterized by their basic properties and participants, unlike, say, persons (who may have wildly different properties in different worlds).
     Now consider the imperfective case in (27)-(28), where the actuality entailment does not arise.

(27)   [TP Past [AspectP Imperfective [ModP can/para [VP Antara dance]]]]
(28a) $[[para]]^{w, f, g, c} = \lambda P_{<s, vt>} \lambda e_v \exists w' \in Best(\cap f(w))$: P(e)(w')
(28b) $[[\ 27\ ]]^{w, f, g, c}$ = defined iff c provides time $t < t_c$, if defined, true iff
$\forall w' \in GEN(w)$: $\forall e[e$ in w' & $\tau(e) \approx t]$ $[\exists w'' \in Best(\cap f(w))$: Antara-dance(e)(w'')], i.e., iff
In all ideal w' accessible from w₀, all past events of , all past events of e of Antara dancing in w' are such that in some w'' compatible with the circumstances in w', e are events of Antara dancing.

These truth conditions guarantee Antara dancing, but only in ideal worlds where, say, her abilities are realized, which the actual world may not be.
     As a side note: in Bangla, as in many other Indo-Aryan (IA) languages, epistemic modals do not carry tense-aspect morphology, and so one cannot really test any possible interactions with aspect (cf. (4)-(19) above).

5   Implicative entailments with root modals with other aspects: the case of the Progressive

Most discussions of actuality entailments with modals look at the contrast between the Perfective and the Imperfective, rarely venturing outside these two cases. Here, I present data from aspects other than those two that bear on the proper analysis of the phenomenon. Bangla, unlike many other languages (including many IA languages) allows Progressive morphology on modals, and when it does, there is an implicative entailment (with both past and present progressive) that is a species of actuality entailment, in a sense made precise below. This was first observed in Guha and Lahiri (2014); a version of this work appears in Guha (2017).

(29)   Antara naʧ-ʈe   par-ʧʰ-Ø-e,   (#kinʈu naʧ-ʧʰ-Ø-e   na)
         Antara dance-INF can-PROG-PRES-3   but   dance-PROG-PRES-3 not
         "Antara is being able to dance, (#but isn't dancing)"

(30)   Antara naʧ-ʈe   par-ʧʰ-il-o,   (#kinʈu naʧ-ʧʰ-il-o   na)
         Antara dance-INF can-PROG-PAST-3   but   dance-PROG-PAST-3 not
         "Antara was being able to dance, (#but wasn't dancing)"

(31)   Antara-ke naʧ-ʈe   ho-ʧʧʰ-Ø-e,   (#kinʈu naʧ-ʧʰ-Ø-e   na)
          Antara-DAT dance-INF   be-PROG-PRES-3   but   dance-PROG-PRES-3 not
         "Antara is having to dance, (#but isn't dancing)"

(32)   Antara-ke naʧ-ʈe   ho-ʧʧʰ-il-o,   (#kinʈu naʧ-ʧʰ-il-o   na)
         Antara-DAT dance-INF   be-PROG-PAST-3   but   dance-PROG-PAST-3 not
         "Antara was having to dance, (#but wasn't dancing)"

(33)   Antara cake bana-ʈe   par-ʧʰ-Ø-e,   (#kinʈu bana-ʧʧʰ-Ø-e   na)

Antara cake make-INF can-PROG-PRES-3   but   make-PROG-PRES-3   not
"Antara is being able to bake a cake, (#but isn't baking a cake)"

(34)   Antara cake bana-ṯe   par-ʧʰ-il-o,   (#kinṯu bana-ʧʧʰ-il-o   na)
        Antara cake make-INF can-PROG-PAST-3   but   make-PROG-PAST-3   not
        "Antara was being able to bake a cake, (#but wasn't baking a cake)"

(35)   Antara-ke   cake bana-ṯe   ho-ʧʧʰ-Ø-e,   (#kinṯu bana-ʧʧʰ-Ø-e   na)
        Antara-DAT cake make-INF be-PROG-PRES-3   but   make-PROG-PRES-3   not
        "Antara is having to bake a cake, (#but isn't baking a cake)"

(36)   Antara-ke   cake bana-ṯe   ho-ʧʧʰ-il-o,   (#kinṯu bana-ʧʧʰ-il-o   na)
        Antara-DAT cake make-INF be-PROG-PAST-3   but   make-PROG-PAST-3 not
        "Antara was having to bake a cake, (#but wasn't baking a cake)"

Note that whereas (29)-(32) entail that Antara danced, (33)-(36) do not entail that Antara baked a cake. This is the familiar distinction between activities and accomplishments w.r.t. the progressive: with accomplishments, a progressive just signals the existence of a process that may or may not get completed. However, there *is* an actuality entailment in all these examples, and that is that the possibility of a process is actualized.

    There are various analyses of the Progressive and the exact semantics remains controversial: however, there is general agreement that sentences with the progressive contain an extensional and a non-extensional part (the only exception being Parsons (1992), who provides a purely extensional analysis, criticized by others). Varying analyses may be found starting from Dowty (1979), though Landman (1992), further refined and extended in Higginbotham (2004). This family of analyses that include a modal component has been criticized in Szabo (2004, 2008), but he also concedes that a proper analysis of the progressive can't be purely extensional.

    For our purposes, it suffices that the semantics of the progressive include a component that makes use of an actual event: that, along with the PED would predict the existence of the kind of actuality entailment we are looking at. For concreteness, let us adopt the semantics of the Progressive presented in Landman (1992), with some modifications, as in the discussion of (37).

(37)   Mary was building a house

(38) $\exists e'[e'$ is in w & $\tau(e') < t_c$ & PROG(e')(w)($\lambda e \exists y$[House(w)(y) & Build(e)(w) & Agent(e)(w) = m & Th(e)(w) = y]).

Much of the work in Landman (1992) and Higginbotham (2004) is to elucidate what "PROG" means in (38), involving an initiation and a continuation of events and so on. For our purposes, we can simply read that part of the formula as "a process of building of a house by Mary"). Adopting a semantics for the Progressive like the one in (38), let's see what a suitably modified Hacquard-like account would look like (examples (39)-(46)):

(39)   [TP Past [AspectP Prog [ModP can/para [VP Antara dance]]]]

(40)   [[39]]$^{w, f, g, c}$ = true iff
        $\exists e'[e'$ in w & $\tau(e') < t_c$ & $\exists w' \in$ Best($\cap f(w)$): PROG(e')(w')(λe[Antara-dance(e)(w')])], iff
        There is a past event e' in w_0 s.t. in some world w' compatible with the circumstances in w_0, e is a process of Antara dancing.

(41)   [TP Past [AspectP Prog [ModP can/para [VP Antara bake a cake]]]]

(42)   [[41]]$^{w, f, g, c}$ = true iff
        $\exists e'[e'$ in w & $\tau(e') < t_c$ & $\exists w' \in$ Best($\cap f(w)$): PROG(e')(w')(λe[Antara-bake-a-cake(e)(w')])], iff
        There is a past event e' in w_0 s.t. in some world w' compatible with the circumstances in w_0, e is a process of Antara baking a cake.

(43)   [TP Present [AspectP Prog [ModP can/para [VP Antara dance]]]]

(44)   [[43]]$^{w, f, g, c}$ = true iff
        $\exists e'[e'$ in w & $\tau(e') \approx t_c$ & $\exists w' \in$ Best($\cap f(w)$): PROG(e')(w')(λe[Antara-dance(e)(w')])], iff
        There is a current event e' in w_0 s.t. in some world w' compatible with the circumstances in w_0, e is a process of Antara dancing.

(45)   [TP Present [AspectP Prog [ModP can/para [VP Antara bake a cake]]]]

(46)   [[46]]$^{w, f, g, c}$ = true iff
        $\exists e'[e'$ in w & $\tau(e') \approx t_c$ & $\exists w' \in$ Best($\cap$f(w)): PROG(e')(w')(λe[Antara-bake-a-cake(e)(w')])], iff
        There is a current event e' in w_0 s.t. in some world w' compatible with the circumstances in w_0, e is a
        process of Antara baking a cake.

The result of the interpretations, plus PED yields the actuality entailments we are after. This is possible because the
predicate PROG contains an event argument that is grounded in the world of evaluation. A well-supported analysis
of the Progressive, with an extensional component, thus explains the phenomenon we are after, in line with
Hacquard's general analysis of actuality entailments.

6   Actuality entailments with root modals with other aspects: the case of the Perfect

Actuality entailments appear with Bangla modals also in the Perfect. This shouldn't be surprising given the standard
analyses of the Perfect, but there are languages where the Perfect apparently doesn't yield actuality entailments, e.g.,
French (Hacquard 2016). It is possible that the French perfect, for example, has different properties from the Perfect
in Bangla. The paradigm is stated in (47)-(54).

(47)   Antara naʧ-ţe   pere-ʧʰ-Ø-e,   (#kinţu naʧ-e   ni   )
        Antara dance-INF can-PERF-PRES-3   but   dance-3   not-PERF
        "Antara has been able to dance, (#but didn't dance)"

(48)   Antara naʧ-ţe   pere-ʧʰ-il-o,   (#kinţu naʧ-e   ni   )
        Antara dance-INF can-PERF-PAST-3   but   dance-3   not-PERF
        "Antara had been able to dance, (#but didn't dance)"

(49)   Antara-ke naʧ-ţe   hoe-ʧʰ-Ø-e,   (#kinţu naʧ-e   ni   )
        Antara-DAT dance-INF   be-PERF-PRES-3   but   dance-3   not-PERF
        "Antara has had to dance, (#but didn't dance)"

(50)   Antara-ke naʧ-ţe   hoe-ʧʰ-il-o,   (#kinţu naʧ-e   ni   )
        Antara-DAT dance-INF   be-PERF-PAST-3   but   dance-3   not-PERF
        "Antara had had to dance, (#but didn't dance)"

(51)   Antara cake bana-ţe   pere-ʧʰ-Ø-e,   (#kinţu bana-e   ni   )
        Antara cake make-INF can-PERF-PRES-3   but   make-3   not-PERF
        "Antara has been able to bake a cake, (#but hasn't baked a cake)"

(52)   Antara cake bana-ţe   pere-ʧʰ-il-o,   (#kinţu bana-e   ni   )
        Antara cake make-INF can-PERF-PAST-3   but   make-3   not-PERF
        "Antara had been able to bake a cake, (#but didn't bake a cake)"

(53)   Antara-ke cake bana-ţe hoe-ʧʰ-Ø-e,   (#kinţu bana-e   ni   )
        Antara-DAT cake make-INF be-PERF-PRES-3   but   make-3   not-PERF
        "Antara has had to bake a cake, (#but didn't bake a cake)"

(54)   Antara-ke cake bana-ţe hoe-ʧʰ-il-o,   (#kinţu bana-e   ni   )
        Antara-DAT cake make-INF be-PERF-PAST-3   but   make-3   not-PERF
        "Antara had had to bake a cake, (#but didn't bake a cake)"

Assume an analysis of the Perfect as argued for in Kamp & Reyle (1994), and Higginbotham (2008), with some
modifications (55-56).

(55)   Antara has baked a cake.

(56) $\exists e'[$ e' is in w & $\tau(e') < t_c$ & $\exists e[$ e is in w & Res(e')(e)(w) & Antara-bake-a-cake(e)(w)]]

The Perfect is assumed to differ from the Perfective in making reference to an event that results from another event (a resultant state). As before, because the events are anchored to the actual world, one expects an actuality entailment (57-60).

(57)   [TP Present [AspectP Perf [ModP can/para [VP Antara dance]]]]

(58)   [[57]]$^{w, f, g, c}$ = true iff
        $\exists$e'[e' in w & τ(e') ≈ t_c & $\exists$e[e is in w & Res(w)(e')(e) & $\exists$w'∈Best(∩f(w)): Antara(w')(e)]], iff
        There is a current event e' in w_0 s.t. in some world w' compatible with the circumstances in w_0, e' is the result of an event of Antara dancing.

(59)   [TP Past [AspectP Perf [ModP can/para [VP Antara dance]]]]

(60)   [[59]]$^{w, f, g, c}$ = true iff
        $\exists$e'[e' in w & τ(e') < t_c & $\exists$e[e is in w & Res(w)(e')(e) & $\exists$w'∈Best(∩f(w)): Antara(w')(e)]], iff
        There is a past event e' in w_0 s.t. in some world w' compatible with the circumstances in w_0, e' is the result of an event of Antara dancing.

The other cases can be derived simultaneously, as before.

7   A Note on Modal Expressions with Futurate Readings of the Progressive[2]

It is well known that in many languages sentences in the Progressive, as well as some other aspects/tenses, have what are called "futurate" readings. Examples (61) and (62) from Copley (2008) are illustrative of the phenomenon:

(61)   The Red Sox play the Yankees tomorrow. (Copley 2008: 261, ex. 1a)
(62)   The Red Sox are playing the Yankees tomorrow. (Copley 2008: 261, ex. 2a)

There are various restrictions on when futurate readings arise: e.g., the sentences corresponding to (61)-(62) with "play" replaced with "defeat" are decidedly odd, as Copley notes, pointing out that the reason for the difference has to do with the fact that matches are usually planned by some agent beforehand, whereas the outcomes are not (unless it is presupposed that a match is fixed, in which case the sentences with "defeat" improve on a futurate reading). In Bangla, sentences in the simple present tense cannot have futurate readings, but sentences in the progressive can, as illustrated by (63)-(64):

(63)   # Mohun Bagan ar   East Bengal kal   kʰæl-Ø-e
        Mohun Bagan and East Bengal tomorrow play-PRES-3
        "Mohun Bagan and East Bengal play tomorrow" (intended reading, unavailable in Bangla)

(64)   Mohun Bagan ar   East Bengal kal   kʰel-ʧʰ-Ø-e
        Mohun Bagan and East Bengal tomorrow play-PROG-PRES-3
        "Mohun Bagan and East Bengal are playing tomorrow"

Sentences containing modals can also appear with the Progressive and get a futurate interpretation, as illustrated by (65)-(66):

(65)   Mohun Bagan ar   East Bengal kal   kʰel-ṭe   par-ʧʰ-Ø-e
        Mohun Bagan and East Bengal tomorrow play-INF can-PAST-PRES-3
        "Mohun Bagan and East Bengal can play tomorrow" (lit., *are being able to play*)

(66)   Mohun Bagan ar   East Bengal-ke kal   kʰel-ṭe   ho-ʧʧʰ-Ø-e
        Mohun Bagan and East Bengal-DAT tomorrow play-INF be-PROG-PRES-3
        "Mohun Bagan and East Bengal must play tomorrow" (lit., *being to play*)

And it is perhaps not surprising, that the actuality entailment disappears in these examples. So (65)-(66) can have the continuation in (65'), without a judgement of contradiction:

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[2] This section is prompted by remarks from Ashwini Deo at the Conference, who also observed that facts similar to the ones being reported here also obtain in Marathi (a language where modals can take the Progressive Aspect, like Bangla).

(65')   kinṯu kʰel-tʃʰ-∅-e   /kʰel-b-e   na
          but   play-PROG-PRES-3/play-FUT-3 not
          "... but won't play"

Thus on the futurate interpretation, (65) simply means that Mohun Bagan and East Bengal are permitted to play tomorrow, and (66) simply means that they are required to play tomorrow (deontic/teleogical). It is easy to see that neither meaning requires the actualization of a process.

    To see matters a little more clearly, suppose we adopt an analysis of futurate sentences along the lines of Copley (2008), whereby the futurate reading comes about because of the presence of an operator (FUTRT(p)) with the following semantics (Copley 2008: 271):

" (30)   a. *Direction Presupposition*
           The director has the ability to ensure that p happens.
       b. *Commitment Assertion*
           The director is committed a p-eventuality happening."

Given this semantics, the semantics of the futurate readings with the modals can be paraphrased as (67) and (68) respectively:

(67)   Presupposition: The director has the ability to ensure that Mohun Bagan and East Bengal
        playing is permitted
        Assertion: The director is committed to MB and EB playing be permitted.

(68)   Presupposition: The director has the ability to ensure that it be obligatory/necessary for
        some goal, etc, that Mohun Bagan and East Bengal play.
        Assertion: The director is committed to it being obligatory, necessary, etc. that MB and
        EB play.

Note that because the PROG predicate is in a modal context given by the futurate semantics, its first event variable is not anchored to the world of evaluation, in neither the presupposition nor the assertion, and hence, it's predicted that no actuality entailment of any kind should arise. The reasoning is exactly the same as with the Imperfective, whose Gen operator bound the event variable coming from the verb (see the contrast between (25) and (28) above), leading to a loss of the actuality entailment.

8   A puzzle and a loose end

I observed earlier that the actuality entailments with the necessity modal meaning expressed by the infinitive+copula is exactly the same as with the possibility modal *para*. This is largely true, except for one puzzling case, viz., the morphological present tense, illustrated by (69)-(71).

(69) Antara natʃ-ṯe   par-∅-e,   (kinṯu natʃ-∅-e   na)
    Antara dance-INF   can-PRES-3   (but   dance-PRES-3 not)
    "Antara can dance, but doesn't dance"

(70) Antara-ke   natʃ-ṯe   hɔ-b-e,   (kinṯu natʃ-b-e   na)
    Antara-DAT dance-INF be-FUT-3   (but   dance-FUT-3 not)
    "Antara has to dance, but she won't dance"

(71) Antara-ke   natʃ-ṯe   hɔ-∅-e,   (#kinṯu natʃ-∅-e   na)
    Antara-DAT dance-INF be-PRES-3   (but   dance-PRES-3 not)
    "Antara has to dance, but she doesn't dance"

Present tense is generic, and yet there seems to be an actuality entailment. This may well be because it is a characterizing necessity statement and they require at least some instantiating examples.

9   Summary

In this paper, I looked at modal-aspect interactions in Bangla, an Indo-Aryan language with a view to a proper analysis of the so-called actuality entailments. I presented novel data with possibility and necessity modals with the Progressive and Perfect aspects that have not been discussed much in the literature, and showed that they carry a species of actuality entailments that can be explained on Hacquard's theory of modal-aspect interactions: a theory that crucially involves event-relativity of modals.

Acknowledgements

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