Latent homomorphism and content satisfaction: The double life of Turkic auxiliary —(İ)p bol—

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Abstract This paper argues that the Turkic auxiliary construction *–(İ)p bol–*, at least in Uyghur and Uzbek, is actually a pair of auxiliaries with distinct meanings. The first auxiliary is described as expressing 'full completion' of the event, but its use is highly restricted, to events with incremental or universally quantified themes. Using targeted context-based elicitation, we find that the expression of completion is indirect. Instead, the auxiliary asserts that the event description is homomorphic— all of its events are both event-mapped and theme-mapped. Homomorphism requires every part of the theme to undergo a part of the event, and this derives the reported sense of completion.

The second auxiliary is not attested in the literature. It applies to all kinds of events, and adds the conventional implicature that the event as described satisfies some salient propositional content by rendering it true. For instance, it makes part of a plan come to fruition. This plan is presupposed, and the content is accessible through a content-generating function.

We apply the methodologies of formal semantic fieldwork to tease these auxiliaries apart, including scope tests that apply differently to the two auxiliaries. Having distinguished them, we suggest new ways to typologically distinguish Turkic auxiliaries and auxiliaries cross-linguistically.

1   Introduction

This paper makes a seemingly pedestrian claim: That the Auxiliary Verb Construction *-(İ)p bol-*, found in several Turkic languages, is actually ambiguous between two identical auxiliaries. However, this claim belies several important consequences about our understanding of auxiliaries.[1]

Most research on auxiliaries is typological and diachronic in nature, focusing on their path to grammaticalization (Heine 1993; Kuteva 2001; Anderson 2006). These studies rely on descriptive research to provide a clear and precise synchronic understanding of what auxiliaries mean and how they function, inasmuch as we can treat them as a single class of objects. However, recent developments in formal semantics have shown for a number of phenomena that these descriptions are vague and need to be explored in greater depth (Matthewson 2017). These developments also show that once such exploration is made, new discoveries and new types of semantic typology emerge (Matthewson 2004; Rullmann et al. 2008).

We contend that in the case of Turkic Auxiliary Verb Constructions, these descriptions are too vague to permit as clear an understanding as we need to figure out how auxiliaries become auxiliaries.

We also open up a line of formal semantic research on auxiliaries. To date, such research has almost exclusively covered modal auxiliaries, abstracting from their status as auxiliaries to focus on their modality. What little discussion that has occurred has been fairly superficial in nature. Anderson (2006) finds that auxiliaries can be semantically classified into one of several functional types: Tense-Aspect-Modality, polarity and negation, voice, direction and orientation, and also adverbial functions like degree. These functional types correspond roughly to semantic types.

1.1   Turkic Auxiliary Verb Constructions

The Auxiliary Verb Construction in Turkic (AVC) is a major feature of most of the languages in the group. An AVC is built by impressing a lexical verb to serve as an auxiliary to a verb phrase marked by a participial or converbial form.[2] Ibrahim

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[1] Abbreviations and glossing convention: The glossing follows the Leipzig guidelines. Language names are referred to with ISO-639-3 abbreviations. 1, 2, 3: person marking, ACC: accusative case/object marking, AOR: aorist tense, V$_{AUX}$: auxiliary form, CAUS: causative, CNV: converb, COP: copula, DAT: dative/allative case, EVID: indirect evidentiality, GEN: genitive/possessive case, IPFV: imperfective aspect, LOC: locative case, NEG: negative, OPT: optative mood, PAST: direct past tense, P: plural agreement, PL: plural noun, POSS: possessor agreement, PRES: present tense, RECIP: reciprocal, Q: yes/no question marker S: singular agreement.

[2] AVCs go by many names in the literature: Auxiliary verbs, light verbs, compound verbs, descriptive auxiliaries, descriptive verbs, postverbs, aspectual verbs, helping verbs/Hilfsverben/yardım fiiller/yardemchi pé'il, and so on. Many of them fit Butt's (2009)'s definition of light verb. We

([1995]: 40) claims that speakers simple forms to assert the mere existence of an event, while AVCs are used to add specific information as they see fit, noting that "Compound verbs [AVCs] are more frequently used than non-compound verbs, especially in the spoken language."

(1) **Surface pattern:** [Verb phrase]–non-finite marker **Auxiliary**-TAM

(2) **Uyghur** (uig) -(*İ*)*p baq-* 'try to' (> *baqmaq* = to look at)

    *Kitab-ni   oq-**up**   **baq**-tim.*
    book-ACC read-CNV try$_{\text{AUX}}$–PAST:1S

    'I tried to read the book.'

On occasion the auxiliary is employed with its lexical verbal meaning (3a), but usually, the lexical verb's meaning is bleached and the AVC itself is idiomatic. For instance, the Uyghur AVC with the converb -(*İ*)*p*[3] and the verb *tashlamaq* 'to throw, drop' combines (in (3b)) to give a sense that the verb took place suddenly and involuntarily. In citation form, the lexical meaning of the impressed auxiliary verb will be given in square brackets.

(3)   a. -(*İ*)*p kel-* [come] 'come while doing'

       uig · *Men kül-**üp**   **kel**-dim.*
            I   laugh-CNV **come**-PAST:1S

           'I came laughing.'

   b. -(*İ*)*p tashla-* [throw, drop] 'event is sudden and involuntary'

       uig · *Men kül-**üp**   **tashli**-dim.*
            I   laugh-CNV **remain**-PAST:1S

           'I laughed involuntarily.'

AVCs remind one of phrasal verbs in English or particle verbs in German in the following way: The verb combines with a lexical item of a distinct category whose meaning is generally bleached to form an apparent lexical unit. For instance, Kazakh (kaz) -(*İ*)*p al-* [take] means 'do for one's benefit', while -*A al-* [take] means 'be able to'. One difference between phrasal verbs and AVCs is that with the latter, the verb itself is not part construction; any semantically compatible verb can be used.

Descriptive material on Turkic languages, increasingly written by native-speaker linguists, lists dozens of AVCs and examines them in varying levels of detail. AVCs

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sidestep that debate. The AVC involves auxiliary verbs that seem to form a construction with the non-finite marker on the main verb, so we will use the term Auxiliary Verb Construction, a term we intend atheoretically.

[3] The capitalized vowel in -(*İ*)*p bol-* reflects the standard method in Turkic linguistics of marking the possibility of vowel harmony.

are attested as far back as the earliest Turkic texts, the 8th century Orkhon inscriptions. Some of them have kept their form and meaning from early times unto the present (4). Every Turkic language still employs AVCs routinely, although they are not as numerous in the Oghuz languages.

(4)   *-(İ)p ber-* [give] 'the event benefits someone besides the subject'

Old Turkic (otk), from the Mongol-era *Maitrimisit*

otk · *bašla-**p**   **ber**-iŋ*
      start-CNV give$_{\text{AUX}}$–IMPER.2S
      'Do us a favor and start.' (Erdal 2004: 261)

Reflecting the importance of AVCs in Turkic languages, a description of their meanings features in every Turkic reference grammar. However, the descriptions remain fairly vague, in two ways. First, the terminology in the descriptions is not always clear, so it is difficult to determine the extent to which AVCs correspond across languages. Second, the descriptions discuss what these forms 'express', but none specify the semantic or pragmatic nature of that expression. Can it be broken down into parts? Are those parts asserted, presupposed, or implicated? What is the compositional structure, which helps determine what the arguments are? Does the AVC entail anything? These questions are crucial, as we can see with the case of Uyghur *-İp baq-*. This AVC is translated as 'try to'. However, with many predicates, it entails success, while English *try to* never does. Hahn (1991: 613) suggests that this AVC expresses an action undertaken with uncertainty about the outcome. Perhaps, then, a better English translation is 'give VP a try'.

(5)   uig · *Boston-gha bér-**ip**   **baq**-tim.*
              B.-DAT   go-CNV look$_{\text{AUX}}$–PAST:1S
              'I gave going to Boston a try.'

1.2   The focus of this paper

In this paper, we will not cover a broad array of AVCs or languages; that would require one or several books. In fact, we will focus on a precise target: The single AVC *-(İ)p bol-* in Uyghur and Uzbek (where it is *-(i)b bo'l-*), with an emphasis on Uyghur.

This AVC is built with the converbial *-İp/ib*, which when used by itself indicates sequential conjoined action (6a), and the impressed verb *bol/bo'l-* 'be, become' (6c).[4]

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[4] The Uzbek language has employed the Latin orthography since the 1990's, but earlier texts used a Cyrillic-based one, and some still do. In sources that are transliterated from the Cyrillic orthography, this auxiliary is spelled *bŭl*.

(6)   a. uig · *Ali öy-ge   kél-**ip**,   tapshuruq ishle-**p**, andin   tamaq*
                A. house-DAT come-CNV, homework do-CNV, and then food

        yé-di.
        eat-PAST:3S

           'Ali came home, did his homework, and ate some food.'

   b. uzb · *Murodjon gugurt chaq-**ib**   vikluchatel-ni top-di.*
           M.   match strike-CNV switch-ACC   find-PAST:3S

           'Murodjon struck a match and found the switch' (Bodrogligeti 2003: 1179)

   c. uig · *Ali oqutquchi **bol**-di.*
      uzb · *A.   muallim   **bo'l**-di.*
           Ali teacher   become-PAST.3S

           'Ali became a teacher.'

Together, these parts combine non-compositionally to form a new meaning, and they cannot be divided. We thus treat the AVC *-(İ)p bol-* as a single morpheme. At first glance, we see a clear consensus on this AVC's meaning: It indicates that the described event was fully completed.

(7)   Uyghur *-(İ)p bol-*

    Hahn (1991: 613)   action is completed, being an accomplished object
    Ibrahim (1995: 127, 132)   expresses a (completely) finished action
    Tömür (2003: 425)   carried out in full, or related to all relevant objects
    Bridges (2008: 37)   the action definitely happened and was completed

(8)   Uzbek *-(i)b bo'l-*

    Kononov (1960: 261)   expresses full completion, or end of the performance steps
    Ibrahim (1995: 206)   expresses a (completely) finished action
    Schamiloğlu (1996: 158)   full completion of action
    Bodrogligeti (2003: 725)   the action expressed by the main verb is fully completed
    Landmann (2010: 86)   bringt das Beenden einer Handlung zum Ausdruck

(9)   Kazakh *-(İ)p bol-*

    Somfai Kara (2002: 49)   expresses the completion of the event
    Muhamedowa (2016: 117)   signals the completed event

Given this consensus, one might feel there is little about *-(İ)p bol-* for us to add. However, several facts cloud this clear picture and warrant a thorough exploration. First, it is not clear what 'full completion' means, given that any sentence with *-(İ)p bol-* could have been truthfully expressed without *-(İ)p bol-* (10). At the very

least, we will need to employ a formal perspective to understand precisely what the completion reading is expressing.

(10) a. uig · *Men bu hékayi-ni oqu-**p**   **bol**-dum.*
       uzb · *Men bu hukoya-ni o'q-**ib**   **bo'l**-dim.*
            I   this story-ACC read-CNV becomeₐᵤₓ-PAST:1S
            'I read this story.'

    b. uig · *Men bu hékayi-ni oqu-**dum**.*
       uzb · *Men bu hukoya-ni o'qu-**dim**.*
            I   this story-ACC read-PAST:1S
            'I read this story.'

Second, some sources indicate that *-(İ)p bol-* can express modal possibility (11). However, this is limited to cases where the auxiliary is marked with the aorist/present. These will be discussed in more detail in section 2.5.

(11) a. uig · *Men bu hékayi-ni oqu-p   **bol-mas**=men.*
            I   this story-ACC read-CNV becomeₐᵤₓ-AOR.NEG=COP.1S
            'I cannot read this story'

    b. uzb · *Hozirgi zamon-da har kim-ga   ishon-ib*
            present time-LOC every person-DAT believe-**CNV**
      bo'l-adi=mi?*
      becomeₐᵤₓ-PRES.3S=Q
            'In our times is it possible to believe anyone?' (Bodrogligeti 2003: 725)

Third, and most importantly, full completion does not always matter for *-(İ)p bol-*. In many cases, it depends on the context. For instance, a sudden cough does not license *-(İ)p bol-* even if it is completed, but a cough conducted as part of a routine (men's) medical physical exam does.

(12) uig · *Yötil-**ip**   **bol**-dum.*
    uzb · *Yo'tal-**ip**   **bo'l**-dim.*
         cough-CNV becomeₐᵤₓ-PAST:1S
        'I coughed.' (discussing my physical)

In the rest of this paper, we will restore clarity to *-(İ)p bol-* by dividing its meaning into two readings. The first is the "full completion" reading seen in the literature, and the next section will lay out the exact semantics that brings about that reading. The second reading is what we call "content satisfaction." This previously unattested reading expresses that the event as described satisfies some contextually

salient propositional content, like the steps of a physical exam. Section three will discuss this in detail, especially the differences between the readings that require us to consider them to be provided by distinct morphemes. Section four will formalize this reading's meaning and situate the auxiliary in the phrase structure.

1.3 The methodology for this project

The findings of this paper rely on targeted context-based elicitation. With this method (Matthewson 2004; Bochnak & Matthewson 2015), the investigator provides a specific scenario to a native speaker to use as a context for judgment or translation, rather than asking for translations or general statements of meaning, like "Can you say this?" or "Does this mean the same thing as that?" This method relies on the observation that the meaning of linguistic expressions depends largely on the real-world conditions that make it a true description. As a corollary of this observation, semantic judgments are most informative when the investigator knows which truth-conditions the speaker is using. Since we cannot read minds, we provide the speaker with those conditions.

Providing a context is especially crucial for a study like this, where context matters. If you simply ask a speaker how to say 'I coughed', they will give you a sentence without *-(İ)p bol-*, like *Yöteldim* in Uyghur. If you then ask if it's possible to say that with *-(İ)p bol-* (*Yötelip boldum*), they will reject it, and we linguists would mark it as ungrammatical. As it turns out, the phrase is perfectly grammatical, but relies on a specific sort of context to be true.

> Context:
> Imagine you had a physical exam and had to cough for it. Later, you
> tell me:

In this case, we can ask for a translation of 'I coughed' given this context, or to judge the targeted expression for truth, not grammaticality. We can also offer targeted expressions we expect to be false, and thus gain negative evidence if our expectations are correct.

For this study, we consulted with two native speakers of Uzbek who studied at our campus. For the Uyghur data, we mainly relied on a native speaker investigator, whom we grilled mercilessly with context after context. Some of the examples were gathered in Uyghur after we lost access to the Uzbek speakers, so they are only confirmed for Uyghur.

2   Full completion derives from homomorphism

This section argues that the full completion reading of *-(İ)p bol-*, which is widespread in the literature, is derived from an actual meaning of homomorphism. Our argument begins with a question: When we say 'full completion', what is actually being completed? We can begin to answer this when we explore a crucial limit on this reading: It only applies when the event's theme has distinguishable parts across which the event is distributed.

2.1   Limited to incremental and universal themes

Tömür mentions the use of *-(İ)p bol-* to express an event 'related to all relevant objects', as his example in (13) shows. He is a native speaker of Uyghur, so his judgment seems like an intuitive clarification of what 'full completion' means.

(13)   *Kél-idighan-lar-ning hemmi-si   kél-**ip**   **bol**-di,*
       come-IPFV-PL-GEN   everyone-3S.POSS come-CNV become$_{\text{AUX}}$-PAST:3
       majlis-ni   bashla-yli
       meeting-ACC begin-OPT.1P
       'All who are coming have arrived, so let's begin the meeting.'

Building off his observation, if we look through the literature we do see a pattern: Every attested instance of *-(İ)p bol-* involves a verb phrase where the theme is incremental or universally quantified. The literature tends to have theme subjects (13), but it is easy to elicit cases with a theme object.

> Context: You jump out of a plane to skydive. But your parachute doesn't open and you land hard, breaking all your bones. Miraculously surviving, you tell your friend about it later:

(14)   uig · *Men hemme ustixan-lir-im-ni   sun-dur-**up***
       uzb · *Men hamma suyak-lar-im-ni   sin-dir-**ib***
             I   all   bone-PL–1S.POSS-ACC break-CAUS–CNV
       ***bol**–dum!*
       ***bo'l**–dim!*
       become$_{\text{AUX}}$–PAST:1S
             'I broke every bone in my body!'

Incremental themes are themes with distinguishable parts such that the event fully applies to each of those parts (Dowty 1979; Krifka 1992). For instance, the predicate *eat the bread* has an incremental theme, because to eat the entire piece of

bread, you must each each part of it. As we expect, *-(İ)p bol-* works well with this predicate.

(15)   uig · *Men nan-ni*   *ye-**p***   ***bol**-dum.*
       uzb · *Men noʻn-ni*   *ye-**b***   ***boʻl**-dim.*
            I   bread–ACC eat–CNV become_{AUX}–PAST:1S
            'I ate the (whole) bread.'

On the other hand, stative predicates and events that lack incremental themes reject *-(İ)p bol-*.

(16)   a. uig · *#Déngiz-gha besh minut   qara-**p***   ***bol**-dum.*
          uzb · *#Dengiz-ga   besh daqiqa qara-**b***   ***boʻl**-dim.*
               sea–DAT   five   minute look at–CNV **bol**–PAST:1S
               'I looked at the ocean for five minutes.'

       b. uig · *#Men bayliq   tép-**ip***   ***bol**-dum.*
          uzb · *#Men xazina   top-**ib***   ***boʻl**-dim.*
               I   treasure find–CNV become_{AUX}–PAST:3S
               'I found the treasure.'

       c. uig · *#Put-um-ni   sun-dur-**up***   ***bol**-dum.*
          uzb · *#Oyog'-im-ni sin-dir-**ib***   ***boʻl**-dim.*
               leg-1S–ACC   break–CAUS–CNV become_{AUX}–PAST:1S
               'I broke my leg.'

Crucially, it does not suffice for the event itself to be incremental. Incremental events like traveling along a path, do not license *-(İ)p bol-*.

(17)   uig · *#Korli-gha   bér-**ip***   ***bol**-duq.*
       uzb · *#Korla-ga   bar-**ib*** ***boʻl**-dik.*
            Korla–DAT go–CNV become_{AUX}–PAST:1P
            'We went to Korla.'

To account for these restrictions, we propose that *-(İ)p bol-* denotes an event description that is sensitive to the thematic relations and event structure of the event that it describes. We will first discuss the meaning semi-formally, with a fully formal discussion following.

2.2   Sensitivity to event structure

The exact nature of *-(İ)p bol-*'s sensitivity to event structure is fairly subtle. The use of *-(İ)p bol-* does not say that the event is completed, but rather that the event

description is homomorphic ([Krifka 1992](#)). Homomorphism is a property of verbs that have a theme argument and an event argument, *viz.* that the theme's parts and event's parts map to one another. Homomorphism can be broken down into two basic properties.

- **Mapping to the theme.** Every part of the entire event affects a distinct part of the theme in the same way the entire event affects the entire theme.[5]
- **Mapping to the event.** Every part of the theme undergoes a distinct part of the event in the same way that the entire theme undergoes the entire event.

We can think of *-(İ)p bol-* as expressing that the VP predicate is homomorphic. Incremental theme predicates are routinely homomorphic. If you have an event of 'eating the bread', every part of that event involves eating a part of the bread, and every part of the bread undergoes an eating event that is part of that. If you have an event of reading the entire book, every part of that event involves reading a part of the book, and every part of the book undergoes a part of the reading event.[6]

On the other hand, breaking your leg is not homomorphic, since it is not true that every part of your leg undergoes a breaking. Looking at the ocean for five minutes is not homomorphic, since it is not true that every part of the ocean undergoes a look. Going to Korla is not homomorphic because it does not involve each part of you going to Korla on its own; the increments are along the path.

Many predicates are ambiguous between an activity reading and an accomplishment reading, like *read War and Peace*. Either the event culminated at its intrinsic end, or it simply came to a stop. Using *-(İ)p bol-* removes this ambiguity, for the event must have culminated at its intrinsic end.

(18)   a. uig · *Kitab-ni   oqu–dum.*
            uzb · *Kitob-ne   oqu–dim.*
                  book–ACC read–PAST:1S

                  'I read the book.' (true if you read the book for a while, or if you read it all)

        b. uig · *Kitab-ni   oqu–**p**   **bol**–dum.*
            uzb · *Kitob-ni   oqu–**b**   **bol**–dum.*
                  book–ACC read–CNV become_{AUX}–PAST:1S

                  'I read the book.' (only true if you finished the book)

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[5] Krifka describes mapping to 'objects', but in more modern terminology would be called 'mapping to the (internal) argument', which with these predicates corresponds to the thematic theme.

[6] A common complaint about Krifka's vision of homomorphism (a complaint he was the first to make) is that the events seem to have extraneous parts. If you draw a circle, for instance, there might be an part of that event where you erase a stray line, but that part does not contribute to the truth-conditions of drawing a circle, so we ignore it. When we say 'every part', then, we have to be mindful that we really mean 'every part contributing to the truth of the whole'.

(19) a. uig · *Pirenik-ler-ni   ye-dim.*
          uzb · *Shirinlik-lar-ni ye-dim.*
                cookie-PL-ACC eat-PAST:1S

                'I ate the cookies.' (true if you did not finish the plate of cookies)

      b. uig · *Pirenik-ler-ni   ye**p**   **bol**-dum.*
          uzb · *Shirinlik-lar-ni ye-**b**   **bol**-dum.*
                cookie-PL-ACC eat-CNV become_AUX-PAST:1S

                'I ate the cookies.' (only true if you finished the plate of cookies)

(20) a. uig · *Kéme chök-ti.*
                ship   sink-PAST:3S

                'The ship sank.' (true whether part or all of the ship sank)

      b. uig · *Kéme chök-**üp** **bol**-di.*
                ship   sink-CNV become_AUX-PAST:3S

                'The ship sank.' (only true if all of it sank)

This disambiguation is even clearer with temporal interval modification. Simple forms are modified with simple modifiers, while *-(İ)p bol-*marked forms require a temporal modifier in the locative case.[7]

(21) a. ? *Besh **sa'et-te**   kitab-ni   oqu-dum.*
             five   hour-LOC book-ACC read-PAST:1S

             'I read the book in five hours.'

      b.   *Besh sa'et kitab-ni   oqu-dum.*
             five   hour book-ACC read-PAST:1S

             'I read the book for five hours.'

(22) a.   *Besh **sa'et-te**   kitab-ni   oqu-p   bol-dum.*
             five   hour-LOC book-ACC read-CNV become_AUX-PAST:1S

             'I read the book in five hours.'

      b. # *Besh sa'et kitab-ni   oqu-p   bol-dum.*
             five   hour book-ACC read-CNV become_AUX-PAST:1S

             'I read the book for five hours.'

We can see that the AVC *-(İ)p bol-* provides a sense of 'full completion' that disambiguates these cases, but we argue that it only provides it indirectly. Since the verb phrase with *-(İ)p bol-*is homomorphic, a predicate of reading the book with *-(İ)p bol-*is only true if every part of the event was a book-reading, and if every part

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[7] The use of locative-marked modifiers with ordinary verbs is grammatical but dispreferred, given the more informative use of *-(İ)p bol-*.

sentence	1	2	3	4	5	6
Kéme chökti.	F	T	T	T	T	T
Kéme chöküp boldi.	F	F	F	F	T	T

Table 1: Truth table for Figure 1.

of the book was read. It thus entails that the entire book was read, and we obtain a sense of completion. Without *-(İ)p bol-*, the predicate is not homomorphic, because in some of the events, it is not the case that every part of the book was read. This bleeds the completion entailment, and the completion reading does not necessarily arise.

A predicate like 'read the book' is not homomorphic by Krifka's definition, since homomorphism only applies if all the event-theme pairs map to each other's parts. There is only one possible mechanism for converting a non-homomorphic predicate into a homomorphic one: A subset relation. We have to divide predicates into those that are fully homomorphic and those that are partially homomorphic. A fully homomorphic predicate is one like Krifka describes. A partially homomorphic predicate is one where only some of the event-theme pairs map to each other's parts. The partially homomorphic predicate has a subset that is fully homomorphic, and some members that are not. The predicate without *-(İ)p bol-* is partially homomorphic, and *-(İ)p bol-* restricts the proposition to the largest homomorphic subset.

Let's consider a ship-sinking event to show what we mean. Figure 1 shows a number of ways that a ship can sink, from not at all (1) to all the way to the sea floor (6). The predicate without *-(İ)p bol-*, *Kéme chökti* 'the ship sank', is true whether the ship sank partway (pictures 2, 4, 5) or all the way (3,6). It's false in 1, since the boat has not sunk at all. The proposition with *-(İ)p bol-*, *Kéme chöküp boldi*, is only true if every part of the ship sank (pictures 3,6). Notably, *-(İ)p bol-* is not made true by the ship sinking all the way to the seabed where it can sink no further (as in 5,6). It only applies when every part of the ship has sunk.

—figure 1 is to be placed here if possible—
– table 1 is to be placed here if possible—

What this tells us is that 'the ship sank' in Uyghur is partially homomorphic. Theme-event pairs like 2,4, 5 are not, but theme-event pairs like 3 and 6 are. The use of *-(İ)p bol-* says 'this is homomorphic', and rules out the non-homomorphic pairs. The only pairs left are those (3,6) where the entire ship sank. The meaning of *-(İ)p bol-* thus entails full completion but does not directly express it.
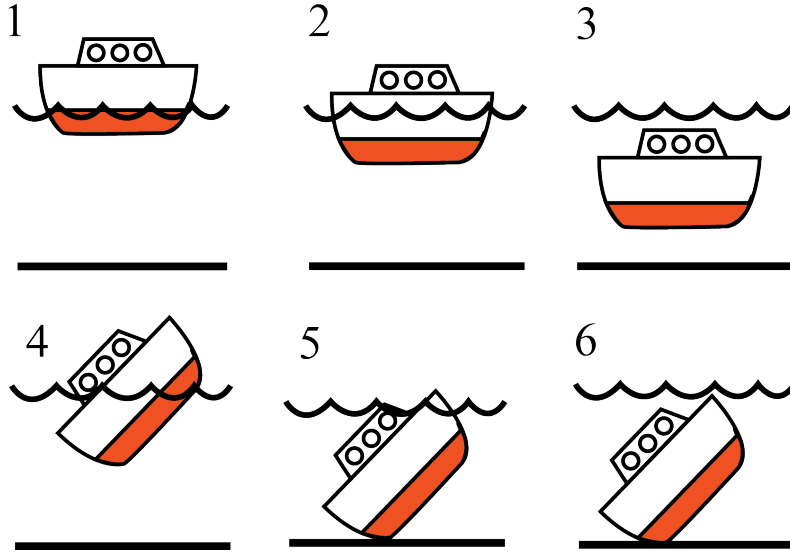
Figure 1: Some of the ways a ship can sink.

Expressing *-(İ)p bol-*'s meaning in terms of homomorphism not only derives the full completion reading, it also explains why it works with universally quantified themes. These too are partially homomorphic. In an event where 'everyone arrived', the universal quantifier is defined such that everyone in the salient group undertook an arrival event. If we consider their arrivals to be parts of the described event (which aspect links to tense), then the expression is effectively theme-mapped.
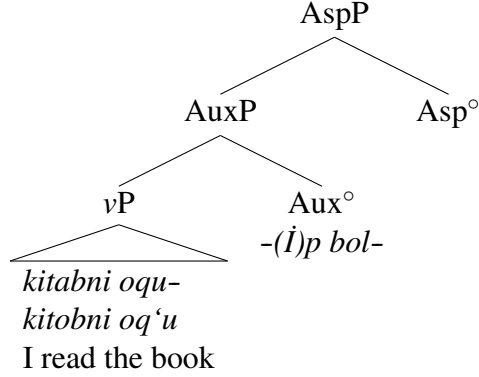
It is not necessarily event-mapped, however. The meaning of the universal quantifier only asserts that every part of the theme is mapped to a part of the event, but asserts nothing about the nature of the event, because the event parts are outside the quantifier's domain. Some of the theme-event pairs in which everyone arrived are homomorphic, some are not. This makes universally quantified expressions partially homomorphic, and they thus allow *-(İ)p bol-*. If *-(İ)p bol-* is used, then the event is theme-mapped: Every part of the event of 'everyone arrived' is mapped to a part of the theme. This rules out extraneous parts, and also seems to enforce distributivity.

2.3   A formal denotation for *–(İ)p bol–*

In this subsection we will lay out a formal analysis of *-(İ)p bol-*'s meaning that results in the intuitive meaning we detailed in the last subsection, and derives the relation between homomorphism and the full completion reading. We saw that -

-(İ)p bol- applies when the VP/*v*P is partially homomorphic, and ensures that the event itself is in the homomorphic part. For Krifka, homomorphism is defined on relations, but due to *-(İ)p bol-*'s syntactic position, we must also consider it to apply to event properties.

(23)

```
                                      AspP
                                     /     \
                               AuxP         Asp°
                              /     \
                           vP        Aux°
                          /   \      -(İ)p bol-
                   kitabni oqu–
                   kitobni oq'u
                   I read the book
```

This shift is not consequential for the semantics, because we observe that for any relation R that is fully homomorphic, and any of its possible themes x, we can describe the event property $R(x)$ as fully homomorphic as well.

Def. 1 Ontology

     i. D_e = the set of individuals (type e)
       D_s = the set of events (type s)
       D_i = the set of time intervals (type i)
       D_t = the set of truth-values (type t)
     ii. For any types σ, τ,
       $D_{\sigma,\tau}$ = the set of functions from type D_σ to D_τ (type $\langle\sigma,\tau\rangle$)

Def. 2 Homomorphism in event properties

     i. Let $\mathscr{H}_R$ be the set of fully homomorphic relations of type $\langle e, \langle s,t\rangle\rangle$
       Let $\mathscr{H}_P$ be the set of fully homomorphic event properties of type $\langle s,t\rangle$.
     ii. Define $\sqsubseteq$ as a part-of relation.
     iii. Let $\mathscr{M}_\varepsilon$ be the set of event-mapping event properties $R(x)$,
          such that $\forall e \in R(x), \forall y \sqsubseteq x \to \exists d \sqsubseteq e \wedge d \in R(y)$
       Let $\mathscr{M}_\theta$ be the set of theme-mapped event properties $R(x)$,
          such that $\forall e \in R(x), \forall d \sqsubseteq e \to \exists y \sqsubseteq x \wedge d \in R(y)$
     iv. Thus, $\mathscr{H}_P = \mathscr{M}_\varepsilon \cap \mathscr{M}_\theta$

Partially homomorphic relations and event properties are those that contain a proper subset that is fully homomorphic, and a non-empty subset that is not homomorphic.

Def. 3 Partial homomorphism

    i. A relation R is partially homomorphic if and only if:
        $R \notin \mathcal{H}_R \wedge \exists Q \subset R; Q \in \mathcal{H}_R$

    ii. A property of events P is partially homomorphic if and only if:
        $P \notin \mathcal{H}_P \wedge \exists Q \subset P; Q \in \mathcal{H}_P$

For consistency in our denotations, let us define two functions. MAXHS maps a set of events to its maximal homomorphic subset, and HOM allows us to use MAXHS in a composition.

Def. 4 Functions for denotations

    i. Define MAXHS as the function $f : D_{s,t} \rightarrow D_{s,t}$
$$\forall P \in D_{s,t}, f(P) =$$
$$\iota S \subseteq P; S \in \mathcal{H}_P \wedge \neg \exists Q \subseteq P; S \subset Q \wedge Q \in \mathcal{H}_P$$

    ii. Define HOM as the function $f : D_{s,t} \rightarrow \overline{D}_{s,t}$
$$\forall P \in D_{s,t}, f(P) = g : D_s \rightarrow D_t$$
$$\forall e \in D_s, g(e) = 1 \text{ iff } e \in \text{MAXHS}(P)$$

    iii. A set of events is fully homomorphic when $\text{MAXHS}(P) = P$
        A set of events is partially homomorphic when $\text{MAXHS}(P) \subset P$

Given these definitions, we can define *-(İ)p bol-* quite simply.

Def. 5 The denotation of *-(İ)p bol-* with the full completion reading

    $[\![\text{*-(İ)p bol-}_{FC}]\!] = \lambda P \in D_{st}.\lambda e \in D_e. \text{ HOM}(P)(e)$
    READ: *Given a property P and event e, e is in the largest homomorphic subset of P.*

The value condition of this denotation rules out any predicate that has no homomorphic event members at all, like states (which are not events), activities (which cannot be event-mapped), or achievements. These will never return a value of 'true' on this reading. Event properties with universally-quantified themes are compatible with *-(İ)p bol-*, even if the verb phrase describes an event that *-(İ)p bol-* cannot usually be used with, like arriving (13), or breaking a bone (14). The partial homomorphism comes from the effective theme-mapping imposed by universal quantifiers. Accessing this part structure requires lightly adjusting the meaning of universal quantifiers. Instead of the classic definition of 'everyone arrived' (24a), we get one that involves parts of a larger event.[8]

(24) $[\![[_{VP} \text{ *everyone arrived* }]]\!]$

    a. $\neq \lambda e. \forall x[\text{person}(x) \rightarrow \text{arrive}(x)(e)]$

---

[8] This approach has been taken in the situation semantics literature (Schwarz 2009).

b. $= \lambda e.\ \forall x[\ person(x) \rightarrow \exists e'[\ e' \sqsubseteq e\ \&\ arrive(x)(e')\ ]]$

The main event here (e) is necessarily theme-mapped, but not necessarily event-mapped, since its domain is not a set of events. In the case where everyone arrived, there may be parts of the main event *e* that do not involve the individuals picked out by the domain. Thus, the predicate itself is only partially homomorphic. Using *-(İ)p bol-* restricts us to the largest fully homomorphic subset of this predicate. In this subset, every person has an arrival, and every part of the main event is one of these arrivals. Within this event nothing else happened. Again, a 'full completion' reading is entailed, but not directly asserted. We note that it seems unlikely that the use of *-(İ)p bol-* in these cases is very informative, since the partially homomorphic use of the universal quantifier strongly implicates the fully homomorphic reading. This might explain why this use is not as common as the simple incremental use.

2.4   Interactions between *–(İ)p bol–* and negation

It is crucial to test any proposed denotation with sentential negation, since the result is predictable. The use of *-(İ)p bol-* indicates that the largest homomorphic subset of the predicate ($\text{MAXHS}(\llbracket\,vP\,\rrbracket)$) holds of the event. Negation thus indicates that the event is not in this subset. As we see in Figure 2, if an event is not in $\text{MAXHS}(\llbracket\,vP\,\rrbracket)$, it must either be in the rest of $\llbracket\,vP\,\rrbracket$ or not. That is to say, if *-(İ)p bol-* is negated, there is either a non-homomorphic event or no event at all.

—figure 2 is to be placed here—

Earlier we derived the full completion reading from homomorphism. Negating that homomorphism negates the full completion reading. An event in the non-homomorphic part of a partially homomorphic $\llbracket\,vP\,\rrbracket$ is necessarily incomplete. For instance, in the book-reading case, negation expresses that there was no homomorphic event (in the topic time) where I read the book. This statement is true in two kinds of conditions: Either there was no book-reading event at all, or there was a non-homomorphic event of book-reading. Book-readings are necessarily theme-mapped; every part of the event is the reading of a part of the book. Therefore, if a book-reading is not homomorphic it is not event mapped, and some of the book is left unread.
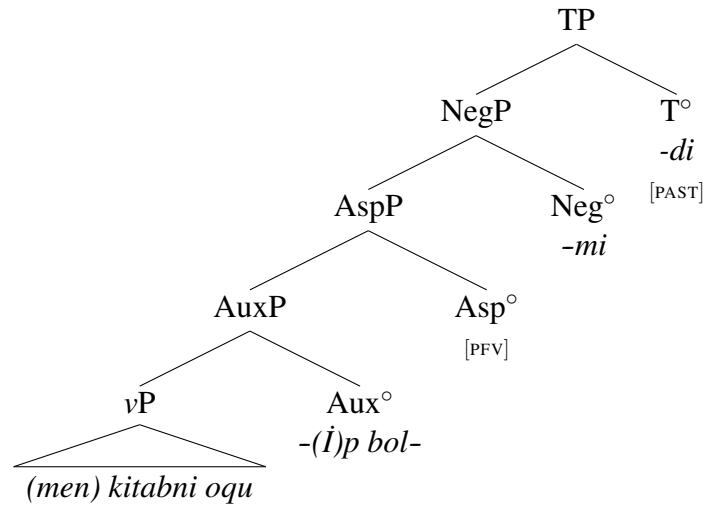
(25)   uig · *Kitab-ni   oqu-p   bol-**mu**-dum.*
        book–ACC read–CNV become_{AUX}–NEG–PAST:1S
        'I did not read the (whole) book.'
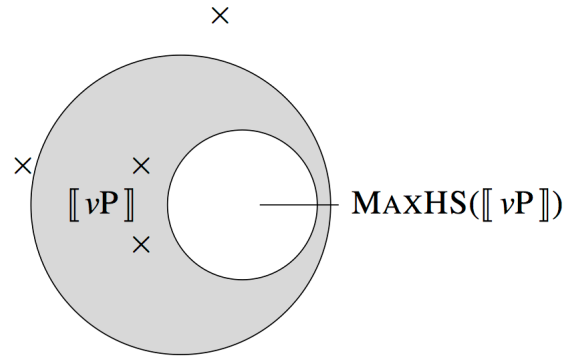
Figure 2: Some possible readings with negation (marked '×').

a.

b. $\lambda t \in D_i : \neg \exists e[\ time(e) \subseteq t\ \&\ [\text{Hom}([\![\textit{I read the book}]\!])](e)\ ]$

As we saw with the positive readings, the effect of completion or incompletion is indirect, due to the homomorphism of the predicate.

2.5   The aorist and ability readings

The use of *-(İ)p bol-* is compatible with all tenses and moods. With most of these, nothing remarkable occurs. However, with aorist marking, the AVC can undergo an apparent change in interpretation, to express possibility or impossiblity (11). This

reading is marked incidentally in a few sources (Tömür 2003; Bodrogligeti 2003). On the other hand, Anderson (2004) claims that *-(İ)p bol-* in Tuvan languages (where it is *-ip pol-*) only has a possibility reading and Bodrogligeti (2001) makes a similar claim for the medieval language Chagatay. However, all of these examples are in the aorist/present.[9]

What is the source of this reading? First, we note that the aorist can be used literally, in that it adds aorist/generic meaning to an *-(İ)p bol-* phrase. This suggests that the ability reading is a conversational implicature.

(26) uig · *Kéme chök-üp   bol-**ar**.*
            ship   sink-CNV become$_{\text{AUX}}$-AOR:3S
            'A ship sinks all the way' (*e.g.*, if it has a hole in the bottom)

(27) uig · *Kitab-ni   oqu-p   bol-**arman**.*
            book-ACC read-CNV become$_{\text{AUX}}$-AOR:1S
            'I (always) read a whole book' (when I have the time)

Second, that implicature is already present in the aorist without *-(İ)p bol-*, which often expresses possibility readings.

(28) uig · *Ete   yamghur yagh-**ar**.*
      kaz · *Erteŋ   žaeŋlbir žaw-**ar**.*   (Muhamedowa 2016: 199)
            tomorrow rain   rain-AOR:3S
            'It will rain tomorrow probably'

We conclude that the reading has to do with the modal nature of genericity as expressed by the aorist. In essence, if an event generally happens, it certainly can happen, and if it does not happen, it is easy to draw the implicature that it cannot happen. It may be the case that *-(İ)p bol-*-marked aorist verbs are especially prone to this implicature, although we do not venture a reason. It is clear, however, that *-(İ)p bol-* is not the source of the modality.

2.6   The full completion reading

This subsection required some intricate formal discussion, but intuitively the result is quite straightforward. The use and meaning of *-(İ)p bol-* to indicate full completion is derived through homomorphism. Speakers only apply *-(İ)p bol-* to incremental activities and universally quantified themes, which are partially homomorphic, in order to turn them into fully homomorphic predicates. The fact that

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[9] [name redacted for anonymity] confirms (p.c.) after a corpus search that in Tuvan, *-(İ)p bol-* is only ever found with the aorist/present.

homomorphism derives from theme-mapping and event-mapping is the source of speakers' sense of full completion: Every part of the theme is affected by the event, and every part of the event affects the theme.

We have accounted for the full completion reading in Uyghur and Uzbek. It is probable that our account works with other Turkic languages as well, and it demonstrates the value of carefully distinguishing a reading from the semantic truth-conditions that derive it. We will leave that question for future research. In the rest of this paper we dedicate our efforts to a very distinct reading of *-(İ)p bol-*.

3   Content satisfaction

The use of *-(İ)p bol-* to signal full completion is noted in nearly every descriptive source on Uyghur and Uzbek. However, direct elicitation finds a second meaning for *-(İ)p bol-*, which must be kept distinct from the full completion auxiliary, for three crucial reasons. First, its use is wholly dependent on the context. Second, it can be used with any predicate except states. Third, it is immune to negation and other scope-bearing items. We will propose in this section that this auxiliary does not assert homomorphism, but rather conventionally implicates that the event would satisfy some at-issue content.

3.1   Contextual effects and event types

We saw that *-(İ)p bol-* cannot be used with several types of eventualities. However, given the right context, it becomes perfectly felicitous with them.

Coughing events are classic semelfactives, and do not allow the 'full completion' *-(İ)p bol-*, since not every part of you coughed. However, if the cough is made to satisfy the demand of a doctor during a physical exam, *-(İ)p bol-* is felicitous.

(29)   uig · *Yötil-**ip**   **bol**-dum.*
       uzb · *Yo'tal-**ib**   **bo'l**-dim.*
              cough–CNV become_{AUX}–PAST:1S
              'I coughed'

Breaking one's leg is another semelfactive, and doesn't allow *-(İ)p bol-*, unless the context allows. In (30), breaking your leg as part of a plan is such a context.

> Context:
> You are due to fulfill army service, but don't want to do it. You hatched a plan to get out of military service by breaking your leg, and now you're telling your friend you've gone through with it.

(30) uig · *Put-um-ni   sun-dur-**up**   **bol**-dum.*
      uzb · *Oyog'-im-ni sin-dir-**ib**   **bo'l**-dim.*
              leg-1S-ACC break-CAUS-CNV become_{AUX}-PAST:1S
              'I broke my leg'

Outside of such contexts, these sentences are rejected outright. Indeed, (30) tended to make speakers laugh when given out of the blue.

Accomplishments are also acceptable with *-(İ)p bol-*. Merely going to a place does not license *-(İ)p bol-*, but if it is part of a pre-established itinerary, it does.

> Context:
> You and your son are traveling on a trip along the following itinerary :
>
> a. Hoten → Aqsu → Korla → Ürümchi (in Xinjiang for Uyghur speakers)
> b. Bukhara → Navoi → Samarkand → Tashkent (in Uzbekistan)
>
> Along the way, you get a call from your spouse, who is at home, where you started. They ask how it's going, and you reply:

(31) uig · *Korli-gha   bér-**ip** **bol**-duq.*
      uzb · *Samarqand-ga bar-**ib** **bo'l**-dik.*
              (city)-DAT   go-CNV become_{AUX}-PAST:1P
              'We went to Korla/Samarqand.'

If you have to take a detour away from the planned route, the event of the detour does not allow *-(İ)p bol-*.

> Same trip, but construction along the route requires you to take a different way. (Uyghur:) From Hoten to Aqsu you must instead pass around the desert through Kashgar. (Uzbek:) From Bukhara to Samarkand you must go south through Qarshi.

(32) uig · *#Qeshqer-ge bér-**ip** **bol**-duq.*
      uzb · *#Qarshi-ga   bar-**ib** **bo'l**-diq.*
              (city)-DAT   go-CNV become_{AUX}-PAST:1S
              'We went to Qashgar/Qarshi.'

Activities also license *-(İ)p bol-* in the right contexts. In (21) we saw that temporal adverbial NPs unmarked for case can be used to modify the duration of activities. Meanwhile the full completion use of *-(İ)p bol-* adds an accomplishment that requires locative case marking. In a context where an activity is prescribed, however, the activity remains, but *-(İ)p bol-* is allowed.

Context:
Your doctor prescribed for you to walk along the sea every day, and look at it for five minutes. You did so today.

(33) uig · *Déngiz-gha besh minut qara-**p**   **bol**-dum.*
      uzb · *Dengiz-ga besh daqiqa qara-**b**   **bo'l**-dim.*
            sea–DAT   five minute look at–CNV **bol**–PAST:1S
            'I looked at the ocean for five minutes.'

3.2   The two meanings cannot be combined

We can generalize over these contexts: They all involve some salient at-issue content, and express that the described event makes some of this content true. We say that it satisfies this content, so we call this reading **content satisfaction**. In section 4 we will discuss the details of this reading. Here we will show that the full completion and content satisfaction readings cannot be derived from a single vague morpheme, which means that the string *-(İ)p bol-* is ambiguous between two lexical items.

We have already seen that the content satisfaction reading is compatible with many event types that the full completion reading is not. More importantly, the proposition of content satisfaction is not part of the assertion. This can be ascertained with negation and other high scope-bearing expressions.

With the full completion reading, negation indicates that the event is not in the homomorphic subset of the $[\![vP]\!]$. In that case, the event is either true but not for the entire theme, or it is not true at all. We can schematize this relation as a $\wedge$ b : a is the assertion that the event happened at all, and b is the proposition that the event-theme pair is homomorphic. For the case of a ship sinking, that's 'it sank some' and 'it sank all the way'. Taking scope over a conjoined condition, negation should be able to negate either or both of these, and it does.

(34)   full completion: NEG [the ship sank *-(İ)p bol-*]

       uig · *Kéme chök-üp   bol-**mi**-di.*
             ship   sink–CNV become_AUX–NEG–PAST:3S
             'The ship did not sink.'

meaning	judgment	paraphrase
not (a) $\wedge$ b	F(alse)	it did not sink some, but it did sink all the way
a $\wedge$ not (b)	✓	it sank some, but it did not sink all the way
not (a) $\wedge$ not(b)	I(nfelicitous but true)	it did not sink some, and it did not sink all the way

With the content satisfaction reading, negation with *-(İ)p bol-* signals that the VP-event did not occur, but that it would have satisfied the content at issue. For instance, it works if you plan to break your leg to get out of army service, but never manage to, or have not yet done so. It cannot mean that you did break your leg but it does not satsify the content.

(35)   content satisfaction: NEG [I broke my leg *-(İ)p bol-*]

meaning	judgment	paraphrase
not (a) ∧ b	✓	I did not break my leg, but breaking my leg would satisfy the plan
a ∧ not (b)	#	I did break my leg, but breaking my leg would not satisfy the plan
not (a) ∧ not(b)	#	I did not break my leg, and breaking my leg would not satisfy the plan

Similar results emerge with epistemic modals like … 'maybe'. With the full completion reading, the modality can take scope over both the verb description and *-(İ)p bol-*. With the content satisfaction reading, the modality can only take scope over the verb description.

(36)   a.   full completion: maybe [Ali read the book *-(İ)p bol-*]

uig · ***Belki*** *Ali bu kitab-ni oqu-p   bol-di*
         maybe A. this book–ACC read–CNV become_{AUX}–past:3s
         'Maybe Ali read this book'

meaning	judgment	paraphrase
may (a) ∧ b	F	Maybe Ali read some of the book, but he did read the whole thing
a ∧ may (b)	✓	Ali did read some of the book, and he did read the whole book
may (a) ∧ may (b)	I	Ali may have read some of the book, and he may have read the whole book

   b.   content satisfaction: maybe [Ali broke his leg *-(İ)p bol-*]

meaning	judgment	paraphrase
may (a) ∧ b	✓	Maybe Ali broke his leg, but breaking his leg would satisfy the plan
a ∧ may (b)	#	Ali did break his leg, and breaking his leg might satisfy the plan
may (a) ∧ may (b)	#	Ali may have broken his leg, and breaking my leg might not satisfy the plan

Going further up the tree, evidential marking affects the FC reading of *-(İ)p bol-*, but not the CS reading. The report required for evidentiality need not include *-(İ)p bol-*.

> Context: You and your friend Samia know that Ali is trying to get out of army service by getting injured. Your other friend Ibrahim does not know this. But he saw Ali in a cast and knows that he broke his leg. Ibrahim told you *Ali putuni sundurdi* 'Ali broke his leg' without *-(İ)p bol-*. You tell Samia:

(37) uig · *Ali put-i-ni   sun-dur-up   bol-**uptu.***
         A. leg-3S–ACC break-CAUS–CNV become$_{AUX}$–PAST.EVID:3S

         'Ali broke his leg.' (I heard)

Incidentally, examples like this show that evidentials in Uyghur are modal in nature rather than illocutionary.

   Going even further up in the structure, we find that embedding under attitudes affects the FC reading, but not the CS reading. This fits in line with the CS content of *-(İ)p bol-* being immune to scope. It also demonstrates clearly that the difference between the two readings is not due to scope alone, since the attitude predicate is in a superordinate clause.

(38) uig · ***Men ishini-men   ki,*** *Ali put-i-ni   sun-dur-up*
         I   think-PRES:1S that, A. leg-3S–ACC break-CAUS–CNV

      bol-di.
      become$_{AUX}$–PAST:3S

         'I think that Ali broke his leg.'

meaning	FC	CS
I think (a) ∧ b	F	✓
a ∧ I think (b)	✓	#
I think (a) ∧ I think (b)	I	#

(39)   (a and I think(b))

   a. Full completion context accepted: You saw Ali doing his homework but
      didn't see him finish. Based on experience, though, you think he has
      finished.

   b. Content satisfaction context rejected: You know that Ali broke his leg,
      but don't know if there's a purpose. Knowing him well, you believe it's
      to get out of army service

(40)   (I think(a) and b)

   a. Full completion rejected: You saw Ali finish his homework, and you
      think he did it.

   b. Content satisfaction accepted: You know that Ali is trying to get out of
      army service, and you heard he broke his leg. The report is reliable but
      you aren't quite sure.

Several scope and distribution facts demonstrate that the full completion reading
and the content satisfaction reading occur in very distinct environments. Therefore,
they must be delivered by distinct, surface-identical morphemes. This requirement
even holds with predicates that allow both readings, like 'eat the cookies'.

(41)   uig · *Pirenik-ler-ni   ye-**p**   **bol**-mu-dum.*
       uzb · *Shirinlik-lar-ni yi-**b**   **boʻl**-ma-dim.*
             cookie-PL-ACC eat-CNV become$_{\text{AUX}}$-NEG–PAST.1S
             'I didn't eat the cookies.'

meaning	FC	CS
not (a) ∧ b	#	✓
a ∧ not (b)	✓	#
not (a) ∧ not (b)	✓	#

3.3   *–(İ)p bol–* as a conventional implicature

The previous discussion shows that when *-(İ)p bol-* expresses the proposition that
the described event satisfies at-issue content, it is immune to scope. Immunity to
scope is a hallmark of two types of expressions: Presuppositions and conventional
implicatures. These are secondary propositions, not necessarily asserted by the
uttered expression but intrinsically tied to it. Several diagnostics distinguish these
meanings, but we will rely on a simple one, which involves a context that ensures
that the secondary proposition is false.

If the secondary preposition is a presupposition (PR), its falsehood prevents the
central proposition from being true or false.

(42)   The King of France is bald.
       PR: There is a king of France
       There is no King of France, so it cannot be true that he is bald. It can also
       not be true that he is not bald.

Meanwhile, a conventional implicature (CI)'s falsehood does not affect the truth or
falsehood of the central proposition.

(43)   Bob Dylan, who is from Canada, won a Nobel Prize.
       CI: Bob Dylan is from Canada.
       Dylan is not from Canada, yet it is still true that he won a Nobel Prize.

With the content satisfaction reading of *-(İ)p bol-*, we saw that *-(İ)p bol-* is felici-
tious even if the described event happened, so long as it does not satisfy the content
at-issue. This is the case in the detour example (32), where the sentence with *-(İ)p
bol-* is rejected, but it is still true that you went to Qashgar/Qarshi.
    Given that *-(İ)p bol-* is immune to scope-bearing objects above it, and that its
falsehood does not affect the truth-value of the rest of the expression, we conclude
that it adds a conventional implicature to the primary asserted proposition.

(44)   uig · *Qeshqer-ge bér-ip bol-duq.* (= 32)
       uzb · *Qarshi-ga bar-ip bo'l-diq.*
       Assertion: We went to Qashgar/Qarshi (true)
       CI : Going there was part of our itinerary (false)

    We can confirm this conclusion by verifying another property of conventional
implicatures. Potts (2005) highlights their non-challengeability. In a discourse,
assertions can be rejected by interlocutors, most clearly with a simple "no." Con-
ventional implicatures, however, cannot be targeted this way. Rejecting them re-
quires stopping the conversation altogether for a detour. Given this, we predict that
the content satisfaction reading of *-(İ)p bol-* cannot be challenged, and indeed it
cannot.

(45)   uig · A: *Qeshqer-ge bér-ip bol-duq.* (= 32)
              B: *Yoq.* ≠ That wasn't part of the plan.

       "No" here can only mean, "No, you did not go to Qashgar."

By contrast, the asserted full completion reading is challengeable, as we expect.
(46) shows this for Uyghur, but similar results are observed for Uzbek.

(46)   uig · A: *Pirenik–ler–ni ye-**p bol**–dum.* 'I ate the cookies'
              B: *Yoq.* = No, you didn't eat all of them.

3.4 How this proposal may work with other Turkic AVCs

This section has shown the importance of determining the nature of the propositional content expressed by the AVC *-(İ)p bol-*. In doing so, it reveals the necessity of determining for any Turkic auxiliary verb construction whether it expresses asserted, presupposed, or implicated content. We can begin to apply this method to these other AVCs. For instance, Uyghur *-iwal-* (> *-ip al-* [take]) indicates that the described event benefits the subject (47a), or at least fulfills the subject's desire. What is the nature of this indicated content? Negated, it is ambiguous. On one reading, the event did not happen, but it still would have fulfilled the subjects' desire (47b). On the other, it did happen, but not to fulfill the subject's desire (for instance, a commissioned professional shoot).

(47) Uyghur (uig) *-iwal-*

    a. *Men u-ning   resim-i-ni   tart-**iwal**-dim.*
       I   her-GEN picture-3S-ACC pull-CNV.take-PAST:1S
       'I took her picture.' (because I wanted one)

    b. *Men u-ning   resim-i-ni   tart-**iwal**-**mi**-dim.*
       I   her-GEN picture-3S-ACC pull-CNV.take-NEG-PAST:1S
       'I did not take her picture.' (though I would have like one)
       'I took her picture, but not for my benefit.'

This ambiguity tells us that *-(İ)wal-* in Uyghur expresses a self-benefit condition that is subject to negation, which makes it part of the assertion.

    The nature of the propositional content of the AVCs, and of auxiliaries generally, is an under-researched area. However, we suspect that a typology along these lines might prove very fruitful and even crucial for synchronic and diachronic studies of auxiliary constructions in general. Nonetheless, this paper focuses on *-(İ)p bol-*, so we will now move on to the second reading, which we call content satisfaction.

4   Details of content satisfaction

The content satisfaction reading is provided by a distinct morpheme from that which provides the full completion reading. Now that we have shown this, we must provide the exact formal meaning of content satisfaction. Basically, *-(İ)p bol-* in this reading expresses the conventional implicature that the described event renders true some salient propositional content. More precisely, it indicates that given a content-bearing object a, if the event has the VP description, some proposition in the content of a is true. To capture this meaning, we will need four formal elements: A set of

propositions forming the content, an anaphoric object bearing these propositions as content, a function generating the former from the latter, and a modal condition using this generated set outside the domain restriction. We will take these parts in order.

4.1   The propositional content being satisfied

We have observed content satisfaction readings in Uyghur and Uzbek in a number of scenarios:

- A plan with several steps
- The parts of a physical exam
- The steps of an itinerary
- A doctor's orders

In each of these cases, there is a set of propositions involved. For instance, Ali's plan to get out of the army (a_2) might consist of the following set of propositions:

(48)   Ali's plan = a_2 = $\left\{ \begin{array}{l} \lambda w. \text{ Ali signs up in w,} \\ \lambda w. \text{ Ali gets injured in w,} \\ \lambda w. \text{ Ali gets doctor's note in w,} \\ \lambda w. \text{ Ali gets released in w} \end{array} \right\}$

In such a case, *-(İ)p bol-* would be felicitous if his leg-break makes at least one of these propositions true. In our example, it does, as Ali gets injured.

The propositions are often ordered, at least partially, but they do not have to be ordered. For instance, if you are describing the steps of a recipe, you can use *-(İ)p bol-* for those steps. For many of these recipes, the order does not always matter.

The propositions can be rendered true directly or by entailment. This allows for serendipitous accidents to satisfy content (49).

> Context: You have a plan to get out of army service. You told your friend two days ago that you'd break your leg in a week. But yesterday, a car hit you.

(49)   uig · *Put–um–ni   sun–dur–**up**   **bol**–dum.*
           uzb · *Oyo'g–im–ni sin–dir–**ib**   **bo'l**–dim.*
                   leg–1S–ACC break–CAUS–CNV become$_{\text{AUX}}$–PAST:1S
                   'I broke my leg.'

In (50), the event is completely unintended, and has a passive marker to signal the lack of an agent. However, if the key part of your plan is the result, rather than the means, then a serendipitous accident can satisfy the content.

> Context: You have a plan to wreck your car to get a new one with the insurance money. You told your friend two days ago that you'd do it in a week. But yesterday, someone hit your car.

(50) uig · *Mashina-m soq-ul-**up** **bol**-di.*
       car–1S   smash–PASS–CNV become_{AUX}–PAST:3S
       'I got in a wreck.' (*lit.* 'my car got smashed')

Essentially, the vaguer the content propositions are, the more kinds of events can satisfy them, and the more readily they license *-(İ)p bol-*. In (49), the propositions allow for any bad thing, so any bad thing happening makes one of these true.

> Context: A soothsayer tells you and your friend that three bad things will happen tomorrow. You both laugh it off, but the next day, you trip and break your leg. You tell the friend:

(49) uig · *Put-um-ni sun-dur-**up** **bol**-dum.*
     uzb · *Oyo'g-im-ni sin-dir-**ib** **bo'l**-dim.*

The more specific the propositions are, the fewer kinds of events can satisfy them, and the less readily they license *-(İ)p bol-*. If the content propositions require intent, that intent must be present in the described event, or *-(İ)p bol-* will fail. For instance, if a travel itinerary is tied to a purpose, like tourism, reaching a point on the itinerary for another reason does not result in content satisfaction.

> Context: You are on a trip with your son from Hoten to Urumchi to see the sights of Xinjiang. Near Korla on the way to Urumchi, your son gets sick. You cancel the rest of your trip. You drive him to the hospital in Korla. You call home, your spouse asks "Are you in Urumchi?" You reply:

(51) uig · *#Yaq, Korli-gha bér-ip **bol**-duq.*
       No, Korla-DAT go–CNV become_{AUX}–PAST:1P
       'No, we went to Korla.'

The same observation applies in Uzbek with the locations switched out:

(52) uzb · *#Yo'q, Samarqand-ga bar-**ib** **bo'l**-diq.*
       No, Samarkand-DAT come–CNV become_{AUX}–PAST:1P
       'No, we went to Samarkand'

On the other hand, if circumstances change, and new content becomes at-issue, the licensing of *-(İ)p bol-* changes.

> Context: You are near Korla on the way to Urumchi and your kid gets sick. You call home, tell your spouse, who says "Take him to the hospital in Korla." So you do, and the next day you update your spouse:

(53) uig · *Korli-gha kél-**ip** **bol**-duq.*
      uzb · *Navoii-ga kel-**ib** **bol**-dik.*
      (city)–DAT come–CNV become_{AUX}–PAST:1P

‘We have come to Korla/Navoii’

Whether the propositions are so precise is an area of context-sensitive vagueness, to be determined on a case-by-case basis.

4.2 Presupposition of the content-bearing object

So far we have discussed a salient set of propositions, but as we've seen that set can be quite vague. As it turns out, the conversation's participants do not have to know exactly which propositions form the content. Instead, they have to be aware of a particular salient content object. For instance, if Ali has a plan to get out of army service, describing his leg-break with *-(İ)p bol-* is only felicitous if everyone in the conversation knows that he has a plan. They do not need to know how he plans to get out of army service, but they must know about his plan. That is to say, the plan itself is subject to an existence presupposition. Like any presupposition, its failure renders a clause infelicitous, and it cannot felicitously be used with speakers unaware of it.

(54) uig · #*Ali putini sundurup boldi.* / uzb · #*Ali oyog'ini sindirib bo'ldi.* / 'Ali broke his leg'

   a. No plan context: Ali is a healthy guy on an ordinary day, and not even subject to military service. He trips and falls, lands hard, and breaks his leg.

   b. Unaware context: You know that Ali wants to get an injury to avoid army service, but his parents don't. They do know he wants to avoid army service, but not that he actually has a plan to do so. He broke his leg this morning and he's in the hospital, so you are the one who must break the news to them.

If presuppositions fail, the proposition whose meaning they contribute to is nonsense: neither true nor false (42). The presupposition of the plan is part of the added content of *-(İ)p bol-*, which is a conventional implicature. The CI fails, but as a CI, its failure does not affect the truth of the rest of the expression. As a result, the use

of *-(İ)p bol-* is felicitous if Ali broke his leg with no plan at all, but he still broke his leg.

Another context involves story adaptations. For instance, if you and a friend have read they *Harry Potter* books, and you are watching the movie adaptation, you can tell your friend what you're seeing using *-(İ)p bol-*. This only works, though, if they know the story that was adapted.

(55)   uig · *Harry Cho bilen söy-üsh-**üp**   **bol**-di.*
            H.   C.   with kiss-RECIP-CNV become_{AUX}-PAST:3
            'Harry and Cho kissed.'

Similar observations can be made for the other kinds of scenarios. In each case, there is an anaphoric object— a plan, a prophecy, an itinerary, and so on— whose existence is presupposed, whose identity is known, and whose content is satisfied by the described event. The salient content is not directly accessed, but is instead accessed through this anaphoric object. The next subsection will describe that process.

4.3   Generating content from content-bearing objects

For the meaning of *-(İ)p bol-*, we propose a content-generating function, Cont, which takes a content-bearing object and returns its propositional content.

Def. 6 Content function
         For any object a that bears content,
         Cont(a) = the set of propositions comprising that content

A content-bearing object (CBO) is an individual or event that contains or bears propositional content. Content-bearing events are described by *verba dicendi* and attitude verbs (*think, say, feel, claim*). Content-bearing individuals are described by nouns like *claim, rumor, fact*. Either kind of expression routinely combines with complement clauses Moulton (2009).

(56)   *Eliza said that the mayor was an alien.*

(57)   *the rumor that the mayor was an alien*

In each of Moulton's cases, the content is accessed by a Content-generating function (cont) provided by the complementizer. This function returns the set of possible worlds where all the content is true (namely, the proposition argument).

Def. 7 Combining events and entities
         Let $D_e \cup D_s$ be the union of the set of individuals and the set of events.

(58)   a.   ⟦ *that*$_{C°}$ ⟧ = λp.λa ∈ D$_e$ ∪ D$_s$. cont(a) = p
             READ: *The set of worlds where the content of a is true is the set of*
             worlds where p is true

        b.   ⟦ *say that the mayor was an alien* ⟧ = λe. e is a saying event, and the set
             of worlds where the content of e is true is the set of worlds where the
             mayor was an alien

        c.   ⟦ *rumor that the mayor was an alien* ⟧ = λx. x is a rumor, and the set
             of worlds where the content of x is true is the set of worlds where the
             mayor was an alien

We employ a slightly different content function for an obscure but important
reason. Moulton's content function combines the modal force (in all the worlds)
with the modal base (the content of a). However, the content satisfaction reading
requires us to split these components. In essence, *-(İ)p bol-* employs a modal base,
but not as the basis of a modal.

4.4   The nature of content satisfaction

There are two straightforward reasons for us to split these modal components,
which are linked to the way a modal base works. A modal base is a set of propo-
sitions used as the basis for modal reasoning. It is generated from a modal anchor,
which can be an event (Hacquard 2006; 2010), an individual (Moulton 2009), a situ-
ation (Arregui 2009), or a possible world. Circumstantial modals can be thought of
as relating certain relevant facts concerning the Davidsonian event argument which
is in the evaluation world (also see Abusch (2012)).

Def. 8 Fact-based/circumstantial modal base
          For any event e, let fact(e) be the set of worlds where all the relevant facts
          concerning e are true

(59)   ⟦ *You have to leave* ⟧ = λe λw. ∀w′[w′ ∈ **fact(e)** → you leave in w′]
        READ: *In all worlds where the relevant facts concerning e are true, you*
        leave

The event argument will be bound by aspect in the case of circumstantial modals,
and by higher operators in the case of epistemic modals. The crucial point here is
that the modal base, fact(e) in this example, has two properties. First, for the modal
we assume that every proposition is true, and second, the modal evaluation is made
in light of that assumption. The content generated by our function Cont has neither
of these properties.

Content satisfaction occurs if the described event makes any of the propositions in Cont(a) true. We do not need for all of them to hold. Second, no evaluation is made in light of the content satisfaction. Instead, the content satisfaction is made in light of the event description holding. Given these properties, we can define content satisfaction formally.

Def. 9 Content Satisfaction

Given a property of events P, and a content-bearing object a,
P satisfies the content of a if and only if:

$\forall w[\ \exists e[\ P(e)(w) = 1\ ] \rightarrow w \in \bigcup \mathrm{Cont}(a)\ ]$

READ: *All worlds where P holds of some event are worlds where some proposition of the content of a holds*

In this definition, the set of propositions consisting of the content of a is not used as a modal base. Instead, it is used in the prejacent— the proposition subject to modal evaluation. The evaluation's modal base is the set of worlds where the described event holds. If the event holds as described, some content is made true. That is, the described event causes some content to be true. The nature of that causation is quite variable, just as we have seen. This denotation allows that variability. Also, this definition employs the content-generating function Cont, so the content is accessed indirectly. Thus, the exact nature of the plan (or other object) does not have to be known, so long as the existence of the plan is.

4.5 Content satisfaction in the meaning of *–(İ)p bol–*

Now that we have an understanding of content satisfaction, we will situate it in the semantic composition and develop a denotation for the *-(İ)p bol-* morpheme. The three elements that are required are the event description, provided by the *v*P, the content-bearing object, and the expression of content satisfaction as a conventional implicature.

The situation of *-(İ)p bol-* in the phrase structure, as an auxiliary, clearly places it above the highest verbal projection, either VP or *v*P. It seems to be below other functional projections, like negation and aspect. It certainly needs to be below aspect, which binds the event argument (Kratzer 1998), and negation, which is above that. This placement is supported by the inability of negation to appear below *-(İ)p bol-*.[10]

---

[10] Negation can occur under *-(İ)p bol-* in one case in Uyghur: If both the main verb and the auxiliary are negated, forming a double negative that is interpreted as a necessity modal. We do not know what is going on with this, or why it only occurs in double negation.

(60)   a.   * uig · *pirenik-ler-ni   yé-**me**-p   bol-dum.*
                  cookie-PL-ACC eat-**NEG**-CNV become_{AUX}-PAST:1S

     b.   * uig · *pirenik-ler-ni   yé-**may**   bol-dum.*
                  cookie-PL-ACC eat-**NEG**.CNV become_{AUX}-PAST:1S

          'I did not eat the cookies.'

We will treat *-(İ)p bol-* as a single piece, because it behaves like one in the semantics. Syntactically the AVC may comprise a discontinuous constituent or idiomatic expression where *-(İ)p* and *bol-* are introduced by distinct heads. Either structure results in the same semantics, so we will opt for the simpler structure.
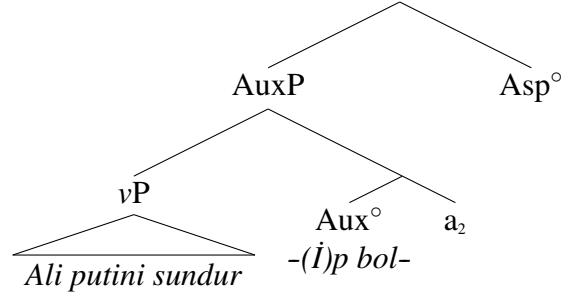
(61)
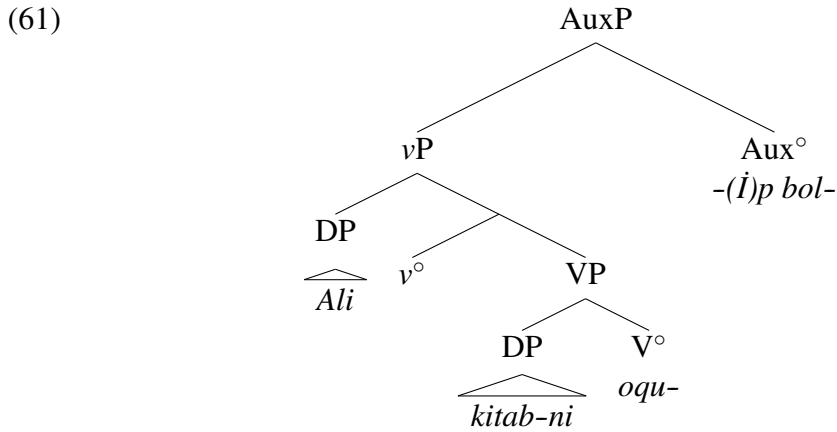
In the structure that feeds the semantic interpretation, the content-bearing object needs to be represented. We assume it to be the first argument of *-(İ)p bol-* . The *v*P will be the second argument.

(62)   *Ali putini sundurup boldi.* 'Ali broke his leg.' (satisfying content)

     a.   Let a_2 be the content-bearing object in this sentence. We get the following structure:

---

(1)   uig · *Pirenik-ler-ni   ye-**may**   bol-may=sen.*
           cookie-PL-ACC eat-**NEG**.CNV become_{AUX}-NEG.PRTP=2S
      'You must eat the cookies.' (= you can't not)

b.

```
                                    /\
                                   /  \
                              AuxP      Asp°
                             /\
                            /  \
                          vP      /\
                         /  \    Aux°   a₂
                  Ali putini sundur  -(İ)p bol-
```

In the semantics, the input to aspect is an intensional property of events (type $\langle e, wt \rangle$), so the AuxP will need to denote something of that type.[11] In essence, it will denote the property of events of Ali breaking his leg, which satisfy the content of a_2. We thus propose this denotation for the content satisfaction reading of *-(İ)p bol-*.

Def. 10 **Denotation of content satisfaction *-(İ)p bol-***

Let $D_{s,wt}$ be the set of intensional properties of events, and W be the set of all possible worlds.

$[\![\text{-(İ)p bol-}_{CS}]\!] = \lambda a \in D_e \cup D_s . \lambda P \in D_{s,wt} . \lambda e \in D_s . \lambda w \in W.$
$P(e)(w) \mid \forall w'[\exists e'[P(e')(w') = 1] \rightarrow w' \in \bigcup \text{Cont}(a)]$

READ: *The assertion that property P holds of event e, with the conventional implicature that P(e) satisfies the content of a content-bearing object a.*

This denotation asserts that the *v*P property (P) holds of e in world w, with the conventional implicature that any world where P holds of e is one where some proposition in the content of a holds. We follow Potts (2005)'s convention of marking the CI as truth-conditionally independent of the main assertion, but do so with a | marker. Thus, the formal expression p | q represents the assertion of p and the conventional implicature of q.

If we apply the denotation in Definition 10 to the structure in (62b), we get the following composition.

---

[11] In section 2.3, we used a semantics that set aside possible worlds. We did so out of convenience, since possible worlds do not affect the full completion reading. The analysis in that section works just as well if we include them.

(63) $\lambda e\lambda w.\ \text{break(leg)}(e)(w)\ \&\ \text{agent(Ali)}(e)(w)\ |$
       $\forall w'[\ \exists e'[\ \text{break(leg)}(e')(w')\ \&\ \text{agent(Ali)}(e')(w')\ ]\to w'\in \bigcup\text{Cont}(a_2)\ ]$

$$\text{[\![}\ vP\ \text{]\!]} \qquad\qquad \lambda P\lambda e\lambda w.\ P(e)(w)\ |$$
$$\qquad\qquad\qquad\qquad \forall w'[\ \exists e'[\ P(e')(w')=1\ ]\to w'\in\bigcup\text{Cont}(a_2)\ ]$$

$\lambda e\lambda w.\ \text{break(leg)}(e)(w)\ \&$ $\text{[\![}\ \textit{-(İ)p bol-}_{\text{cs}}\ \text{]\!]}$ a_2
$\text{agent(Ali)}(e)(w)$

This denotation captures the observed meaning of the content satisfaction read-ing. Once aspect is added, we assert that there is an actual event of Ali breaking his leg, and conventionally implicate that in any world where Ali breaks his leg, some of the content of his plan is true. Since the actual world is one of these worlds, this condition entails that some of the content is actually true.

If we negate the structure in (63), we assert that there is no actual event of Ali breaking his leg, but still conventionally implicate that in any world where Ali breaks his leg, some of the content of his plan is true. That is, the event *would* satisfy the content of the plan. Other scope-bearing elements will similarly avoid the content satisfaction condition.

Immunity to scope also predicts that the presupposed content object is not sub-ject to quantificational variability, and this is the case. For instance, if we take our itinerary from Hoten to Korla every week, and every week we pass through Qash-gar to do so, we cannot use *-(İ)p bol-* for this general trait. This is expected if the content-object refers to a specific itinerary. Each trip has its own content-bearing object (its own itinerary), even if each object bears the same set of propositions as content. In contrast, the full completion reading is part of the assertion, and it can apply to each quantified-over event.

4.6   Summarizing content satisfaction

This section has explored the nature of content satisfaction, and proposed a formal denotation that captures its properties. Essentially, events satisfy the content of an object when they have a property that would entail some of that content. Since the satisfaction is expressed with a conventional implicature, it is immune to fur-ther scope operations. This exploration also demonstrates that the components that contribute to the meaning of modals can be found in other kinds of uses.

5 Conclusion

We have argued that the Turkic AVC *-(İ)p bol-* is actually two AVCs, at least in Uyghur and Uzbek. The first AVC expresses the 'full completion' reading that is found in the literature by asserting homomorphism, from which a sense of completion can be derived. This assertion is subject to scope-taking operators like negation or modals. Since many event descriptions cannot be homomorphic, the use of this AVC is limited.

The second AVC expresses the conventional implicature that the event satisfies the content of some anaphoric content-bearing object. This AVC does not restrict the type of event it can occur with, and its contribution lies outside the scope of negation and other operators.

This study has several important consequences for linguistic theory and the study of auxiliaries. First, it demonstrates the role played by homomorphism, and more broadly the formal structure of events, in deriving descriptive notions of 'full completion'. Second, this study demonstrates a new role for propositional content, and the use of the pieces of modality outside their use in modals.

Third, this study offers new light on the function, structure, and meaning of Turkish AVCs. By focusing on the interaction of the auxiliary's meaning with the rest of the proposition, we suggest a new way of typologically categorizing these constructions, which number in the dozens. Moreover, since these AVCs occur across a number of languages, and similar constructions occur around the world, our study may lead to new hypotheses about possible universal organizations of verbal meaning.

A final consequence is methodological. This study amply demonstrates the value of formally-informed targeted semantic elicitation. A corpus-based approach, valuable as it is, did not lead any of the dozen or previous researchers to even find the content satisfaction reading. We ourselves only stumbled upon it during the course of elicitation. Nevertheless, even untrained speakers swiftly and robustly accept it. Without testing for negative evidence, we could not possibly untangle such fine strands of meaning. Also, a corpus will not indicate whether that meaning is asserted, implicated, etc, unless by completely serendipitous accident. On the other hand, working with native speakers to judge expressions in specific contexts, rather than asking general questions of acceptability, led us to discover exactly what these morphemes mean. Framing these discoveries in terms of a formal semantics, including the composition, led us to discover that we dealt with two distinct morphemes. This framework clarified our questions and allowed us to formulate hypotheses precise enough to test properly. In writing this paper, we hope to set a replicable example for the study of AVCs and auxiliaries in general.

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