

# The Structure of Taking Time

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*Abstract.* This paper investigates the Take-TIME Construction (TTC), e.g., *It took an hour to read this article*. I provide an explicit syntax that draws on the eventive nature of the construction, building the groundwork for a formal semantic analysis. I further discuss a number of argument alternations that are permitted in the TTC, and show how these can be modeled using a process that allows us to introduce additional arguments to events (Kratzer, 1996; Pylkkänen, 2008). Following (Salzmann, 2015) in spirit, but not formalism, I argue that referential subjects of the *tough*-construction and TTC have the semantics of a *proleptic argument*. The analysis firmly sides with a predication (Browning, 1987) rather than movement (Chomsky, 1981) analysis for the *tough*-construction.

The goal of this paper is to elucidate the alternation in (1), the Take-TIME Construction (TTC), which has, as far as I'm aware, received no theoretical investigation.

- (1) a. It took an hour to read this article.  
b. This article took an hour to read *e*.

From a syntactic perspective, the TTC displays a number of interesting properties. Perhaps most notably, it permits an alternation between an expletive subject and an antecedent-gap chain, as illustrated in (1). Such chains are reminiscent of a more well studied alternation, the *tough*-construction.

In addition to this expletive alternation, the TTC also permits what I call a “Middle Subject.”

- (2) a. It took Mary an hour to read the article.

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We would like to thank ...

- b. The article took Mary an hour read *e*.

A complete picture of the TTC thus must be able to explain not only the alternation in (1), but also the addition of a Middle Subject.

I illustrate that the “glue” the holds the pieces of the TTC together are *events* (or eventualities). The Take-TIME VP and *for*-CPs can compose because they are each eventive elements. The antecedent-gap chain in is derived simply by adding a subject to the clause (Kratzer, 1996), and that this subject has the semantic status of a *proleptic argument* (Davies, 2005; Salzmann, 2006, 2015). The Middle Subject will be shown to be an applied argument to the VP (Pylkkänen, 2008).

I will explore the consequences of my proposals in ???. We’ll see that the analysis correctly captures data beyond the *tough*-construction/TTC. Finally, in ???, I’ll address some issues involving intervention, exploring what happens when *for*-CPs are forced to displace.

### 1. Events and the TTC

To begin, we identify two pieces of the TTC: The first piece is the main clause consisting of a light verb TAKE and a noun phrase typically referring to a span of time—the *temporal phrase*. The second piece is the *for*-CP, which I address in a moment. On its own, take+TIME VPs are fundamentally predicates of events (even when the noun phrase isn’t a time-span). They can take event denoting subjects, but not individual denoting subjects.

- (3) a. The race took 3 hours.  
b. The examination of the students took 50 minutes.  
c. Climbing the mountain took a day.
- (4) a. \*The tree took an hour.  
b. \*The examination on the table took 50 minutes.  
c. \*The mountain took a day.

To the extent that we can understand the sentences in (4), they can only be understood to involve an implicit event like *to cut down*, *to grade*, *to climb* respectively. I assume that the take+TIME VP has a meaning like in (5).

- (5) a.  $\llbracket [VP \text{ TAKE+TIME}] \rrbracket = \lambda e \lambda w. e \text{ measures TIME in } w.$   
 b.  $\llbracket \text{the race took 3 hours} \rrbracket^w = 1$  iff There exists an event  $e$  in  $w$  such that  $e$  was a race and  $e$  measured three hours in  $w$ .

I use the meta-language “measure” as shorthand for a *measure function* which describes the time span in hours, in this case.<sup>1</sup> Observe that even when the object of TAKE isn’t a time span, the predicate is eventive, and this event is entirely described by the DP object.

- (6) a. Breaking the window took three lbs of pressure.  
 b. Sinking the boat took 200 gallons of water.  
 c. Reaching the door took five steps.

I will assume that a proper definition of “measure” can explain this, but I will otherwise put the issue aside here.

The other piece of the TTC is the *for*-CP. This, too, shows properties of being eventive. For instance, it can be the subject of a predicate that needs eventive subject. Psych-verbs like *scare*, *embarrass*, *irritate* can have Agentive subjects, or they can have event-denoting Causer subjects. Since the *for*-CPs cannot be Agents, they must be event-denoting Causers.

- (7) a. For the dead man to sit up scared Mary.

<sup>1</sup>Kratzer (2007, fn. 24) provides a way to formalize this measure function where she posits a functions that equates an event with a measure relative to a certain measurement, e.g.,  $f_{hour}(e) = 3$  or  $f_{minute}(e) = 20$ . The same function can hold for the examples in (6) as well. I note here that the synonymy between the TTC and *in*+TIME is consistent with treating such (i.e., “telicity imposing”) temporal modifiers as predicates of the event, rather than quantifiers over it (cf, (Moltmann, 1991)) Being predicative, it is now no wonder that there is no “atelic counterpart” to the TTC in English (or any language I know of) which picks out *atelic* events. This would follow if such durative measurements were always quantificational.

- b. To my father to pick me up from school in his pajamas embarrassed me.
- c. For John pick his scabs irritated me.

They can also be iterated occurrences.

- (8) a. For the Dodgers to win the pennant is an infrequent event
- b. For John to stay up late is an infrequent occurrence.
- c.

Indeed, they can also be subjects of take-TIME VPs. This is as expected since we've already seen that take+TIME VPs need eventive subjects.

- (9) a. To read this article takes an hour.
- b. For John to finish the

Finally, *for*-CPs can be equated with event-denoting subjects.

- (10) a. The game is for the catcher to tag the runner.
- b. The examination of the students was for Professor Smith to assess their potential.
- c. The battle was for the Gods to decide who controlled the kingdom.
- d. The solution was for John to drive to New Jersey.

I will assume that the *for*-CP minimally has the following denotation.

- (11) a.  $\llbracket [CP \text{ for } P] \rrbracket = \lambda e \lambda w. P(e)(w) = 1$
- b.  $\llbracket \text{The game is to tag the runner} \rrbracket^w = 1$  iff There's an event  $e$  in  $w$  such that  $e$  is a game and  $e$  is an event of the catcher tagging the runner in  $w$ .

There are no doubt additional complications we could add into the meaning for the *for*-CP, but the denotation in (11-a) is sufficient for the discussion below. Importantly, we've identified that both

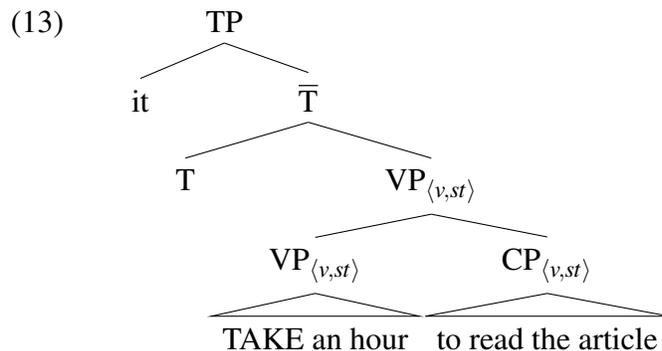
take-TIME VPs and *for*-CPs are properties of events.

## 2. Composition

With the understanding that the VP and the *for*-CP are (or at least can be) both predicates of events, we can ask how the two compose. The meaning that we want to get out of an sentence like (12-a) is something like (12-b).

- (12) a. It took an hour for John to read the article.  
 b. There's exists an event  $e$  such that  $e$  measures an hour and  $e$  is a John reading the article event.

There are two basic ways that such a meaning can be derived. The option which I will pursue is the one where the *for*-CP merges as a modifier of the VP, as in (13).

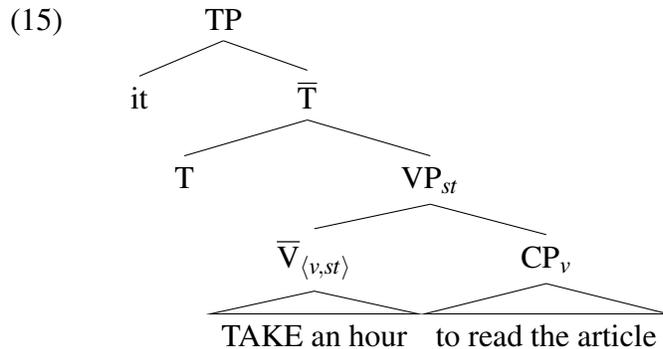


In this tree, the *for*-CP is a modifier of the event of the main clause. It describes the main clause event measuring an hour as an event which is also a reading-the-article event. (Presumably the event is closed via an Event Closure operation, defined formally in a moment.) The modification approach matches an intuition about the role of the *for*-CP. It has the “feel” of a purpose clause.

- (14) a. It took an hour (in order) to read this book.  
 b. It took 10 years (in order) to quit smoking.

Since purpose clauses are uncontroversially considered adjuncts (Jones, 1991), the modification analysis would explain the semantic relationship better. I will return to this topic later and show how the connection to the purpose clause can be paid off more formally.

The other option would be to suppose that the *for*-CP is an *argument* of the VP, as in (15).



There a few reasons why treating the *for*-CP as an argument doesn't hold up. Some I will address now, while others will wait until later. First, by treating the *for*-CP as an argument, we lose the empirical distinction between “true” arguments and clausal arguments. So ?? might be expected to be grammatical in the same position, since they can saturate the event slot of the VP.

- (16) a. \*It took 50 minutes the examination of the students.  
 b. \*It took a 3 hours the race.

We might possibly explain these data by assuming that nominals must appear in a “cased” position, while *for*-CP, like other CPs, must appear in a “caseless” position (Stowell, 1981). However, closer inspection of other eventive elements suggests that this isn't correct. ACC-gerunds, as opposed to POSS-gerunds, similarly describe events and cannot be in a caseless position. For instance, neither ACC-gerunds nor *for*-CPs can be the subject of a small clause.

- (17) a. \*I consider John smoking harmful to his health.  
 b. \*I expect them winning likely.

- (18) a. \*I consider for John to smoke harmful to his health.

- b. \*I expect for them to win likely.

Despite this distributional similarity, ACC-gerunds are not possible in the TTC.

- (19) a. \*It took an hour John finishing the exam.  
b. \*It took years Mary quitting smoking.

If being eventive and resisting cased-positions were the explanatory factors in the distribution of the *for*-CP in the TTC, then these facts are surprising.

Note that one analysis that I consider a non-starter is treating the *for*-CP as a modifier of the temporal phrase, meaning something like *an hour in which to read the article*.

- (20) a. \*It took an hour in which to read the article.  
b. \*It took a year in which to learn French.

The *for*-CP is connected to the VP, not the DP under the VP.<sup>2</sup>

### 3. *Middle Subjects*

The first piece of the puzzle concerns how *Middle Subjects* are introduced. Middle Subjects are so named because they descriptively sit in the “middle” of the sentence and are obligatorily construed as the subject of the lower clause.

- (21) a. It took John an hour to read the article.  
b. It took Mary a year to learn French.

<sup>2</sup>For the sake of brevity, I will not dwell on the relationship between the VP and the *for*-CP, although there is indeed much more to be said on the subject. In particular, it's clear that there are (at least) two events involved in the TTC, one associated with the verb TAKE, and the other associated with the infinitive. The events are linked, surely, but they are nonetheless distinct. To capture this would require me to spend some time dealing with some of the more formal properties of the meaning of the *for*-CP, in particular its intensional contribution. As I don't wish to get distracted by this important, but ultimately orthogonal point, I'll put the issue aside here.

I illustrate below that Middle Subjects are introduced as *applied arguments* to the main clause event, controlling a PRO subject of the lower clause, using standard diagnostics for a control relationship. First, expletives licensed by the lower predicate are not permitted.

- (22) a. It took an hour for there to be enough people to start the game.  
 b. \*It took there an hour to be enough people to start the game.

Second, idiom chunks in the Middle Subject position cannot be interpreted in the lower clause.

- (23) a. It took an hour for the shit to hit the fan  
 b. #It took the shit an hour to hit the fan (literal only)

- (24) a. It took an hour for the cat to get out of the bag  
 b. #It took the cat an hour to get out of the bag (literal only)

- (25) a. It took an hour for headway to be made  
 b. \*It took headway an hour to be made

Only the literal reading of (23) and (24) are available, and (25) is ungrammatical to my ear.

Third, certain predicates prefer an inverse scope reading, where the predicate scopes over the subject, as in (26).

- (26) A policeman became necessary necessary > policeman

In (26), the available reading is “it became necessary that there be a policeman.” With respect to the TTC, when the subject is inside of a *for*-CP, the inverse reading is found. As a Middle Subject, the sentence cannot have this meaning. (Note I’ve used *become* as a result predicate to satisfy the TTC’s telicity requirement.)

- (27) a. It took an hour for a policeman to become necessary necessary > a policeman  
 b. ??It took a policeman an hour to become necessary a policeman > necessary

There's a potential confound here that I'll discuss next concerning the appearance of indefinites in the Middle Subject position. Nonetheless, to the extent that (27-b) is acceptable, it cannot have an inverse scope reading.

Fourth, as noted above, the fact that (27-b) is best read with a specific policeman in mind reveals a further difference between the Middle Subject and *for*-CP subject. Bare plurals and mass nouns are degraded in the Middle Subject position, although perfectly natural as subjects of the lower clause.

(28) a. It took an hour for wildlife to devour the carcass

b. ??It took wildlife an hour to devour to carcass

(29) a. It took an hour for lions to devour the carcass

b. ??It took lions an hour to devour the carcass

Lastly, there's a difference in meaning between the Middle Subject and *for*-CP subject. Middle Subjects are generally more "affected" by the event, suggesting that the Middle Subject is assigned a  $\theta$ -role by the matrix verb. Compare the phrases in (31).

(30) a. It took John an hour to stand up.

b. It took an hour for John to stand up.

(31) a. It took John a year to climb Everest

b. It took a year for John to climb Everest

The intuitive difference between (30-a) and (30-b) is that John is actively trying to stand up for an hour in (30-a), while this is not necessarily so of (30-b); John could have dallied for 59 minutes on the phone, and then stood up at the end. In other words, *John* seems to measure out the event more in (30-a).

This difference is also reflected in the idea that the Middle Subject "measures out" the event more than the subject of the *for*-CP. Consider,

- (32) a. It took Mary five minutes to get angry.  
 b. It took five minutes for Mary to get angry.

In sum, the above diagnostics provide ample evidence for a control relationship. Given the interpretive and thematic distinctions between the two positions, it cannot be the case that there has been movement into the Middle Subject position. The diagnostics also suggest what kind of phrase the Middle Subject is generated in. In general, the Middle Subject patterns like an applied object (Pykkänen, 2002, 2008). For instance, applied arguments in the Double Object Construction are degraded as bare plurals/indefinites (Cuervo, 2003). (Note that this is also attributable to the fact that the Middle Subject must be “quantized” (MacDonald, 2006).)

- (33) a. ??John threw lions/wildlife some meat  
 b. ??John showed children/a child a painting.

Similarly, Middle Subjects cannot be gapped in an  $\bar{A}$ -dependency, just like applied objects.

- |      |    |  |                     |
|------|----|--|---------------------|
| (34) | a. | *Who did John show <i>t</i> a picture?                           | <i>wh</i> -movement |
|      | b. | *Mary, John showed <i>t</i> a picture.                           | Topicalization      |
|      | c. | *It was Mary who John showed <i>t</i> a picture.                 | Clefting            |
| (35) | a. | *Who did it take <i>t<sub>wh</sub></i> an hour to read the book? | <i>wh</i> -movement |
|      | b. | *Mary, it took <i>t</i> an hour to read the book.                | Topicalization      |
|      | c. | *It was Mary who it took <i>t</i> an hour to read the book.      | Clefting            |

Moreover, when we look at languages that have overt applicative morphology and a TTC, we find that the Middle Subject requires an applicative affix on the verb. This is the case in Llogoori, a (Luhya) Bantu language of Kenya.<sup>3</sup>

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<sup>3</sup>Thanks to Mwabeni Indire for this data. Nouns are glossed with their class prefix. The class 9 subject agreement is an expletive subject. See (Gluckman and Bowler, 2016) for discussion of this marker.

- (36) a. i-a-vogol-a muhega mla ku-ombaka inyumba  
 9-ASP-take-FV 1year 1one 17-build 9house  
 ‘It took a year to build the house’
- b. i-a-vogol-**el**-a Sira muhega mla ku-ombaka inyumba  
 9-ASP-take-**APPL**-FV Sira 1year 1one 17-build 9house  
 ‘It took Sira a year to build the house’

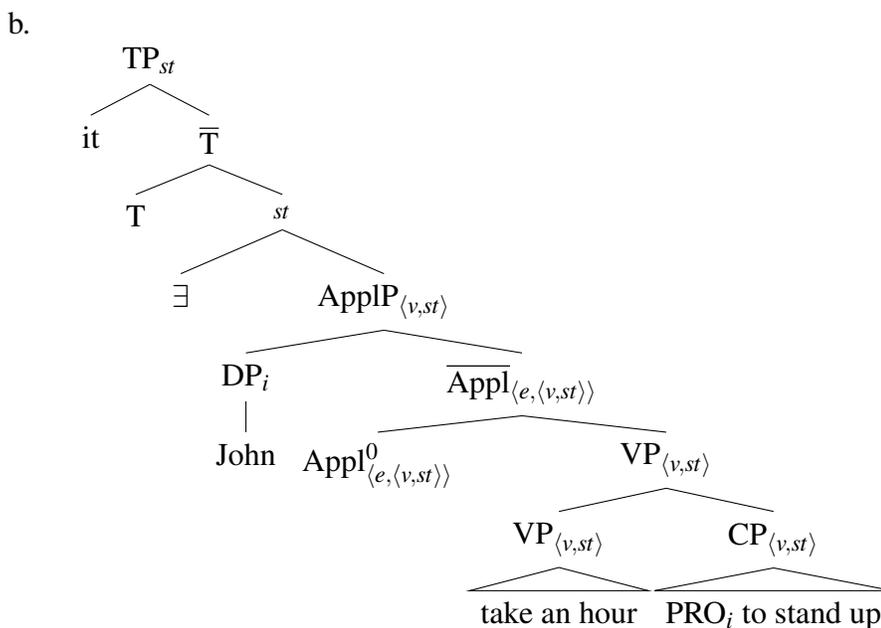
Given the fact that the Middle Subject c-commands into the *for*-CP, and the fact that the Middle Subject is introduced in an ApplP, we must conclude that this corresponds to High Appl, i.e., an Appl<sup>0</sup> that takes a VP complement. I assume that subsequent head-movement around this argument (e.g., verb raising to T) derives the correct linear ordering.

(37) *Event Identification*

$$\langle e, \langle v, st \rangle \rangle \langle v, st \rangle \rightarrow \langle e, \langle v, st \rangle \rangle$$

(38)  $\llbracket \text{Appl}^0 \rrbracket = \lambda x \lambda e \lambda w. x \text{ measures out } e \text{ in } w.$

- (39) a. It took John an hour to stand up.



- c.  $\llbracket (39) \rrbracket^w = 1$  iff  $\exists e$  such that  $e$  measures an hour in  $w$  & John measures out  $e$  in  $w$  &  $e$  is an event of John standing up in  $w$

It's important to see that no other structure would satisfy the various constraints that the TTC imposes. For instance, merging Appl<sup>0</sup> anywhere lower, say, as a low applicative in between TAKE and the temporal phrase, wouldn't work because the *for*-CP composes with the VP. Thus, we would not be able to establish the control relationship because the applied argument wouldn't c-command the *for*-CP.<sup>4</sup> Moreover, since it's not Pylkkanen's Low Appl, this Appl<sup>0</sup> must map an argument to an event. Thus it must compose with a predicate of events, which is what the VP is.

In sum, the Middle Subject is an applied argument situated between the subject position and the *for*-CP. The evidence for the Middle Subject being generated *in situ* is ample, as is the evidence that it c-commands into the lower clause. This last point will be the crucial point when we look at how a movement account can explain infinitival object gaps.

There are some side issues though. Notably, it's unclear to me how case is assigned to the Middle Subject. It's a robust generalization in English that the verbs which do not assign an external theta-role cannot case-mark an object, e.g., Burzio's Generalization. The Middle Subject must be listed an exception to this rule.

Second, it's probably not necessary to encode the fact that the Middle Subject measures out the event as a property of the meaning of Appl<sup>0</sup>. It seems to me that by adopting additional assumptions about how syntax encodes (lexical) aspect (e.g. (Borer, 2005; MacDonald, 2006; Travis, 2010)) we could derive the meaning of the Middle Subject more naturally, without stipulating it into the meaning of the head.

Finally, it's generally assumed that English lacks High Applicatives, and only have Low Applicatives (McGinnis, 2001; Pylkkänen, 2008). However, recent work on different "flavors" of HAVE suggest that this is too simplistic a view. At least in some cases, there can be an argument

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<sup>4</sup>Relevantly, the control relationship is *predicative* as opposed to *logophoric* (Landau, 2015). This is diagnosed by the fact that Middle Subjects do not permit partial control.

- (i) \*It took John an hour to gather at the park.

Predicative control requires a strict c-command relation between the controller and the empty position (cf, Williams 1980). I will otherwise remain agnostic as to the exact formalization for how PRO gets its reference.

introduced as an applicative (e.g., in Voice) which takes a VP complement (Kim, 2012). There is at least an intuitive connection between HAVE and TAKE which may be possible to cash out via, say, lexical decomposition; I'll leave this for future work.

#### 4. The antecedent-gap chain

Let me put aside the Middle Subject now and turn to the alternation in (40).

- (40) a. It took an hour to read the article.  
 b. The article took an hour to read *e*.

The first step will be to identify characteristic properties of this chain. We'll see that it involves evidence for an  $\bar{A}$ -step in the infinitival clause, and that the head of this chain is an argument that is sitting in an A-position. Moreover, we'll observe a general constraint where we are allowed to interpret the subject. In particular, it cannot be interpreted in the *for*-CP. These various properties are reminiscent of the *tough*-construction, and I will attempt to draw a direct parallel between the two construction in ??.

The analysis for (40) will actually borrow quite a bit from the Middle Subject. I'll argue that the referential subject is, in fact, a subject, merged in Voice on top of the VP. However, I'll argue it is syntactically and semantically distinct from the Middle Subject. In general, the referential subject has the semantics of a *proleptic argument*, typically characterized by an "aboutness" relation with the lower clause. The aboutness-relation will be shown to come for free considering the meaning we've already postulated.

I first consider properties of the antecedent-gap chain. It appears to display to properties of an  $\bar{A}$ -chain. For instance, it does not permit indirect object gaps.

- (41) \*Who did John read  $t_{wh}$  an article?  
 (42) a. \*Mary took an hour to read *e* a article.  
 b. \*John took 5 minutes to show *e* the picture.

Second, it licenses parasitic gaps.

- (43) a. The article took 5 minutes to file *e* after reading *pg*.  
b. French took a year to learn to read *e* after learning to speak *e*.

Third, the *tough*-construction permits long-distance dependencies to be formed in the infinitival clause. They aren't perfect, but they are certainly more grammatical than A-movement.

- (44) a. ?This article took 10 minutes to convince Mary to read *e*.  
b. ?French took an year to want to learn *e*.  
c. This article took an hour to start reading *e*.

In general such dependencies are contingent on the verbs involved in the lower clause. Not all long-distance dependencies work, and long distance dependencies out of finite clauses are strongly degraded.

- (45) a. \*The book to a year to decide to read *e*  
b. \*The book took an hour to say that John read *e*.  
c. \*This book took an hour to realize that Mary read *e*.

Note that one consequence of this quasi-clause-boundedness is that tests for islandhood are generally moot.

Fourth, when there's an antecedent-gap chain, the *for*-CP is an island for further  $\bar{A}$ -extraction.

- (46) a. \*Who did the book take an hour to read  $t_{wh}$  to *e*.  
b. \*Who did John take 5 minutes to introduce  $t_{wh}$  to *e*.

Thus, there appears to be ample evidence for an  $\bar{A}$ -step—at least in the lower clause. However, the head of this chain is uncontroversially an element sitting in an A-position. The subject can trigger agreement on the verb, or further A-raise.

- (47) a. These articles take an hour to read *e*.  
 b. This article takes an hour to read *e*.
- (48) a. The article is likely to take an hour to read *e*.  
 b. French seems to take years to learn *e*.

Finally, despite heading an antecedent-gap chain, the referential subject strongly resists being interpreted at the gap site.<sup>5</sup>

- (49) a. Many articles took an hour to read *e*.  
 ≠ It took an hour to read many articles.  
 b. Three languages took a year to learn *e*.  
 ≠ It took years to learn three languages.

We can see a similar effect with bound variables. A variable inside of the referential subject cannot be bound by a quantifier inside of the *for*-CP.

- (50) a. \*Her<sub>*i*</sub> car took an hour for every woman<sub>*i*</sub> to wash *e*.  
 b. \*His<sub>*i*</sub> desk took a year for each boy<sub>*i*</sub> to build *e*.  
 c. \*The tree in front of himself<sub>*i*</sub> took 10 minutes for John<sub>*i*</sub> to draw *e*.

The same point can be made testing for Condition C: there is no violation incurred when there's an R-expression inside of the subject that is coreferential with the subject of the lower clause.

- (51) a. Mary's car took an hour for her to wash *e*.  
 b. John's desk took a year for him<sub>*i*</sub> to build *e*.  
 c. The tree in front of John<sub>*i*</sub> took 10 minutes for him<sub>*i*</sub> to draw *e*.

<sup>5</sup>It's worth noting that the opposite is true as well: elements inside of the *for*-CP cannot be interpreted out of it. This is consistent with the idea the chain does not involve movement, as the *for*-CP is an island for syntax and interpretation.

Finally, although the referential subject appears to be *syntactically* an argument of TAKE, it is *thematically* an argument of the infinitival clause.

- (52) a. \*The tree took an hour.  
b. \*The car took 10 minutes.  
c. \*The desk took 3 days.

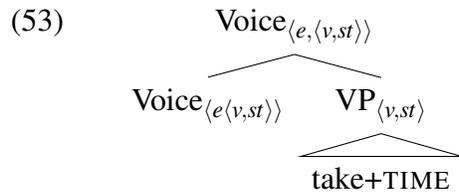
To the extent that we understand (52), it can only be with respect to an implicit event like *chop down*, *start*, *build* respectively. In sum, the antecedent gap chain displays properties of an  $\bar{A}$ -step, which is localized inside of the *for*-CP. Heading this chain is an antecedent in an A-position, and while this argument cannot be interpreted at the gap site, it is thematically associated with the infinitive.

## 5. Proleptic objects and subjects

In this section, I lay out an analysis that can account for the various properties of the referential subject of the TTC. In fact, very little new syntactic machinery is needed. I'll argue that we can introduce an external argument to the VP in exactly the same way as we did with the Middle Subject. We'll also need a way to introduce a variable into a *for*-CP, and to do this I show that independently needed mechanisms for adding arguments to VPs and *for*-CPs can account for the syntactic properties. I propose that the referential subject is introduced as an argument of the main clause in a Voice projection which is "underspecified" for thematic role. I show that this thematic relation is needed independently to introduce a *proleptic object* (Quine, 1956; Davies, 2005; Landau, 2011; Salzmann, 2015). Characteristic of prolepsis is the "aboutness" relation that holds between the proleptic argument and an embedded CP clause. I illustrate how this relation is already predicted given the relationship between the take-TIME VP and the *for*-CP. In ??, I will compare this analysis with a similar account proposed in (Salzmann, 2006, 2015).

## 5.1 Voice and events

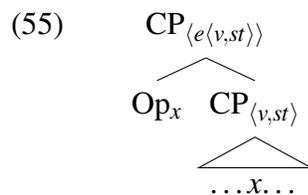
Let's start from the hypothesis that we can type-lift VPs into predicates of individuals of events, as Event Identification allows. To differentiate this from adding a Middle Subject, I will assume that the head that introduces the referential subject is  $\text{Voice}^0$ , although nothing at this point differs between  $\text{Appl}^0$  and  $\text{Voice}^0$ .



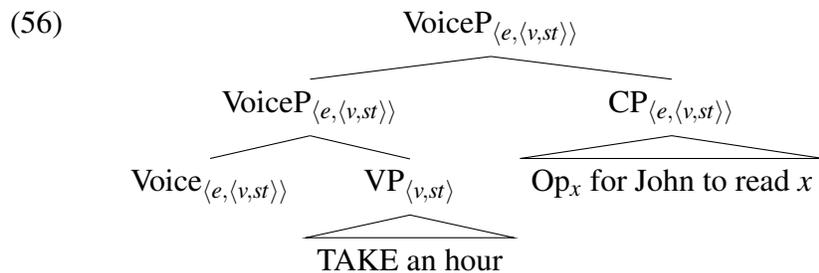
Additionally, assume that there's a method for type-lifting *for*-CPs into predicates of individuals as well. Evidence for such a process is found in the following predication structures (Chomsky, 1977; Browning, 1987).

- (54)
- a. The sandwich is for John to eat  $e$ .
  - b. The paper was for Mary to take notes on  $e$ .
  - c. The vase was to put the flowers in  $e$ .
  - d. This computer is for the students to use  $e$ .

As we've already established that *for*-CPs describe properties of events, then the following schematizes merging a Operator that binds a variable in an infinitival clause (Landau, 2011).

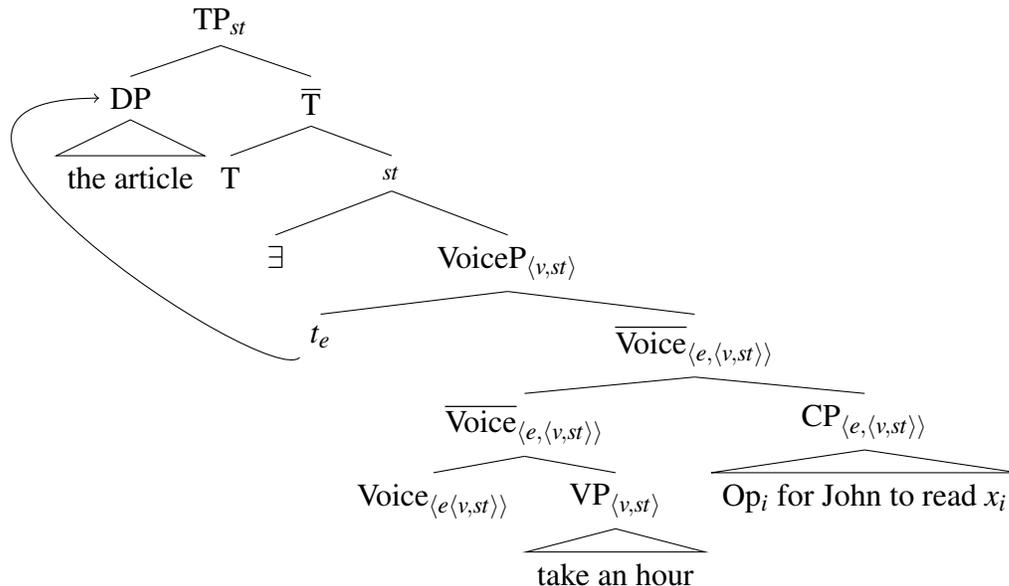


The same modification analysis can apply now to merge the main clause and the *for*-CP. In this case, we're combining two predicates of type  $\langle e, \langle v, st \rangle \rangle$ .



$\text{VoiceP}$  now describes a relation between an individual and an event, in particular an event of reading which measures an hour. We can predicate this of a subject, which interacts with the syntax normally.

(57) The article took an hour for John to read  $e$ .



But how would we describe the meaning of this phrase? What does it mean for this complex predicate to have a “subject?” In particular, what  $\theta$ -role do we assign to *this article*? It certainly cannot be getting one from the verb (phrase), as we saw earlier in (52). Moreover, since it hasn’t originated locally to the the infinitival verb, it cannot be getting thematically licensed in the lower clause either.

Well, consider the Neo-Davidsonian break-down in (58). Assume that “ROLE” stands for the  $\theta$ -role that the subject receives from Voice.<sup>6</sup>

- (58)  $\exists e$  such that  $e$  measures an hour &  $e$  is an event of reading &  $\text{AGENT}(e) = \text{John}$  &  
 $\text{THEME}(e) = \text{the article}$  &  $\text{ROLE}(e) = \text{the article}$

We would get the correct result if it was simply the case that ROLE didn’t conflict with whatever  $\theta$ -role was assigned by the infinitival verb. I propose that Voice in the TTC is “underspecified.” It simply asserts that the event “involves” the argument in its specifier. The denotation for the head Voice<sup>0</sup> is in (59) and the subsequent meaning for the entire tree is in (60). Note that the contribution of assigning the  $\theta$ -role THEME to the object entails the thematic contribution of Voice<sup>0</sup> (in parentheses).

- (59)  $\llbracket \text{Voice}^0 \rrbracket = \lambda x \lambda v \lambda w. e \text{ involves } x \text{ in } w.$

- (60)  $\llbracket (65) \rrbracket^w = \exists e \text{ in } w \text{ such that } e \text{ measures an hour in } w \text{ \& } e \text{ is an event of reading in } w \text{ \& } \text{AGENT}(e)(w) = \text{John} \text{ \& } \text{THEME}(e)(w) = \text{the article} \text{ (\& } e \text{ involves the article in } w)$

But is there independent evidence for the “underspecified” thematic relationship? I think that there is. Consider the sentences in (61) where there is an argument introduced by the preposition *with*.

- (61) a. It took an hour with this article to understand it completely.  
 b. It took 10 minutes with these shoes to tie their laces.  
 c. It took a decade with these kids to discipline them properly.  
 d. It takes years with French to be able to speak it fluently.

<sup>6</sup>Of course, this problem goes away if we relax the stipulation that every external merge position is a  $\theta$ -position. Since this is a theory-internal decision, I will adopt the more restrictive choice and develop an analysis. It would of course be possible to formulate an analysis under the less restrictive framework.

The theoretical term for such phrases is *prolepsis*. The characteristic features of proleptic arguments are that they are formally elements of the main clause, but they form an “aboutness” relationship with an embedded clause, e.g., *John believes of Orcutt that he’s a spy* (Quine, 1956; Davies, 2005; Landau, 2011; Salzmann, 2015).<sup>7</sup> The *with*-PPs here are simply introducing an argument and asserting that the event “involves” this argument. In other words, if the infinitive doesn’t plausibly involve the element in the *with*-PP, the sentence sounds wrong.

- (62) a. #It took an hour with this article to talk to the professor.  
b. #It took 10 minutes with these shoes to eat the pizza.  
c. #It took a decade with these kids to shave my face.  
d. #It takes years with French to sew a sweater.

Given that we need such a relation between DPs and the event, I propose that *with* and Voice in the TTC are, semantically, identical. They both add an argument to the event. They differ syntactically: *with*-phrases are adjuncts, while Voice heads are not.<sup>8,9</sup>

Correlating with whether Appl<sup>0</sup> or Voice<sup>0</sup> is merged is whether the *for*-CP can have a gap. When the DP is in a *with*-PP, there cannot be a gap. This is as expected. (63) are bad because of a type mismatch; the *for*-CP needs to combine with a predicate of individuals, which the VP is not.

- (63) a. \* It took an hour with this article to read *e*.

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<sup>7</sup>Prolepsis is typically associated with intensional predicates. As I have not pursued looking at intensionality involved in the TTC, I will not pursue that the discussion of prolepsis here, but a better understanding of the semantics should take intensionality into account. In particular, we would need a theory for how events are related across worlds. As there are a number of complications in this domain (see (Hacquard, 2011)), I cannot adequately pursue the topic in the space here.

<sup>8</sup>It’s worth noting that *with* PP’s can alternate with Voice in other domains as well, cf (Levin, 1993).

- (i) a. John opened the door with a key.  
b. The key opened the door.  
(ii) a. Mary sank the boat with dynamite.  
b. The dynamite sank the boat.

<sup>9</sup>This is not to say that Voice<sup>0</sup> and Appl<sup>0</sup> are licensed in identical contexts. Intuitively, Voice<sup>0</sup> is the preferred strategy. But, as we’ll see, they are not always interchangeable, in which case Appl<sup>0</sup> may be necessary.

- b. \* It took a year with French to learn *e*.
- c. \* It took a week with this mountain to climb *e*.

That is, a gap is only licensed if the main clause forms a relation between an individual and an event. On the other hand, in the presence of Voice, the gapless *for*-CPs should be fine as well. This is because a *for*-CP of type  $\langle v, st \rangle$  can merge with the VP below Voice<sup>0</sup> (or VoiceP itself). This is indeed the case, as long as the element now covaries with the *subject* of the infinitival clause.<sup>10</sup>

- (64)
- a. The tree took an hour to fall.
  - b. Mary took 10 minutes to die.
  - c. The bus took 20 minutes to arrive.
  - d. John took a year to quit smoking.

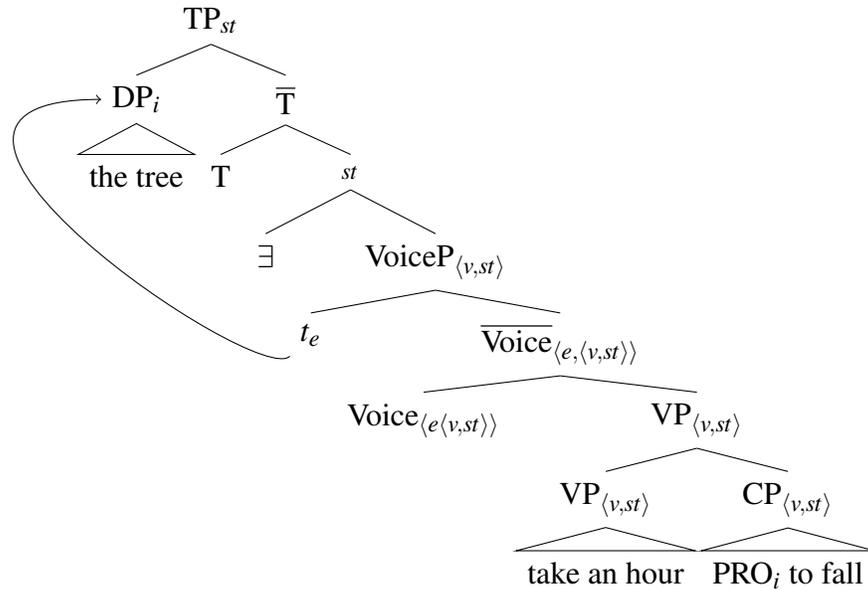
(65) The tree took an hour to fall.

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<sup>10</sup> How do we know that these aren't Middle Subjects that have raised? One piece of evidence comes from languages where applicative morphology is overt, like in Llogoori again.

- (i)
- a. ebasi e-vogul-(\*el)-i esa n-lara kudoka  
 9bus 9-take-(\*APPL)-FV 9hour 9-one 17.arrive  
 'The bus took an hour to arrive.'

Another argument comes from theoretical economy. We would have to posit two "kinds" of Middle Subject, one which raises and one which doesn't. On this present account, whatever is merged in Voice gets to be a subject, and whatever is merged in Appl stays in *in situ*.



To review: introduced in a *with*-PP, the event must “involve” the DP, but there is no restriction on syntactic position, and there cannot be a gap in the *for*-CP. Introduced in Voice, again, the event must “involve” the DP, and there can be either an object gap or a subject gap, but the subject must covary with some unpronounced element in the *for*-CP.

Importantly, the involvement requirement severely restricts the syntactic position where gaps can appear in the infinitival clause. Consider (66).

- (66) a. \*The article took an hour to explain that Mary read *e*.  
 b. \*It took an hour with this article to explain that Mary read it.
- (67) a. \*French took a year to believe that John learned *e*.  
 b. \*It took took a year with French to believe that John learned it.

(66) are bad because they describe an event that measures an hour and involves an article and is an **explaining** event. This is ungrammatical because *the article* isn’t a participant in the explaining event, it’s a participant in the reading event. Likewise, (67) are bad because they describe an event which measures a year, involves French, and is a **believing** event, not a learning event. Effectively, the only things that can be related to the subject of the TTC or the element in the *with*-PP are

arguments of the infinitive, so subjects and objects.

This explanation solves the strange fact that the antecedent-gap chains in the TTC are only “weakly” unbounded in the lower clause. As we observed earlier, they can cross some clause boundaries, mainly infinitives, but they are marked crossing finite clause boundaries. This is surprising since the chain passes a number of other tests for an  $\bar{A}$ -dependency. We can now explain this weak-clause-boundedness as a function of the semantics. The thematic position of the argument must be perceived as related to the event of the infinitive. Thus, some verbs (mainly restructuring verbs) will allow the dependency, while other verbs won’t. The good examples in (69) are better because the VP and the *for*-CP share an event, of which the proleptic argument/subject is involved.

- (68) a. ??It took an hour with Orcutt to decide that Mary likes him<sub>i</sub>.  
 b. ??It takes 10 minutes with these shoes to say that John bought them<sub>i</sub>
- (69) a. ?It took an hour with Orcutt to start to hate him.  
 b. ?It takes 10 minutes with these shoes to manage to get them on.

Finally, it’s important to point out that I have taken a strong, and different, stance on “prolepsis.” At least for the TTC (and the *tough*-construction below), prolepsis is tied to events. When we add an argument to the event of the main clause, it carries over to the event of the embedded clause, provided those events are related. This is not meant to be a comprehensive theory of prolepsis. It seems plausible to me that there are other ways that an “aboutness” relation can be formed. The proposal is constrained only to the TTC, and later, the *tough*-construction. Other cases of prolepsis should be investigated separately.

## 6. Interaction of the subjects

We now have two ways for introducing an argument into the main clause. One way results in a Middle Subject interpretation, while the other results in an antecedent-gap construction. Indeed, both elements can be present at once.

- (70) a. The article took Mary an hour to read  $e$ .  
b. French took John a year to learn  $e$ .

Observe that the referential subject exhibits properties of reconstruction below the Middle Subject.

- (71) a. His <sub>$i$</sub>  theory took no author <sub>$i$</sub>  a week to prove  $e$   
b. Her <sub>$i$</sub>  car took no woman <sub>$i$</sub>  an hour to wash  $e$ .  
c. A copy of his <sub>$i$</sub>  homework takes no student <sub>$i$</sub>  10 minutes to make  $e$ .

Note that this is a distinct result from the observation that the referential subject cannot be interpreted as the gap site. Compare (71) with (72), where the quantifier is inside of the *for*-CP.

- (72) a. \*His <sub>$i$</sub>  theory took a week for no author <sub>$i$</sub>  to prove  $e$   
b. \*Her <sub>$i$</sub>  car took an hour for no woman <sub>$i$</sub>  to wash  $e$ .  
c. \*A copy of his <sub>$i$</sub>  homework takes 10 minutes for no student <sub>$i$</sub>  to make  $e$ .

The same point can be made with Condition C. A violation is incurred when there is a Middle Subject, but not when the subject is inside of the *for*-CP.

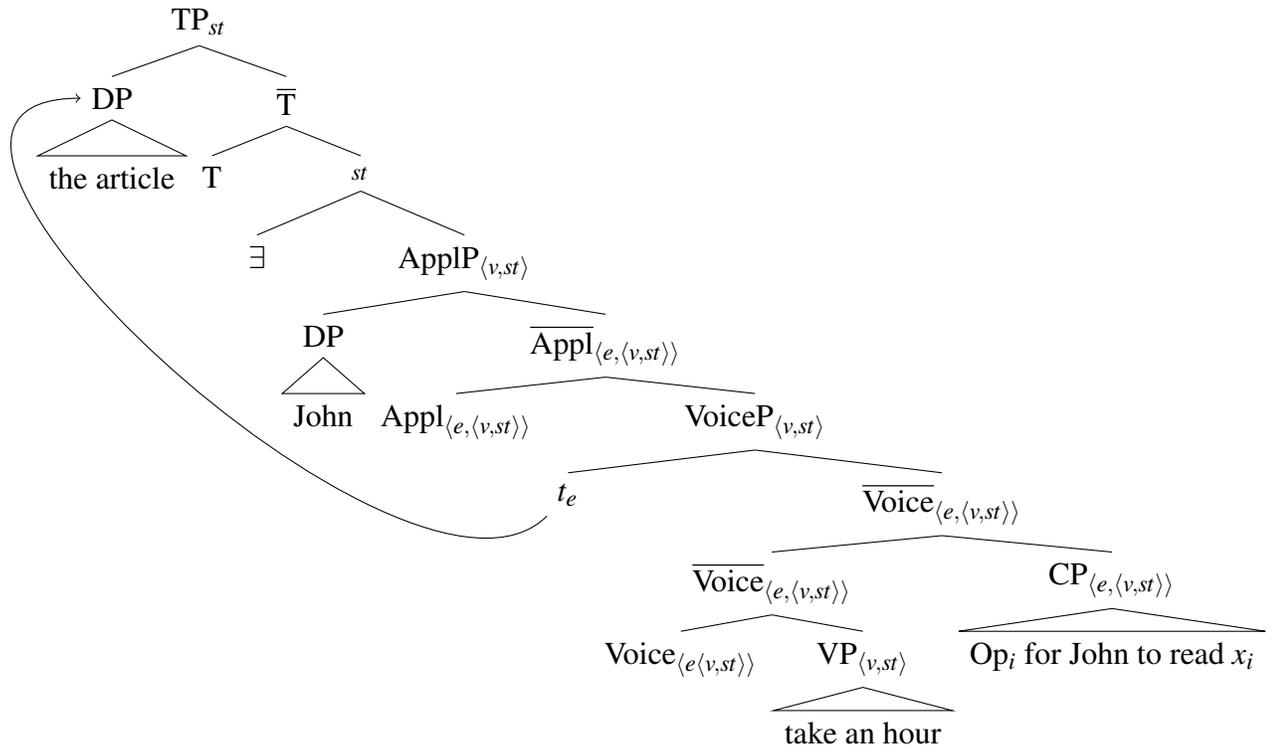
- (73) a. \*John <sub>$i$</sub> 's theory took him <sub>$i$</sub>  a week to prove  $e$ .  
b. \*Mary <sub>$i$</sub> 's car took her <sub>$i$</sub>  an hour to wash  $e$ .  
c. \*A copy of Susan's homework took her <sub>$i$</sub>  10 minutes to make  $e$ .
- (74) a. John <sub>$i$</sub> 's theory took a week for him <sub>$i$</sub>  to prove  $e$ .  
b. Mary <sub>$i$</sub> 's car took an hour for her <sub>$i$</sub>  to wash  $e$ .  
c. A copy of Susan's homework took 10 minutes for her <sub>$i$</sub>  to make  $e$ .

That is, we have evidence that the referential subject originates in a position below the Middle Subject, but not inside of the *for*-CP. The structure that can accomplish this is given in (75-b). It involves two applications of Event Identification, where Appl<sup>0</sup> targets the constituent that includes

the referential subject.

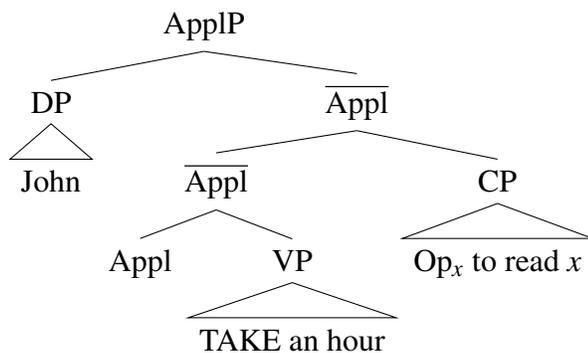
(75) a. The article took John an hour to read *e*.

b.



Moreover, observe that this is the only configuration that satisfies the various constraints. For instance, suppose we let the CP target  $\overline{\text{Appl}}$ , as in (76-a). The meaning we would derived for this constituent (ignoring issues of PRO) is in (76-b).

(76) a.



b.  $\llbracket(76\text{-a})\rrbracket = \lambda e \lambda w. e$  measures an hour in  $w$  & John measures out  $e$  &  $e$  is an event of PRO reading **John**.

For the semantic composition to work out, the *for*-CP must combine with Voice in order for the gap to co-vary with the correct argument.

Now suppose that Voice merged above Appl. On the one hand, we couldn't explain the fact that the Middle Subject can bind into the referential subject, nor would be have good way to establish the control relationship between the Middle Subject and *for*-CP.<sup>11</sup>

Thus, the configuration in (75-b) is the only possible ordering of elements within the given framework that satisfies the constraints. That said, the geometry in this tree introduces a number of interesting and problematic issues. Some I think have reasonable responses, others are more mysterious.

First, it's generally thought that (High) Applicatives occur below the position where the external argument is introduced (Pylkkänen, 2008) (among many others). Now, it's important to keep in mind that the labels "Appl" and "Voice" come with theoretical baggage. I've adopted this terminology simply to illustrate some parallels, but it's important to consider that these might be functionally very different elements, specific to the TTC. Moreover, I think if we elaborate on the aspectual nature of the particular Appl head suggested here we would have a better explanation. As I suggested earlier, it's possible that it merges above an aspectual layer, not directly onto Voice. Finally, I'll note that there are suggestions that there can be applied arguments which target positions quite high in the tree (Cuervo, 2003; Kim, 2011, 2012).<sup>12</sup>

<sup>11</sup>There is one alternative that we could adopt which involves inventing a new Event Identification, allowing us to add an argument to a predicate of individuals.

- (i) *Event Identification II*  
 $\langle e, \langle e, \langle v, st \rangle \rangle \rangle \langle e, \langle v, st \rangle \rangle \rightarrow \langle e, \langle e, \langle v, st \rangle \rangle \rangle$

Allowing such a process would massively over-generate where we are allowed to add applied arguments—in English and cross-linguistically—and so it should be argued for with extreme caution.

<sup>12</sup>In particular, I refer the reader to (Kim, 2012) who posits an Appl projection above Voice to account for "experiencer HAVE."

- (i) a. John had Mary punch him in the nose.  
 b. [<sub>ApplP</sub> John [<sub>VoiceP</sub> Mary [<sub>vP</sub> punch him in the nose ] ] ]

To the extent that HAVE and TAKE are related via lexical decomposition, Kim's analysis and my own might be unified.

Second, there is an issue of locality. How is it possible that the subject can move *across* another DP argument? Note that merely positing that the Middle Subject is “defective” (Chomsky, 2000) isn’t an adequate explanation, as we need to explain why it’s possible to cross Middle Subjects, but not interveners in the Double Object Construction, e.g., \**The ball was kicked Mary*. This I find to be a complex and theoretically challenging issue, and I cannot address it properly here. It has been suggested in (Gluckman, 2016), that such defective intervention (or defective “non-intervention”) is actually dependent on semantic factors, rather than (purely) syntactic factors, and this seems a plausible line of research to pursue.

Third, given that there need not be a gap in the *for*-CP, we might wonder whether we over-generate again, allowing a Middle Subject to co-vary with a non-subject argument. However, in general I do not think this will be a problem. If there is a DP in Voice and there isn’t an operator-gap in the *for*-CP, then the DP must covary with the subject of the infinitive. This was the conclusion we reached above. If this is the case, then obligatory control cannot be established with anything else, namely, an element in spec-Appl.

## 7. Extension to the *tough*-construction

Having laid out an account of the TTC, now let me extend the analysis to a much more familiar, though equally complex, beast. The *tough*-construction in ((77)) has received a large amount of attention in the literature.

- (77) a. It was difficult to read this book.  
 b. This book was difficult to read *e*.

One major line of research centers on the antecedent-gap chain created in (77-b). The chain consists of an  $\bar{A}$ -step in the lower clauses, which is headed by the subject in an A-position (Chomsky, 1977; Browning, 1987; Jones, 1991) among many others. Moreover, while displaying a number of  $\bar{A}$ -properties, the chain is “weakly” clause-unbounded in the lower clause. It can cross some, but not all, clause boundaries.

- (78) a. This book was difficult to try to read *e*.  
b. ??This book was difficult to want to read *e*.  
c. This book was difficult to convince Mary to read *e*.  
d. \*This book was difficult to think that John read *e*.  
e. \*This book was difficult to decide to read *e*.

These various noted properties should look familiar by now, as they are exactly parallel to what I've explored in the TTC above. In this section, I'll briefly show that what was proposed above carries over to the *tough*-construction directly.

The first step is to show that *tough*-predicates is a predicate of events.<sup>13</sup> They can take event-nominal subjects, but not individual-denoting subjects.<sup>14</sup>

- (79) a. Running the race was difficult/easy/impossible/...  
b. Building the house was difficult/easy/impossible/...  
c. The destruction of the city was difficult/easy/impossible/...
- (80) a. \*John was difficult/easy/impossible/...  
b. \*The car was difficult/easy/impossible/...  
c. \*The tree was difficult/easy/impossible/...

The examples in (80) can only be felicitous if they are understood to include an implicit event, like *to talk to*, *to drive*, *to chop down*, respectively. But *difficult/easy/impossible/...* cannot by themselves be predicates of individual-denoting nominals. Therefore, I give *tough*-predicates a

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<sup>13</sup>Pesetsky (1987); Jones (1991); Hartman (2012); Longenbaugh (2015) all observe that there is at least an implicit relation between events and the *tough*-construction, although they do not make the jump to consider that they are full predicates of events.

<sup>14</sup>It's worth noting that not all *tough*-predicates are *always* eventive. Adjectives like *important/fun/disgusting* can be predicates of individuals as well.

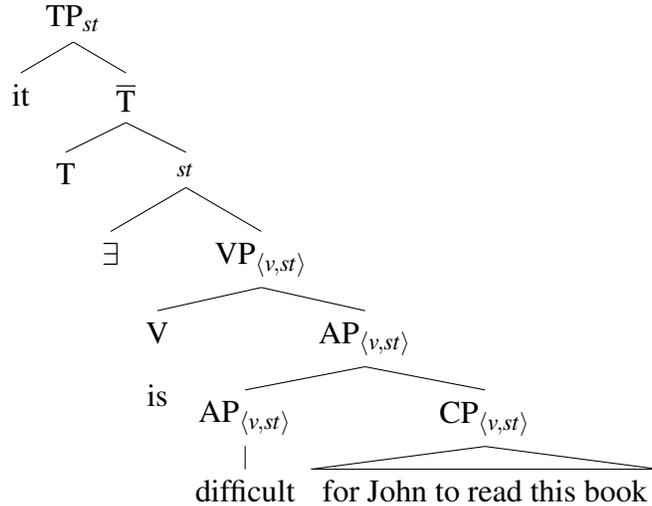
- (i) a. John is important/fun/disgusting.  
b. Running is important/fun/disgusting.

I assume that some predicates are simply ambiguous between being predicates of events and predicates of individuals.

denotation as in (81-a). Together with the established denotation for *for*-CPs give us the LF and meaning in (81-b) and (81-c).<sup>15</sup>

(81) a.  $\llbracket \text{difficult} \rrbracket = \lambda e_v \lambda w_s. e \text{ is difficult in } w$

b.



c.  $\llbracket (81\text{-b}) \rrbracket^{w, \text{AH}} = 1$  iff There's an event  $e$  in  $w$  such that  $e$  is difficult in  $w$  and  $e$  is a reading-this-book event in  $w$ .

As before, we might ask what evidence there is to treat the relationship between the adjective and the *for*-CP as modification, rather than argumenthood. Besides an appeal for a parallelism with the TTC, the *tough*-construction provides some additional arguments in favor of a modification relationship. For space reasons, I focus on one here.<sup>16</sup> (Other arguments can be formed from looking at linear ordering, and the *for*-CP can be predicated of a nominalized *tough*-adjective.)

A convincing argument comes from nominalizations. As discussed in (Grimshaw, 1990), event-nominalizations can sometimes appear with an (internal) argument.

<sup>15</sup>I leave out here an important but orthogonal issue, which is that *tough*-predicates fall into the class of *judge-dependent* elements (Lasnik, 2005; Stephenson, 2007; Pearson, 2013). A more accurate denotation would include a judge element, putting aside some issues about how (or whether) the judge is represented syntactically.

(i)  $\llbracket \text{difficult} \rrbracket = \lambda e \lambda x \lambda w. e \text{ is difficult to } x \text{ in } w$ .

<sup>16</sup>In the following discussion, many of the arguments against treating the the *for*-CP as an argument come from recent work (Kratzer, 2006; Moulton, 2009) (see also (Stowell, 1981; Grimshaw, 1990)) where the selectional relationship involving *that*-CPs has also been brought into question.

- (82) a. the examination of the students  
 b. the destruction of the city  
 c. the discussion of the theory

*Tough*-predicates can nominalize, of course, and they can appear with an argument (which are event-denoting nominals), but they cannot appear with a *for*-CP.

- (83) a. the difficulty  $\left\{ \begin{array}{l} \text{of the exam} \\ *to\ \text{finish the exam} \end{array} \right\}$   
 b. the importance  $\left\{ \begin{array}{l} \text{of this theory} \\ *to\ \text{prove this theory} \end{array} \right\}$   
 c. the simplicity  $\left\{ \begin{array}{l} \text{of the plan} \\ *to\ \text{execute the plan} \end{array} \right\}$   
 d. the each  $\left\{ \begin{array}{l} \text{of at-home check-in} \\ *to\ \text{check in at home} \end{array} \right\}$

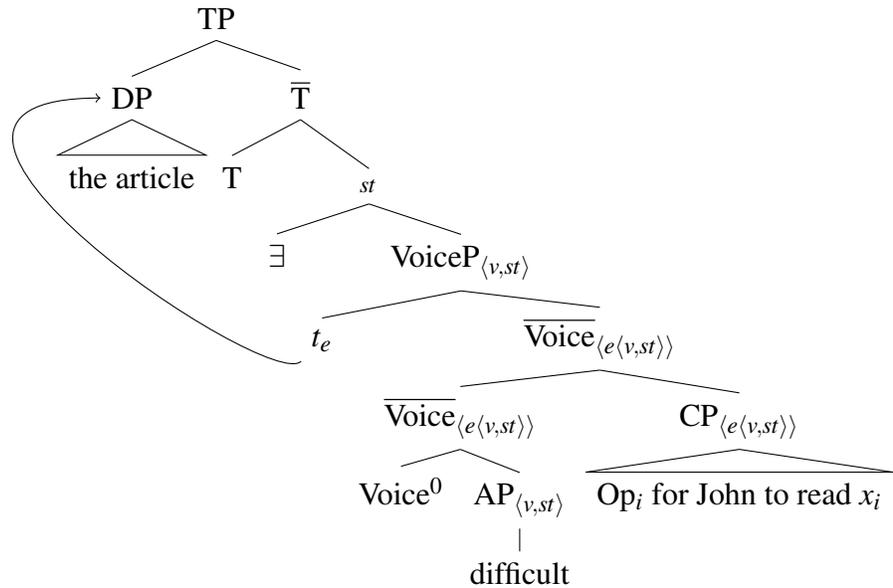
The ungrammatical examples cannot be due to a simple constraint that bans *for*-CPs from cooccurring with event-nominals.

- (84) a. the battle to win the throne  
 b. the examination of the students to assess their competence.

Thus, we can observe in (83) that *tough*-adjectives can be nominalized, and they can appear with an argument, but they cannot appear with a *for*-CP, illustrating that *for*-CPs act differently from “true” arguments. I conclude from this that the *for*-CP and the *tough*-predicate are in a modification relationship, as shown in (81-b).

Since *tough*-predicates are properties of events, it’s possible to give them an argument via Event Identification and underspecified Voice<sup>0</sup>. The *for*-CP+operator modifies this new phrase just as before.

- (85) a. This article was difficult to read  $e$ .  
 b.



- c.  $\llbracket (85\text{-b}) \rrbracket^w = 1$  iff  $\exists e$  in  $w$  such that  $e$  is difficult in  $w$  &  $e$  is an event of reading in  $w$  & AGENT( $e$ )( $w$ ) = John and THEME( $e$ )( $w$ ) = this article (&  $e$  involves this article in  $w$ )

Of course, this is not the typical use of Event Identification and Voice<sup>0</sup>. We typically restrict the process to apply only to VPs. But this is because VPs are typically seen as the only things in the sentences which are properties of events. Event Identification can hypothetically apply to any predicate that is of type  $\langle v, st \rangle$ . It's not categorically restricted.

There is empirical support for adding the underspecified Voice<sup>0</sup> to the *tough*-predicate. We first observe that *with*-prolepsis is possible with the *tough*-construction. The phrases are infelicitous if the infinitival clause doesn't involve the proleptic object.

- (86) a. It was difficult with this book to read it.  
 b. It's easy with this car to drive it.  
 c. It's important with these shoes to tie them tight.
- (87) a. #It was difficult with this article to talk to Mary.

- b. #It's easy with this car to sleep at night.
- c. #It's important with these shoes to shave my face.

We similarly see restrictions on what the proleptic object can be associated with in the infinitival clause, and these restrictions correlate with whether there can be a gap.

- (88) a. It was difficult with this article to convince Mary to read it.
- b. This article was difficult to convince Mary to read *e*.
- (89) a. It's important with this shirt to try to keep it clean it
- b. This shirt is important to try to keep clean *e*.
- (90) a. \*It's easy with Mary to think that John dumped her
- b. \*Mary is easy to think that John dumped *e*.
- (91) a. \*It's important with this book to want to read it.
- b. \*This book is important to want to read *e*.

(90) and (91) are bad for the same reason as observed with the TTC. The easy and important events are not dumping and reading events, respectively. Thus we see that the analysis offered for the TTC maps to the *tough*-construction without any further stipulation.

Of course, there are differences between the *tough*-construction and the TTC. the *tough*-construction does not have a version which includes a Middle Subject. This is as expected since Appl<sup>0</sup> needs to apply to a VP includes a non-stative event. (Or alternatively, only merges above an Aspect projection.) *Tough*-predicates are adjectives,<sup>17</sup> and so do not include aspect as part of their meaning. Thus, because the Middle Subject is dependent on Aspect being in the syntax, the *tough*-construction cannot have a Middle Subject.

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<sup>17</sup>Actually, there are some *tough*-nouns, but the same restriction applies to them as well.

- (i) a. This book was a pleasure to read *e*.
- b. This car is a pain to drive *e*.

## 8. Conclusion

There are a number of open questions to pursue. Most prominently, can the analysis for the TTC and *tough*-construction be extended to other superficially similar examples, like *too/enough* clauses (*This book was too long to read e*), psych-verbs (*War frightens me to think about e* Pesetsky (1987)), or *cost* (*This book cost me \$20 to print e*)? The answer depends on how much these structures can be shown to interact with events. At least for the latter two, I think there is ample evidence that events are needed to understand the meaning; it is less clear to me that events figure prominently in the analysis of *too/enough*-degree clauses.

An additional much broader question is the overall distribution of *for*-CPs. Are they always predicates of events—even when they combine with verbs, e.g., *John waited for the bus to arrive*? This must remain an open question pending further investigation. That said, it's worth noting that treating the *for*-CP as a modifier rather than an argument of the Take-TIME VP and *tough*-predicate parallels the treatment of finite clauses (*that*-CPs) as proposed in (Kratzer, 2006; Moulton, 2009) *et seq.* It is possible that uniform treatment of clausal “complements” can be formulated by treating all CPs as fundamentally modifiers.

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