The Syntax and Semantics of the *Tough*-Construction

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Abstract. This paper investigates the *tough*-construction. I identify events as the unifying element for the *tough*-predicate and the *for*-CP, providing a compositional syntax and semantics. By adopting proposals from (Moulton, 2009) and (Hacquard, 2010) into the analysis of *for*-CPs, I show how various syntactic and semantic properties of this construction are straightforwardly derived. In addition, the analysis proposes a generalized strategy for CP syntax and semantics, following (Kratzer, 2006; Moulton, 2009). I follow (Salzmann, 2015) in spirit, but not formalism, and I illustrate how referential subjects of the *tough*-construction 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 provide a compositional syntax and semantics for the *tough*-construction, in (1).

(1) a. It was difficult to read this article.

b. This article was difficult to read *e*.

In fleshing out this alternation, I'll illustrate how two independent lines of research converge in the analysis of *for*-CPs. We'll see that the line of inquiry pursued in (Moulton, 2009, 2013, 2015) on finite CPs, and the line of inquiry in (Hacquard, 2006, 2009, 2010) on the semantics of events/eventualities are needed to understand the complex syntax and semantics of the examples in (1). The core proposal here is that a compositional syntax and semantics which includes reference to events derives the various properties that characterize the *tough*-construction.

The following work builds off of the numerous previous attempts to capture the alternation in (1) (Postal and Ross, 1971; Postal, 1974; Chomsky, 1977; Lasnik and Fiengo, 1974; Chomsky, 1981; Browning, 1987; Jones, 1991; Mulder and den Dikken, 1992; Hicks, 2003, 2009; Řezáč, 2006; Hartman, 2011, 2012; Longenbaugh, 2016; Salzmann, 2015; Keine and Poole, 2015) (among many others). Two general accounts have been put forth. In one, the subject (improperly) moves to its surface position (Postal and Ross, 1971; Chomsky, 1981; Hicks, 2003, 2009; Hartman, 2011, 2012; Longenbaugh, 2016). In another, the relationship is formally predication, where the matrix subject is generated in the matrix clause and the adjective plus *for*-CP are predicated of it (Chomsky, 1977; Lasnik and Fiengo, 1974; Browning, 1987; Mulder and den Dikken, 1992; Řezáč, 2006; Salzmann, 2006, 2015; Keine and Poole, 2015).

After briefly reviewing the core properties of the *tough*-construction (section 1) and previous analyses (section 2), I show that an understanding of the syntax and semantics of *events* (or eventualities) is a crucial component in analyzing the *tough*-construction (section 3). Simply put, *tough*-predicates describe properties of events. In section 4 and section 5, I extend the discussion of events by generalizing recent proposals from (Moulton, 2009) *et seq* and (Hacquard, 2006) *et seq* to apply to *for*-CPs: *for*-CPs can be predicates of events, too, and they can combine with other predicates of events via predicate modification. The key bit of meaning that I argue is necessary for any account of the *tough*-construction is that the events of the main-clause and the *for*-CP are in a "similarity relationship." With this in hand, in section 6 I propose, following (Salzmann, 2006, 2015) that so-called *tough*-movement is best analyzed as a form of *prolepsis*: the *tough*-subject has the semantics of a proleptic argument in the matrix clause. However, I argue that the "aboutness" relation that is proposed to characterize prolepsis is merely the reflex of the previously mentioned similarity relation. The analysis takes advantage of a prediction made by (Kratzer, 1996) *et seq* about adding arguments to events. Since *tough*-predicates are shown to be eventive, we should be able to give them a "subject." I argue that this subject is the referential subject in *tough*-construction.

I will explore the consequences of my proposals in section 8. We'll see that the analysis correctly captures data beyond the *tough*-construction. Finally, in subsection 8.3, I'll address some

issues involving intervention, exploring what happens when *for*-CPs are forced to displace.

1. Properties of the *tough*-construction

The *tough*-construction displays a rather unique set of properties. On the one hand, there is a "weak" $\overline{\text{A}}$-movement in the lower clause (Chomsky, 1977)—"weak" because it's not entirely unbounded. For instance, it passes most tests for $\overline{\text{A}}$-extraction like a ban on extraction of Goals in Double Object constructions (2) and being able to license parasitic gaps (3). And while it can indeed cross some clausal boundaries (4) it cannot cross all of them (5).

(2)   a.   *John was difficult to read *e* the book.

         b.   *Mary was easy to send *e* the package.

(3)   a.   The book was difficult to file *e* after reading *pg*.

         b.   The article was fun to read *e* after writing *pg*.

(4)   a.   This book was difficult to convince Mary to read *e*.

         b.   This article was easy to believe Mary read *e*.

(5)   a.   *The book was difficult to say that John read *e*.

         b.   *This book was easy to realize that Mary read *e*.

Thus, on the one hand, the *tough*-construction appears to contain a fairly vanilla $\overline{\text{A}}$-chain. On the other hand, the head of this chain is an argument which is sitting in a thematic position, the subject of the clause. This subject passes tests for being thematically an element of the matrix clause, like agreement on the verb (6) and raising (7).

(6)   a.   The books were difficult to read *e*.

         b.   The rocks were easy to lift *e*.

(7)   a.   The book appears to be difficult to read *e*.

         b.   The rock is likely to be easy to lift *e*.

The head of the antecedent-gap chain in the *tough*-construction also displays somewhat unexpected interpretative properties. In particular, the subject cannot be interpreted at the gap site (Postal, 1974; Fleisher, 2013).

(8)   a.   Many books are important to read *e*.

            cannot mean It is important to read many books.

       b.   A few children are easy to teach *e*.

            cannot mean It is easy to teach a few children.

This lack of a lower reading contrasts sharply with "normal" A-movement, where such reconstruction is available.

(9)   a.   Many books are likely to be sold.

            can mean It is likely that many books will be sold.

       b.   A few children seem to be sick.

            can mean It seems that a few children are sick.

Similar facts can be observed with variable binding. A bound variable in the referential subject cannot be interpreted in the scope of a quantifier in the *for*-CP.[1]

(10)   a.   *The brother of his$_i$ girlfriend is important for every boy$_i$ to meet *e*.

        b.   *The graffiti on her$_i$ car is difficult for every woman$_i$ to scrape off *e*.

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[1]It is sporadically noted that the *tough*-construction displays certain reconstruction effects (Sportiche, 2006; Hicks, 2009; Salzmann, 2006).

(i)   a.   Pictures of his$_i$ family are hard for no photographer$_i$ to sell *e*
       b.   Pictures of his$_i$ friends are easy to persuade every photographer$_i$ to sell *e*.

                                                            (Sportiche, 2006, exx (30), (31))

       c.   Pictures of himself$_i$ nude are tough for me to think that any man$_i$ would like *e*.

                                                            (Salzmann, 2006, ex (666a))

As all known instances of such binding involves "logophoric" NPs like *picture*, I find these cases unconvincing. Indeed, controlling for this factor, as I have done in (10), gives a more accurate picture of the variable binding facts.

From the point of the view of interpretation, the subject appears to be strongly associated with the main-clause predicate. Importantly however, the subject isn't *thematically* an argument of the main clause, as (11) illustrate.

(11)   a.   The mountain was difficult to climb $e \longrightarrow$?? The mountain was difficult.

        b.   The tree was easy to chop down $e \longrightarrow$?? The tree was easy.

        c.   The laces were tough to tie $e \longrightarrow$?? The laces were tough.

To the extent that the sentences after the arrow are grammatical, they can only be interpreted with respect to an implicit event, e.g., "The mountain was difficult to climb/descend/paint/..." and "The tree was easy to chop down/climb/paint/...." This suggests that, despite the interpretative ties to the main-clause predicate, the *tough*-subject is thematically an argument of the infinitival verb.

2. Previous analyses

There are currently two main proposals for how infinitival object gaps should be derived. Under the Movement analysis, the infinitival gap is derived via movement out of the lower clause (Postal and Ross, 1971; Chomsky, 1981; Hicks, 2009; Hartman, 2011; Longenbaugh, 2016). The general idea behind the movement analysis is that the subject is thematically licensed in the *for*-CP and moves into its surface position "improperly," that is by first undergoing an $\overline{\text{A}}$-step, followed by an A-step.[2]

In the other camp, the predication analysis, $\overline{\text{A}}$-movement/merge of an Operator in the lower clause creates a predicate out of the infinitival CP (Akmajian, 1972; Chomsky, 1977; Browning, 1987; Jones, 1991; Řezáč, 2006; Salzmann, 2015; Keine and Poole, 2015). This derived predicate combines with the *tough*-adjective which is in turn predicated of the subject.

In terms of empirical coverage, I think that the predication analysis has an edge. It systematically accounts for the fact that there is no reconstruction into the *for*-CP. Moreover, we don't have

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[2]Although (Longenbaugh, 2016) proposes that there is restructuring and the subject undergoes "long-movement" into spec-TP. The $\overline{\text{A}}$-diagnostics above show that this is not a possible derivation in English.

to postulate the theoretically troublesome process of improper movement, or have to deal with issues of Case. (Does the moved element receive case in both positions? See (Hornstein, 2001).) We merely need to entertain that the *for*-CP is a predicate by virtue of some operator (movement) (Chomsky, 1977; Browning, 1987; Jones, 1991; Landau, 2011), and that there's a relationship between the *for*-CP and the matrix predicate. The tricky part is that we have to decide how the subject is thematically licensed. To make the predication analysis work, there needs to be a way to generate the subject in the matrix clause in an apparently non-thematic position. This topic will be taken up in section 6. But before we get there, we need to understand more about how *for*-CPs combine with the main clause.

3.   Events and the *tough*-construction

Here are the takeaway points from this first part of the paper: 1) *Tough*-predicates are predicates of events, and *for*-CPs can be, too. 2) *For*-CPs are modifiers, not arguments, of the *tough*-predicate. I justify these claims in the following sections.

It has been somewhat obliquely noted that *tough*-predicates concern events in some way (Pesetsky, 1987; Jones, 1991; Hartman, 2012; Longenbaugh, 2015). In fact, they are simply predicates of events. They can take event-nominal subjects, but not individual-denoting subjects.[3]

(12)   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.

(13)   a.   *John was difficult/easy/impossible.

b.   *The car was difficult/easy/impossible.

c.   *The tree was difficult/easy/impossible.

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[3]Keep in mind that not all *tough*-predicates are always eventive. Adjectives like *important/fun/disgusting* can be predicates of individuals as well. I return to this topic later.

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

The examples in (13) can only be felicitous if they are understood to include an implicit event, like *to talk to, to drive, to chop down*. But the *tough*-predicates cannot by themselves be predicates of individual-denoting nominals. A simple denotation for *tough*-adjectives is given below.[4]

(14)   ⟦difficult⟧ = $\lambda e_v \lambda w_s$. e is difficult in w

Thus, the meaning of (12-a) is that there's an event of running the race, and this event was difficult.

(15)   ⟦Running the race was difficult⟧^{w} = 1 iff $\exists e$ in w such that e was a running-the-race event in w & e was difficult in w.

As *tough*-predicates are predicates of events, individual-denoting subjects are correctly banned.

4. *For*-CPs are eventive, too

For-CPs are also eventive elements. Observe first that *for*-CPs can denote events. For instance, they can refer to events that startle/amaze/frighten (16), and be deictically referred to as events (17), or be (iterated) occurrences (18).

(16)   a.   (For John) to open the door startled me.

         b.   (For the magician) to make the rabbit vanish out amazed me.

         c.   (For the Cubs) to win excited John.

(17)   a.   Yes, that (event) startled me, too.

         b.   Yes, that (event) amazed me, too.

         c.   Yes, that (event) made Mary excited, too.

(18)   a.   (For John) to skip school was a frequent occurrence.

         b.   (For the magician) to make the rabbit vanish was a one-time occurrence.

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[4]The ontology of types I assume includes: v is the type of events (e), s is the type of worlds (w), e is the type of individuals ($x, y, z, \ldots$).

c.   (For the Cubs) to win was not a frequent occurrence.

Moreover, we've already established that *tough*-predicates need an eventive subject, and since the *for*-CP can be a subject of these phrases, this is further evidence that *for*-CPs denote events.

(19)   a.   (For John) to read this book was difficult/easy/impossible.

   b.   (For the tree) to grow new leaves was difficult/easy/impossible.

   c.   (For the Cubs) to win the World Series was difficult/easy/impossible.

   For-CPs can also be equated with event nominals (uncontroversially of type $\langle v, st \rangle$) in (20), but not individual-denoting nominals (21).

(20)   a.   The battle was [to control the kingdom]

   b.   The examination of the students was [for John to assess their potential]

   c.   The game was [for everyone put up their thumbs and shut their eyes]

   d.   The homework was [to do five problems from the book]

(21)   a.   *The examination on the table was for John assess the potential of the students.

   b.   *The chair was to eat dinner.

   c.   *The tree was for us to sit.

   d.   *The students were for the professor to teach class.

Given the equation with event nominals, we conclude that *for*-CPs are of the same type. As a starting place, I give *for*-CPs the denotation in (22). There are many additional complications that I'm ignoring; I'll revise (22) in a moment.

(22) $[\![_{CP} \text{ for John to read this book }]\!] = \lambda e_v \lambda w_s.\text{John reads-}e \text{ this book in } w$

This correctly captures the equative use, as in (20) above (*modulo* some semantic issue discussed presently), as well as the meaning of a *for*-CP when there has been existential closure over events,

presumably when it occurs as a subject. I return in a moment to this closure operation, as well as further issues involving the semantics of *for*-CPs. Before this, I will address the syntactic question of how the *for*-CP relates to the main predicate in the *tough*-construction.[5]

5.   *For*-CPs are adjuncts, not complements

With the understanding that *tough*-predicates and *for*-CPs are (or at least can be) predicates of events, we must ask what the relationship is between the adjective and the *for*-CP. For the *tough*-construction, the assumption that has been almost ubiquitously adopted in the literature is to suppose that the *for*-CP is selected by the adjective. Evidence for such an analysis comes from the apparent parallelism between *for*-CPs and finite CPs, e.g., *John said that Mary left,* which have traditionally been assumed to be complements. In addition, *for*-CPs cannot be iterated, as we might expect if we treated them as being selected by the matrix predicate.

(23)   *It was difficult [for John to leave] [for Mary to arrive]

However, I will argue, adopting ideas from (Kratzer, 2006; Moulton, 2009, 2015), that *for*-CPs are *modifiers* of the matrix predicate, not arguments of it. Since all the elements under discussion are of type $\langle v, st \rangle$, *for*-CPs simply merge with *tough*-predicates and are interpreted via predicate modification (Heim and Kratzer, 1998). Once the *tough*-predicate and *for*-CP combine, the resulting complex predicate needs an event, which is provided by event closure in (24). As there is no referential subject filling spec-TP, an expletive/pleonastic subject is inserted. (In the trees below, I ignore the contribution of tense, and treat the copula as semantically vacuous.)

(24)   *Event Closure*   (Moulton, 2015, p. 25)

$$[\![\, \exists \,]\!] = \lambda p_{\langle v,st \rangle} \lambda w. \, \exists e \text{ such that } p(e)(w) = 1$$

(25)   a.   It's difficult for John to read this book

        b.

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[5]For simplicity, I will ignore how PRO is specified in the discussion below. This is merely for expositional purposes given the long literature on PRO.

```
                    TP_st
                  /      \
                it         T̄
                         /    \
                        T       st
                       / \     /   \
                      ∃    VP_⟨v,st⟩
                          /         \
                         V           AP_⟨v,st⟩
                        / \         /        \
                       is  AP_⟨v,st⟩          CP_⟨v,st⟩
                            |           /            \
                        difficult    for John to read this book
```
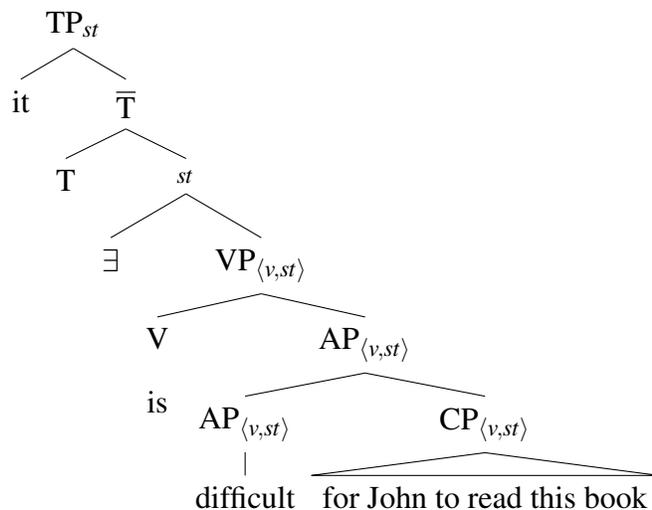
Roughly, what this tree means is, "There's an event such that this event was difficult and this event was John reading this book." And this seems to match our intuitions about the meaning of the sentence.

However, there's an alternative analysis in which the *for*-CP always denotes an event and just combines with the *tough*-predicate via function composition. (26) is truth-conditionally equivalent to (25).

(26)   a.   It's difficult for John to read this book

      b.

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                    TP_st
                  /      \
                it         T̄
                         /    \
                        T      VP_⟨st⟩
                              /        \
                             V          AP_⟨st⟩
                            / \        /       \
                           is  AP_⟨v,st⟩        CP_⟨v⟩
                                |          /          \
                            difficult   for John to read this book
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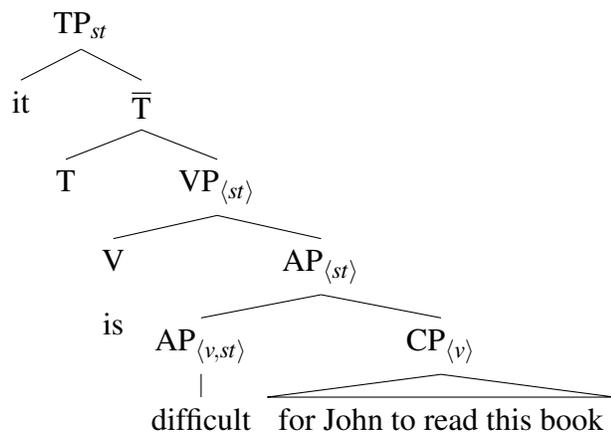
At first blush, this is a tempting solution as it matches the idea that CPs are arguments of finite verbs. Moreover, this analysis seems to be independently needed for when the *for*-CP is a subject (*modulo* Stowell's (1981) evidence that CPs cannot be subjects). However, despite this initial intuition, there is evidence that *for*-CPs are not arguments of the main predicate.

For one thing, linear ordering of the predicate and the *for*-CP isn't "tight" like complementation. For instance, adjectives with true complements typically do not allow intervening material/extraposition. *For*-CPs, on the other hand, reorder freely. (Cf the data in (Bruening, 2014) discussed below.)

(27)　　a.　　John was proud of his son yesterday.

　　　　b. ??John was proud yesterday of his son.

(28)　　a.　　It was important (yesterday) to read this book (yesterday).

　　　　b.　　It will be difficult (tomorrow) to schedule a meeting with the dean (tomorrow).

A more persuasive argument comes from nominalizations. Moulton (2009, 2015) builds a compelling argument from (Stowell, 1981; Grimshaw, 1990) that finite CPs (*that*-CPs) are not arguments. The basic idea is that *that*-CPs do not behave like arguments of nominalizations. With a certain class of nominalizations, any (inner) argument is required to be present, but with those same nominals, *that*-CPs are never obligatory.

Looking at *for*-CPs, we first note that they are never licit with a nominalized *tough*-predicate, although event nominals are.

(29)　　a.　　the difficulty of the exam/*to take the exam.

　　　　b.　　the importance of the theory/*to prove the theory

　　　　c.　　the simplicity of the plan/*to fix the car

　　　　d.　　the ease of at-home check-in/*to check-in at home

We could perhaps explain this by stipulating that *for*-CPs cannot appear with nominalizations, but this is clearly not true, as discussed by (Grimshaw, 1990).

(30)   a.   the battle of the armies/to win the throne

b.   the examination of the students/for the teacher to assess the students

On the other hand, we might try to appeal to the distinction between complex event nominals and result nominals, argued for by Grimshaw. The former must appear with internal arguments, while the latter may not. While it's arguable whether such a distinction exists in the nominalization of *tough*-predicates, given that they do not have an internal event structure (i.e., an aspect layer) that could be included in a nominalization, nonetheless, the fact that they can appear with some arguments, *the exam, the theory, . . .* , but not *for*-CPs illustrates that *for*-CPs cannot be considered arguments of the *tough*-predicate.

The another persistent problem is that we might expect *for*-CPs to be fully interchangeable with other event-denoting objects. That is, treating *for*-CPs as event-denoting when they combine with *tough*-predicates loses the distinction between nominals and *for*-CPs. So (31) might be expected to be fine.

(31)   a.   *It was difficult the battle.

b.   *It was easy the examination of the students.

c.   *It was tough the race.

This could possibly be explained by the proposal that CPs (of all kinds) are special in that they must appear in a "caseless" position, and regular nominals must appear in a "cased" position (Stowell, 1981). This account runs into problems however when we consider the distribution of gerunds. Event-denoting ACC-gerunds (versus POSS-gerunds) are also disallowed in cased-positions, like the subject of a small clause, but they are *not* permitted in the *tough*-construction.

(32)   a.   *Mary considers John reading the book important.   ACC-gerund

cf, Mary consider John's reading of this book important.   POSS-gerund

    b.   *Mary believes him smoking cigars disgusting.   ACC-gerund

cf, Mary believes his smoking of cigars disgusting.   POSS-gerund

(33)   a.   *It was important John reading this book.

          b.   *It was disgusting him smoking cigars

If being event-denoting and being required to appear in a caseless position were the explanatory factors in the distribution of *for*-CPs, then we should expect ACC-gerunds to pattern together with *for*-CPs.[6]

In conclusion, the evidence is in favor of treating the *for*-CP as a modifier of the *tough*-predicate, not a complement. Note that this parallels the conclusion that (Moulton, 2009) comes to with respect to *that*-CPs and nominals like *belief*.

5.1   *Refinements: the meaning of for-CPs*

So far, we've identified that events are the crucial factor that ties together the *tough*-predicate with the *for*-CP. But the meaning we've postulated is incorrect. The issue is: there is no single event. Rather there are (at least) two events involved in the *tough*-construction. To see this consider (34-a) and the Neo-Davidsonian breakdown in (34-b).[7]

(34)   a.   It was difficult for John to read the article.

          b. $\exists e$ such that read(e) & Theme(e)(this article) & Agent(e)(John) & difficult(e).

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[6]The modification account proposed above can capture these facts without appealing to idea that CPs (of all sorts) must appear in a caseless position. Looking ahead to facts discussed in subsection 8.3, under the *for*-CPs-are-modifiers analysis, when the *for*-CP is a predicate, it remains *in situ.* But if we permit *for*-CPs to move, then the semantics can be configured in such a way as to have the trace left by movement be a variable of type $\langle v \rangle$, following (Fox, 2002; Moulton, 2015). This variable can saturate where the predicate *for*-CP cannot. Thus we can derive simply using types why *for*-CPs cannot be in θ-positions.

[7]I commit to the use of events in this paper, but we could equally convert the analysis to appeal to situations, i.e., slices of times-locations in worlds. In this case, we would say that there are multiple situations, and a single event that holds across each situation. The same problem would arise. As far as I'm aware, the analysis proposed below can be suited to fit either ontology with no empirical differences.

What (34-b) say is that the event of difficulty and the event of reading are the same event. But this cannot be true. For one thing, consider the ambiguity of *again* modification; the adverb can target the difficult event, or the event in the infinitive.

(35)   It was difficult to climb the mountain again.

      a.   There was a second difficulty in climbing the mountain.

      b.   There was a difficulty in climbing the mountain for a second time.

The interpretation that we want to derive is that there is an event associated with the main-clause predicate, and an event associated with the infinitival clause, and these events are related in some way. That is, while we have to account for the fact that there's a difficult event and a reading event in (34-a), we also have to recognize that the reading event is *also* a difficult event. When we assert *It's difficult for John to read this article*, we're saying that there's an event of difficulty e_1, and there's an event of John reading this article e_2, and e_2 shares with the e_1 the property of being difficult.

The formal explanation for how to handle multiple events requires wading into theories of intensional semantics, and equating events across multiple worlds, as in (Hacquard, 2006, 2009, 2011). The appeal to intensional semantics is necessary because we would like to account for the fact that *for*-CPs are evaluated intensionally (Bhatt, 1999; Hackl and Nissenbaum, 2012). The infinitival event is an event relative to a world which is not the actual world. One way we could handle this is to assume that the *tough*-predicate itself carries intensional semantics. And there is indeed evidence that at least predicates like *important, difficult, fun* do house a level of intensionality separate from the infinitive.

Instead of pursuing such an approach however, I'd like to try to further capitalize on the proposal of Moulton's (2009; 2013; 2015), who analyzes the complementizer *that* as being responsible for the intensional properties of (formerly) intensional verbs and nouns. In Moulton's terms, *that*-CPs are predicates of "contentful individuals," that is, individuals which consist of propositional content. The phrase *the belief that John left*, loosely, has a meaning like "there's a unique

individual-entity instantiating a belief, and the contents of the individual is the proposition that John left."

Generalizing this idea, I postulate that the complementizer C_{for} (with allomorphs *for* and ∅) makes a predicate of *contentful events*. As utilized in (Hacquard, 2006, 2009, 2011), contentful events are events which are associated with, or composed of, propositional content. We can illustrate the idea with nominal and *for*-CP in (36).

(36)   the mission for Mary to save the prince.

On Hacquard's view, we would say that there's one event which is the mission, and this event is associated with propositional content, namely "Mary saves the prince." The meaning we would ultimately derive, with some additional work, is that in all of the accessible worlds in which the event of the mission happens, Mary saves the prince in those worlds.

Given this background, the proposal is the following denotation for C_{for} (where AH = attitude holder).[8],[9]

(37) $[\![\, C_{for} \,]\!]^{c,\text{AH}} = \lambda P_{v,st} \lambda e \lambda w. \, \forall w' \in \text{CONTENT}(e)(\text{AH})(w), \, \exists e' \text{ in } w' \text{ such that } P(e')(w') = 1$, where,

$\text{CONTENT}(e)(\text{AH})(w) = \{ \, w' \mid w' \text{ is compatible with the beliefs of AH during } e \text{ in } w\}$

The complementizer returns a predicate of events, thus the *for*-CP combines with the matrix clause in the same way as illustrated above, but it also requires that this event is associated with propositional content—the CONTENT function. Finally, C_{for} existentially closes any open event variable in its domain. Note further that by giving an extra layer of meaning, in particular, quantification over worlds coupled with the event closure, we leave room to add in any additional details to

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[8] I model the CONTENT function as relying on a doxastic modal base. This might not be right, according to (Grano, 2015), who argues that *for*-CPs are always evaluated relative to a circumstantial modal base. For the present purposes, the difference will not be important.

[9] I stipulate that the attitude holder of the *for*-CP is a parameter. This is in part merely for simplicity, but it also is an attempt to capture the fact that *tough*-predicates all fall into the class of *subjective* elements, which have been modeled as being *judge-dependent* (Lasersohn, 2005). In the end, it is necessary to identify the attitude holder as the judge, and parameterization is one way of doing this. It could also be done syntactically.

cover non-finite tense. These issues will not be important here, but do matter if we want a full understanding of the meaning of the *for*-CP.[10]

We must adopt one other proposal from Hacquard, which is that we can identify "similar" events across worlds. We need some way of making sure that the event inside of the *for*-CP is related to the event of the main clause. As it stands, e' and e are not related in any meaningful way, but we need to make sure that e' is a John-reading-this-article event in (34-a) *as well as* an event of difficulty. To achieve this, I introduce the event-counterpart relation.[11]

(38) $(e)(w)\copyright(e')(w') = e'$ in w' is a counterpart of e in w.

I assume, for better and for worse, all the typical things about counterparts (Lewis, 1971, 1983), but most importantly, counterparts are functionally similarity relations. When choosing in w' a counterpart for e, we choose an event e' which is as close to e as possible, given the state (or more accurately, the beliefs of the attitude holder during e in w) of w'. Thus, the full denotation for the infinitival complementizer is given in (39).

(39) $[\![C_{for}]\!]^{\text{AH}} = \lambda P_{v,st} \lambda e \lambda w. \forall w' \in \text{CONTENT}(e)(\text{AH})(w), \exists e'$ in w' such that $(e)(w)\copyright(e')(w')$
        & $P(e')(w') = 1$, where,

    a. $\text{CONTENT}(e)(\text{AH})(w) = \{ w' \mid w'$ is compatible with the beliefs of AH during e in $w\}$, and,

    b. $(e)(w)\copyright(e')(w') = e'$ in w' is a counterpart of e in w.

The proposal for C_{for} gives us the following meaning for the *tough*-construction.

(40)   a.   It's difficult for John to read this book

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[10]See, for instance Wurmbrand's (2014) careful study of different kinds of infinitives. *For*-CPs fall into the class of "tensed" infinitives. As such, we need a way to specify this tense. One option is to provide it in the meaning of C_{for}. Another is to propose that is comes from something lower (as Wurmbrand does).

[11]Functionally, this does the same thing as Hacquard's (2009) *Preservation of Event Description.* (Which is an update of her *Event Identification across Worlds.*) However, because I assume differently from Hacquard that there are no trans-world events, the event-counterpart relation is needed here.

b.

c.
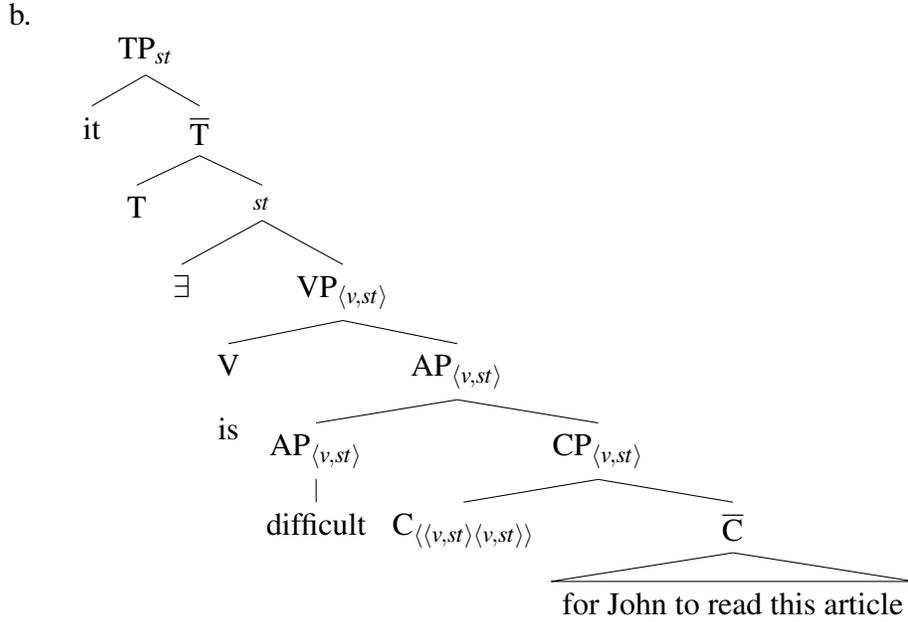
$[\![(40\text{-}b)]\!]^w = 1$ iff $\exists e$ in w such that e is difficult in w and $\forall w' \in \text{CONTENT}(e)(\text{AH})(w)$, $\exists e'$ such that $(e)(w)\copyright(e')(w')$ & John reads-e' this article in $w' = 1$

Note the important work that the counterpart relation does. It makes sure that the event of John reading the article is actually a difficult event. Without this extra step, there would be no way capture the meaning we want, namely, that John's reading the article shares the property of being difficult with the main clause event. In the following discussion, the most important aspect is the last one—a way of handling the fact that there can be similar events across intensional domains. Note that while the event-counterpart relation is a stipulation, there is a very real need for something that achieves this same effect, no matter what theory of intensionality is adopted. The additional matters, e.g., how intensionality is encoded, and where (on the matrix predicate, C_{for}, or a silent modal WOLL as in (Wurmbrand, 2014)), are largely orthogonal to the syntax of the *tough*-construction discussed here.[12]

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[12]This is not to say that the choices are arbitrary. The null hypothesis is that *for*-CPs always have the same denotation. This is an empirical question, but it predicts that whenever we find a *for*-CP, we find a similar meaning. This is too large a topic to be treated here, but I think that the empirical landscape looks promising. For instance, purpose clauses are intensional domains, even when the matrix predicate is not intensional. None of the examples in (i) commit the speaker to a belief in mythical beings.

5.2   Consequences so far

Turning back to the main thread, we've established the importance of events in the analysis of the *tough*-construction and cashed this out by having the main predicate be a predicate of events that combines with the *for*-CP via predicate modification. This was possible because *for*-CPs are also predicates of events, specifically, contentful events. Importantly, one piece of meaning that we decided was crucial was that the event of the matrix clause and the event of the infinitival clause are in a similarity relationship, formalized as the counterpart-relation ©.

At this point, we can do away with one of the arguments against a modification analysis, namely, that *for*-CPs cannot be iterated. This is a result of the fact that the *for*-CP specifies the content of the event. An event simply cannot have two different contents.

The upshot of the analysis is that we don't have to specify two different lexical entries for *tough*-predicates, one which selects for a *for*-CP and one which doesn't. *Difficult* and other event-predicates always have the same denotation. Sometimes they are predicated of event-nominals, and sometimes their event argument is provided by existential closure. Because they remain one type, $\langle v, st \rangle$, *for*-CPs, also of type $\langle v, st \rangle$, can modify them.

As noted above, the analysis parallels to a large extent the analysis of finite CPs (*that*-CPs) in (Moulton, 2009, 2015). It's well beyond the scope of the present work to compare types of CP clauses, although I will touch on this briefly in section 8. Nonetheless, the analysis of *for*-CPs suggests that a unified and generalized analysis of all CP clauses may be possible: all CPs are predicates of either contentful individuals or events, and merge as modifiers, not complements. I leave it for future work to explore the consequences of such a proposal.

6.   Proleptic objects and subjects

Given that *for*-CP's are modifiers, it seems unlikely that a movement analysis of *tough*-movement will work. Not only would this be improper movement, but it would be (A-)movement out of

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(i)   a.   John sang a song [$_{CP}$ to attract a unicorn]
       b.   John is wearing garlic [$_{CP}$ to ward off vampires]
       c.   John cut the carrots [$_{CP}$ (in order) for Mary bring them to the elf-queen]

an adjunct. This means that the non-expletive subject in the *tough*-construction must come from somewhere in the matrix clause. The question is, where? This is the central question that any analysis of *tough*-"movement" must confront. We seemingly want contradictory things: The subject needs to be an argument of the matrix predicate which gets promoted to subject, but it doesn't appear to be thematically licensed by the matrix predicate. In fact, the subject seems to be thematically an argument of the infinitival clause, but then we need a process which allows us to (A-)move out of an adjunct (and this movement bears none of the interpretive diagnostics for movement).

In this section, I lay out an analysis that can account for the various properties of the referential subject of the *tough*-construction. I show that independently needed mechanisms for adding arguments to events 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 anyway in the *tough*-construction to introduce a *proleptic object* (Quine, 1956; Davies, 2005; Salzmann, 2006; Landau, 2011). Characteristic of prolepsis is the "aboutness" relation that holds between the proleptic argument and an embedded CP clause. I show how this relation is already predicted by the semantics I've introduced earlier. Specifically, I tie the "aboutness" relation to the counterpart relation for events. In subsection 6.5, I will compare this analysis with a similar account proposed in (Salzmann, 2006, 2015).

6.1   *Voice and events*

From a purely syntactic point of view, it is not difficult to find a way to generate the referential subject in the main clause. These are the ingredients we need: i) There must be a way to type-lift a predicate of events into a predicate of individuals, i.e., we need to be able to add an argument to a predicate of events; and ii) There needs to be a way to type-lift a *for*-CP into a predicate of individuals as well. If we can do both of these things, then all the pieces simply combine as before.

Addressing the first point, it is now widely accepted that there is a process which takes a predicate of events, and adds an argument to it, creating a predicate of individuals (of events). This

is the analysis of Voice/Appl$_{\text{HIGH}}$ proposed in (Kratzer, 1996; Pylkkänen, 2008). Voice, of type $\langle e \langle v, st \rangle \rangle$, targets a predicate of events, "identifies" the event, and adds an external argument to the event.

(41)   *Event Identification*   (Pylkkänen, 2002)

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

Since *tough*-predicates are predicates of events, we predict that such a formal process should be able to target these phrases as well.

(42)   Voice$_{\langle e, \langle v, st \rangle \rangle}$

Voice$_{\langle e \langle v, st \rangle \rangle}$ AP$_{\langle v, st \rangle}$

difficult

Given the independent need for a way to introduce an argument to a predicate of events, then it is trivial to apply this same process to *tough*-predicates. I will return in a moment to the thematic role attributed to the specifier.[13]

What about the *for*-CP? Here as well, we know independently that there must be a way to take a *for*-CP, and make it a predicate of individuals by introducing a bound variable gap (Chomsky, 1977). (Indeed, this is one prominent analysis of the *tough*-construction (Browning, 1987).)

(43)   a.   The pie on the windowsill is [Op$_x$ for John to eat x at his party]

         b.   The box in the hallway is [Op$_x$ for the students to put their homework in x]

         c.   The computer is only [Op$_x$ for professors to use x]

There must be a way to merge an operator with a *for*-CP such that it binds a variable. Note that this operation is subject to island and locality conditions, and so must be construed as an $\overline{\text{A}}$-dependency

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[13]One question we could ask is, Is there morphological evidence for adding a Voice projection? Not as far as I'm aware, but English is not the ideal place to look since there is little morphological evidence for Voice anyway. There is a prediction, though, that in languages where such syntactic relations are always overtly realized we should see evidence for it in the *tough*-construction (provided that the languages have this structure to begin with).

(Chomsky, 1977).

(44)

$$\text{CP}_{\langle e\langle v,st\rangle\rangle}$$

Op$_i$ CP$_{\langle v,st\rangle}$

C$_{\langle\langle v,st\rangle,\langle v,st\rangle\rangle}$ $\overline{\text{C}}_{\langle v,st\rangle}$

$\ldots x_i \ldots$
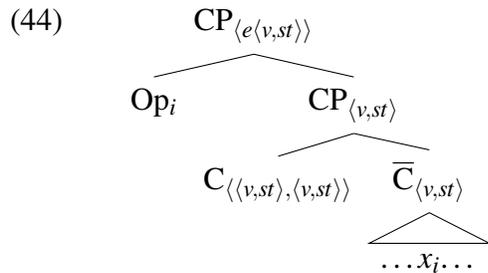
Since the main clause predicate and the *for*-CP can both be type-lifted, composition works as before: The *for*-CP, now a predicate of individuals, modifies the main clause as before. (I simplify the semantics of the movement operation.)

(45)   a.   The article was difficult for John to read *e*.

     b.

TP$_{st}$

DP $\overline{\text{T}}$

This article   T   *st*

$\exists$ VP

V   VoiceP$_{\langle v,st\rangle}$

t_e $\overline{\text{Voice}}_{\langle e,\langle v,st\rangle\rangle}$

$\overline{\text{Voice}}_{\langle e,\langle v,st\rangle\rangle}$ CP$_{\langle e,\langle v,st\rangle\rangle}$

Voice$_{\langle e\langle v,st\rangle\rangle}$ AP$_{\langle v,st\rangle}$ Op$_i$ for John to read x_i

difficult
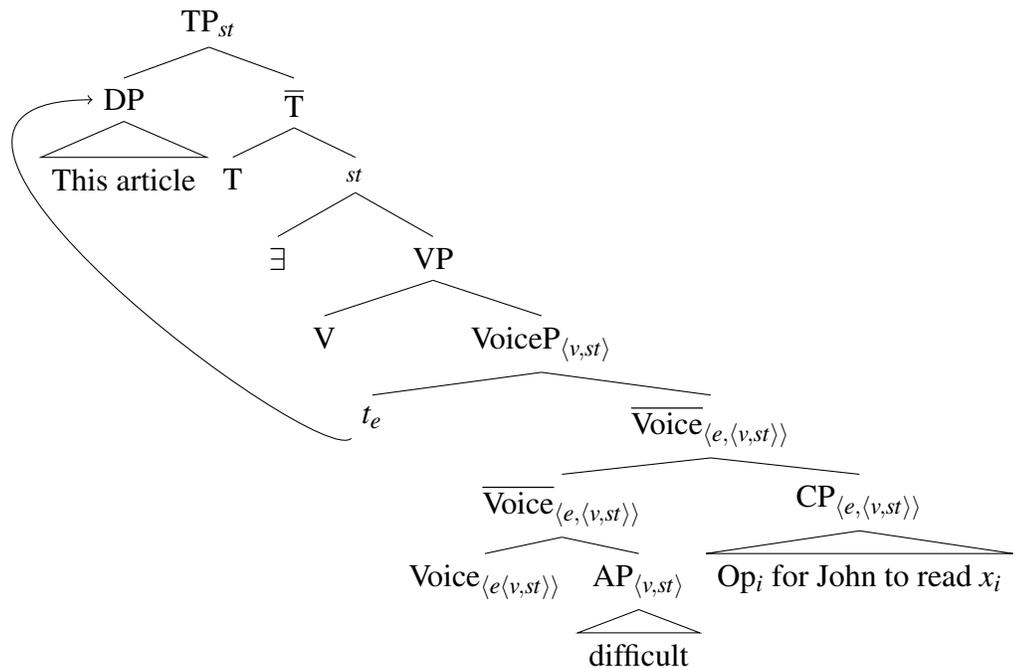
The tree in (45) adopts two independently needed mechanisms (Voice+Event Identification and Op merger/movement), applies them, and combines the pieces. From a syntactic perspective, there is nothing particularly novel about the above derivation. All the pieces are independently

needed and combine as before. But there are a number of issues. First, what is the thematic role of the subject? Things introduced in Voice (or High Appl) are typically characterized by thematic properties, say, Agentivity or "affectedness" (Pylkkänen, 2008).

Moreover, while the pieces *can* fit together as described above, there are other geometries that should be possible. For instance, couldn't the *for*-CP without an operator-gap still merge with a main predicate either before Voice has been introduced or after it has been saturated? Both of these issues will be addressed below when we consider the meaning of subject.

6.2   Proleptic subjects

I would like to argue that the head that introduces the referential subject in the *tough*-construction is generally underspecified for thematic role. Voice merely adds an argument to the main clause event, and asserts that the event "involves" this argument.

(46) $[\![\text{Voice}^0]\!] = \lambda x \lambda e \lambda w.$ *e* involves *x* in *w*.

I will argue that this thematic relation is independently needed in introducing a *proleptic object*. Thus, the referential subject of the *tough*-construction has the semantics of a proleptic argument, in that the infinitival clause is generally "about" the subject. The aboutness condition will be shown to be a consequence of the similarity relation that has already been posited.

The term "Proleptic object" refers to arguments of verbs which also have an embedded clause, and the embedded clause is "about" the proleptic object in some way (Davies, 2005). This typically manifests in there being a "bound" pronoun in the embedded clause. ("Bound" in the sense that it's obligatorily coreferential; as I illustrate later, I do not commit to syntactic binding.) So in (47), John has a belief about a particular individual, namely, Ortcutt, and this belief is that he's a spy/the Russians are looking for him/the Russians recruited his secretary. If the embedded proposition doesn't involve the proleptic object, the sentence doesn't make sense (47-d).

(47)   a.   John believes of Ortcutt that he's a spy.

         b.   John believes of Ortcutt that the Russians are looking for him.

       c.   John believes of Ortcutt that the Russians recruited his secretary.

       d. #John believes of Ortcutt that Mary went to New Jersey.

The *tough*-construction can have a proleptic object, too, typically introduced by the preposition *with*. As with proleptic objects of verbs, if the *for*-CP doesn't involve the object, then the sentence in infelicitous (48-e).

(48)   a.   It's difficult <u>with Ortcutt</u> for the Russians to track him down.

         b.   It's difficult <u>with these shoes</u> to tie their laces.

         c.   It's important <u>with kids</u> to discipline them properly.

         d.   It's easy <u>with this article</u> to get lost completely.

         e.   # It's difficult <u>with Ortcutt</u> for Mary to go to New Jersey.

I propose that the referential subject of the *tough*-construction also fills the role of a proleptic argument. As evidence, observe that both a proleptic object and a subject cannot both be present.

(49)   a. *This book was difficult with Mary to read *e* to her.

         b. *The tires were easy with this car to replace *e* on it.

         c. *The laces were complicated with these shoes to tie *e* on them

    The claim, then, is that the referential subject of the *tough*-construction is "thematically" the same as the argument introduced by *with*. So what is *with* doing semantically? More generally, what does it mean to introduce a proleptic argument in the *tough*-construction? One way to look at prolepsis—at least in the *tough*-construction—is that "prolepsis" is merely the result of adding a thematically unspecified argument to the main clause event. Because there's a similarity relation between the main-clause and infinitival events, the aboutness relation comes for free: the lower event will *necessarily* involve any argument that has been added to the main clause. That is, if in (48-a) there's a difficult event involving Orcutt, then the Russian's-tracking-down event must involve Ortcutt as well.

Seen in this way, there isn't an inherent relationship between the proleptic argument and the lower clause, via say, variable binding or otherwise, as suggested in (Landau, 2011). *With* merely adds an argument to the main clause. This is clearly seen when no *for*-CP is present.

(50)   a.   This mission was difficult <u>with Ortcutt</u>

      b.   Running is easy <u>with these shoes</u>

      c.   A good education is important <u>with kids</u>

The relevant reading of (50-a) is that there's an event e which is a mission event, and e involves Ortcutt, and e was difficult. Similarly, (50-b) means there's an event e which is running event, e involves these shoes, and e is easy.

There are two important points in these data. The first is that the proleptic argument doesn't necessarily bind a variable, as proposed in (Landau, 2011; Salzmann, 2015). Relatedly, the second point is that *with*-PPs are simply adjuncts to the event. They add an argument and assert that the event "involves" this argument to some extent, just like any other *with*-adjoined phrase, e.g., *John chopped the tree <u>with an axe</u>*.[14] Just in the cases where the event also holds of a property in a *for*-CP do we get the reading that the *for*-CP is "about" the *with*-PP. This is because the events are in a similarity relationship. Anything we add to the main clause event must be present in the event associated with the infinitival clause.

One prediction that this system makes is that the proleptic object will be barred from "binding" a pronoun which isn't related to the event of the main clause. This accounts for the degraded status of (51), where the proleptic argument isn't involved in the event of the higher verb in the *for*-CP.

(51)   a.   ?? It was difficult with Ortcutt to decide whether Mary slapped him.

      b.   ?? It was important with these shoes$_i$ to say that John bought them.

      c.   ?? It was surprising with this mountain to find out that Mary climbed it.

---

[14]Note also that *with*-clauses are VP-adjuncts, consistent with the data here.

The reason that these are odd is that the similarity relationship holds between the main clause event and the infinitival event, but there is no similarity relationship that relates the main clause event to the lowest verb, when the proleptic object is an argument. In (51-a) since *Ortcutt* isn't an argument of the deciding-event, the events aren't sufficiently similar. Likewise, in (51-b) and (51-c), the *important/surprising* event isn't an event of *buying/climbing*, respectively.[15]

Observe that when we use restructuring verbs in the lower clause then the sentences improve, since in these cases, the events of the lower verb are now in a "closer" relationship (Wurmbrand, 2001).

(52)   a.   ?It was easy with Ortcutt to want to slap him.

       b.   ?It important with these shoes to be able to get them on quickly.

       c.   ?It was surprising with this mountain to fail to climb it.

These facts are the natural result of postulating a similarity relationship, formalized as a counterpart relation, between the main-clause and infinitival event.

Turning back to the main thread, given the independent need for an underspecified relation between *tough*-predicate and the proleptic argument, and the fact that both a referential subject and a proleptic argument cannot both be present, we conclude that the head introducing the referential subject, postulated to be Voice, bears this underspecified thematic relation.[16]

(53)   a.   This article was difficult for John to read e.

       b. $[\![(45)]\!]^{w,\mathrm{AH}} = 1$ iff There exists an e such that e is difficult in w & e involves this article in w & $\forall w' \in \mathrm{CONTENT}(e)(\mathrm{AH})(w)$, There's an e' in w' such that $(e)(w)\mathrm{\textcircled{C}}(e')(w')$ &

---

[15]That said, (51) are good to the extent that the main clause proleptic object can be construed as a proleptic object of the *infinitive*

(i)   a.   ?It was difficult with Ortcutt to decide (of Ortcutt) whether Mary slapped him.
      b.   ?It was important with these shoes to say (of these shoes) that John bought them.
      c.   ?It was surprising with this mountain to find out (about this mountain) that Mary climbed it.

[16]It would be possible to derive the referential subject by incorporating *with* into the main predicate. I do not see any strong evidence for this approach, so I do not pursue it here, but it would be consistent with the overall spirit of my analysis.

John reads-e' this article in $w' = 1$

As additional support that this is correct, consider again the well noted fact that the gap in the non-finite clause displays "weak" $\overline{\text{A}}$-properties. As illustrated above, the dependency passes a number of classic tests for $\overline{\text{A}}$-movement, except that it doesn't easily permit long-distance dependencies.

(54)   a.   *This article was difficult to explain that John read *e*.

   b.   *The mountain was tough to decide that Mary would climb *e*.

These data can now be understood as simply a reflex of the similarity relationship. They receive the same explanation as the data in (51): the variable is an argument of an event which is not in a similarity relationship to the main-clause event. Again, using predicates in which the events in the lower clause are in a closer relationship ameliorates the problems.[17]

(55)   a.   ?This article was difficult to try to read *e*.

   b.   ?The mountain was tough to start to climb *e*.

An important aspect of this analysis is that construing the proleptic argument as the subject hasn't affected the semantic relationship between it and the *tough*-predicate. That is, the subject of the clause isn't interpreted as a thematic subject, i.e., *??The article was difficult.* The *tough*-subject is still, semantically, a proleptic argument.[18] Moreover, we haven't done away with the fact that the *tough*-construction is fundamentally eventive. Existential closure still needs to provide an appropriate event for the adjective and the *for*-CP. We've managed to keep the same denotation for the *tough*-predicate, given the independently available process of Event Identification.

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[17]However, it should be noted that this general clause-boundedness is true of *all* such gaps in *for*-CPs. Whether the explanation outlined above can carry over to these cases as well is left to be seen.

[18]Indeed, it has been observed that the *tough*-subject bears properties of being a "topic" (Řezáč, 2006). Given the intuitive relationship between topics and proleptic arguments, the topichood properties are not surprising.

6.3 Problem #1: Resumption

Given the structure in (42), it should still technically be possible to merge a CP of type $\langle v, st \rangle$ targeting VoiceP or the AP below Voice. This should presumably allow structures where there's a referential subject but no gap, as in:

(56) a. *The article was difficult for John to bake a cake.

b. *The mountain was easy for Mary to go home.

However, we must keep in mind that anything we add to the matrix event must also be a participant in the infinitival event because the two events are in a similarity relation. Thus, (56) are actually predicted to be bad given the semantic relationship between the two events. In other words, *the article* isn't involved in the *John baking a cake* event, and *the mountain* isn't involved in the *Mary going home event*. But we should expect to find contexts where such a relationship is possible. In fact, it has been noted to me that the *tough*-construction is marginally available with a resumptive pronoun.

(57) a. ??The article was difficult for John to understand even half of it.

b. ?The mountain was easy for Mary to climb about a quarter of the way up it.

c. ?The homework was tough to make sure that it was completely right.

I would suggest that such "resumption" is simply the consequence of merging a *for*-CP without a gap. In such cases, there may appear to be a binding effect simply due to the requirement that the subject be involved in the lower clause. These may appear marked simply due to blocking: there's a better way to express these sentences, i.e., with a gap.

6.4 Problem #2: Constraining underspecified Voice

Finally, can we constrain where such an underspecified Voice is added? Yes, I think we can at least descriptively identify when it is licensed. It seems that we can productively merge this kind of Voice whenever, i) the main predicate can take a proleptic argument in a prepositional phrase, and

ii) there's a version of the predicate which permits an expletive subject. That is, it must be possible that the verb doesn't s-select for a subject.

(58)   a.   It's believed of John that he left.

b.   John is believed to have left.

(59)   a.   It's expected of Mary that she come home at 12.

b.   Mary is expected to come home at 12.

(60)   a.   It's said of/about this house that it's haunted.

b.   This house is said to be haunted.

As long as these two requirements are met, then "proleptic promotion" is a generally possibility—putting aside many additional complications which will be left for future work. Note that I do not claim that the analysis of prolepsis proposed above should be directly imported to other predicates like *believe*. There are no doubt additional issues that affect the interpretation of these arguments. Indeed, the choice of preposition suggests to me that proleptic objects of verbs like *believe* are not event-related adjuncts.

6.5   An alternative prolepsis account

Salzmann (2006, 2015) proposes that the *tough*-"movement" examples above can be understood under a kind of Matching Analysis, sketched in (61), (62).[19] Under his approach, the proleptic argument bears a predication relationship to the infinitival clause—itself a predicate due to the "operator" (i.e., the moved element) in the left-periphery. In one case, the lower copy is pronounced, and in another, it's a gap.

(61)   [$_{TP}$ It's difficult with this book [$_{CP}$ this book$_i$ to read it$_i$]]. Predication

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[19](61) is adapted in good faith from other examples provided by Salzmann. He doesn't appear to be aware that *with* prolepsis is available with *tough*-movement, so I assume that his analysis of *John believes of Orcutt that he's a spy* carries over to *tough*-structures as well.

(62)   [$_{TP}$ This book is tough [$_{CP}$ ~~this book~~$_i$ to read ~~t_i~~]]
        Predication

While I generally agree with this approach, there are a couple of difficulties in the formalization. First, Salzmann requires two different ways to pronounce the variable in the lower clause due to the fact that resumptives are required in certain configurations that otherwise ban gaps, like islands. But with *tough*-movement, it's not clear why (61) is ungrammatical with a gap instead of a pronoun and *vice versa*. Put another way: there is no difference in the relationship between the bound variable and the proleptic argument in (61) and (62). Empirically, it's unclear why (63-a) is bad when the referential subject is coindexed with a bound variable. And on the opposite end, it's not clear why (63-b) is bad when there's a proleptic object with a gap.

(63)   a.   * The mountain was difficult to climb it.

        b.   * It was difficult with this mountain to climb *e*.

On the analysis I've proposed the sentences in (63) are ruled out for a very simple reason: In (63-a), the *for*-CP is a predicate of events, while the main clause is a predicate of individuals of events. (See also the discussion in subsection 6.3.) (63-b) is ruled out because now the *for*-CP is a predicate of individuals, while the main clause isn't. In both cases, it's simply a type-mismatch.

Moreover, observe that a bound pronominal element isn't actually necessary in any proleptic structure, as the example in (48-d) illustrates.[20] Note that the issue is *not* whether there is an implicit argument of the embedded proposition—there crucially is. The issue is whether there is a requirement that there be an explicit (but unpronounced) argument in the lower clause that is syntactically bound. The data bring into question Salzmann's assumption that prolepsis always

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[20]Moulton (2013, fn 16) makes the same point with regards to prolepsis and finite clauses. I provide similar examples in (i).

(i)   a.   Mary believes about Europe that the Germans eat more meat than any other nation.
       b.   John said of/about macaroni and cheese that Chef Boyardee perfected the art of pasta-in-a-can.
       c.   It's required of new employees that all hiring paperwork be finished before July 1st.
       d.   April discovered about her new husband that the divorce had never been finalized.
       e.   Bradley hates about his car that the radio only works when the heat is on.

requires an operator in the lower clause.

7.   Summary

Here are the main points from the proposal above. The uniting factor for the *tough*-construction and *for*-CPs is that they are both predicates of events. This allows them to combine via predicate modification. Semantically, they are linked via a similarity relationship. The referential subject fits the description of the proleptic argument, which can be introduced in two ways: inside of a prepositional phrase, or in a Voice projection which is underspecified for thematic role.

It's important to note that the above analysis extends some already well-motivated lines of research. On the way hand, I've adopted proposals from (Moulton, 2009) and (Hacquard, 2010) into the analysis of nonfinite CP clauses and how they combine with their "heads." On the other hand, I've also adopted the idea that arguments can be introduced to predicates of events (Kratzer, 1996) and that *for*-CPs can be made into predicates via merge/movement of an operator (Chomsky, 1977; Browning, 1987). The combination of these tools provides an elegant account of the *tough*-construction that captures both syntactic and semantic properties. The proposal is firmly on the side of a predication, rather than a movement, analysis of the *tough*-construction. This is consistent with the empirical data. *Tough*-subjects cannot be interpreted in the infinitival clause, but they also have properties of being thematically "licensed" by the infinitival verb clause. As a bonus, we can explain why the gap in the lower clause is clause-bounded in a way that other $\overline{\text{A}}$-dependencies are not.

8.   Consequences and predictions

8.1   *Pretty-class adjectives*

One benefit is that we can readily account for classes of non-expletive adjectives, e.g., *pretty*-class adjectives. These adjectives permit the gapped version, but lack an expletive version.

(64)   a.   *It was pretty to look at Mary.

       b.   Mary was pretty to look at *e*.

(65)   a.   *It was tasty to eat this cake.

           b.   This cake was tasty to eat *e*.

Since properties like *pretty* and *tasty* must be true of individuals, not events, the lack of an expletive version is explained. But since they are still of type $\langle e \langle v, t \rangle \rangle$ (assuming that events and states are ontologically the same thing), then they can combine with *for*-CPs which are of the same type.[21]

8.2   *Predicates of individuals and events*

Some *tough*-predicates are ambiguous between being predicates of individuals and predicates of events.

(66)   a.   John/Running the race is important

           b.   The professor/the lecture was interesting

Interestingly, the ambiguity exactly parallels which predicates can occur with a *for*-CP and which with a *that*-CP.

(67)   a.   It's important/interesting/amusing for John to go to Denver.

           b.   It's important/interesting/amusing that John {go/went} to Denver.

(68)   a.   It's difficult/easy/fun for John to go to Denver.

           b.   *It's difficult/easy/fun that John {go/went} to Denver.

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[21]Note that such an operation appears to be restricted to the class of *subjective* predicates (Sæbo, 2009).

(i)   a.   *The book was long to read *e*.
           b.   *The coffee was hot to drink *e*.

This is presumably due to the fact that *for*-CPs need a contentful event. This is also compatible with the idea that *for*-CPs must appear in the presence of a modal element (Portner, 2011).

This is precisely the state of affairs we should expect if *for*-CPs are only event-predicates, and *that*-CPs are individual-predicates, as proposed by Moulton.[22]

Likewise, adjectival predicates that are only predicates of individuals may only appear with *that*-CPs.

(69)   a.   This fact/the solution/answer is obvious/evident/clear.

        b.   *Running/the examination of the students is obvious/evident/clear.

        c.   It's obvious/evident/clear that John went to Sacramento.

        d.   *It's obvious/evident/clear for John to go to Sacramento.

Of course, it's not the case that all individual-denoting predicates will work with a *that*-CP. Only those that involve *contentful* individuals. That is, we can't say *It's long that John went to Sacramento* because *long* doesn't itself select for a contentful-individual denoting noun, e.g., *fact, rumor, belief*, etc.

A similar argument can be made with event-nominals. As discussed in (Grimshaw, 1990), like finite CPs, *for*-CPs can combine with certain classes of nominals. Importantly, *for*-CPs must combine with nominals which are eventive, i.e., which denote an event. Temporal modifiers like *constant, for 10 years, hour-long, interminable* ensure that these nominals are eventive.

(70)   a.   the (constant) battle (for 10 years) for John to be king

        b.   the hour-long examination to assess the progress of the students.

        c.   the interminable speech to rouse the public

---

[22]One question that this raises is why there is no *tough*-movement with *that*-CPs.

(i)   a.   John was important for Mary to talk to *e*.
        b.   *John was important that Mary talk to *e*.

The simply answer is that since *that*-CPs are no longer predicates of events (the event variable is already closed), they are of the wrong type to combine with the adjective, which still has an open event.

Moreover, they cannot be result nominals, i.e., nominalizations that are individual denoting. *Examination* can refer to an event (71-a), or an object (71-b). Only the event use may appear with a *for*-CP.

(71)   a.   The examination of the students for John to assess their progress took an hour.

          b. *The examination for John to assess the students' progress was on the table.

These data not only provide additional evidence for treating *for*-CPs as predicates of events, but they complement Moulton's original analysis. We have an explanation that covers all types of event-nominals.

8.3   "Intervention" and extraposition

Bruening (2014) observes a set of facts concerning intervention in the *tough*-construction. Basically, anything that occurs between the *tough*-predicate and the *for*-CP can be an intervener.[23],[24]

(72)   a.   It will be tough tomorrow to get an audience with the pope.

          b. *The pope will be tough tomorrow to get an audience with *e*.

(73)   a.   It was very hard in such conditions to give up sugar.

          b. *Sugar was very hard in such conditions to give up *e*.   (Bruening, 2014, exx (8), (9))

According to (Keine and Poole, 2015), all intervention effects in the *tough*-construction are attributed to a type-mismatch between the *for*-CP and the adjective. I think this is right in spirit—there is a type-mismatch—but Keine & Poole misattribute what it stems from. The key point is that adjuncts force the *for*-CP to extrapose, and this movement can lead to a breakdown when there's a gap.[25]

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[23]On its surface, this is empirically false. See Gluckman (in prep) for an overview of the relevant distinctions.

[24]Bruening claims that positioning the intervening material higher inside of the matrix clause restores grammaticality. It appears that judgments are are extremely variable for these phrases, so I'll put them aside.

[25]In Keine & Poole's analysis, the type mismatch is in the merge of the adjunct/Judge (also called Experiencer) argument. These arguments must take as their first argument something of type $\langle st \rangle$, and so cannot merge with an AP of type $\langle e, st \rangle$. The issue with this approach is that there is no general ban on adjuncts/Judges and predicates of type $\langle e, st \rangle$, (i).

To understand what's happening here, we need to understand what happens when *for*-CPs move. Under the copy-theory of movement, moving constituents of complex types requires additional "repairs" in order for the structure to converge. Let's assume, following (Fox, 2004), that when constituents of complex types move, they bind a variable of a low type. (Moulton, 2015) generalizes this idea as a *Category Neutral Trace Conversion.* By assumption the variable bound by the moved predicate always corresponds to the first argument of the constituent that's moved.[26] The notation $< 4, \alpha >$ should be understand as a variable with index 4 and type α.

(74)   *Category Neutral Trace Conversion*   (Moulton, 2015)

    a.   Quantifier removal: Q $[_{XP_{\langle \alpha, \beta \rangle}}$ Pred $]_4 \rightarrow [_{XP_{\langle \alpha, \beta \rangle}}$ Pred $]_4$

    b.   Index Interpretation: $[_{XP_{\langle \alpha, \beta \rangle}}$ Pred $]_4 \rightarrow [< 4, \alpha > \mid < 4, \alpha > =$ Pred $]$

(75)   a.   Quantifier removal: $[_{CP_{\langle v, st \rangle}}$ for John to read this book $]_4 \rightarrow [_{CP_{\langle v, st \rangle}}$ for John to read this book $]_4$ (vacuous)

    b.   Index interpretation: $[_{CP_{\langle v, st \rangle}}$ for John to read this book $]_4 \rightarrow [< 4, v > \mid < 4, v > =$ for John to read this book $]$

More simply, when something of type $\langle v, st \rangle$ moves, it leaves behind a variable of events, which is bound by the abstraction created below the moved predicate.

(76)   a.   It was important yesterday to read this book.

    b.

(i)   a.   Mary is important to John
    b.   The budget was important at the meeting.
    c.   The pope was annoying yesterday.

[26]This condition is a stipulation, but indeed, it doesn't actually matter whether we adopt this version of Trace Conversion or something other, say, where the variable is always of type $\langle e \rangle$.

$$\text{CP}_{\langle v,st\rangle}$$

$$\text{CP}_{\langle v,st\rangle} \qquad \text{CP}_{\langle v,st\rangle}$$

$$\text{TP}_{\langle st\rangle} \qquad \lambda 1 \quad \text{to read this book}$$

$$\text{TP}_{\langle st\rangle} \qquad\qquad \text{AdvP}_{\langle st,st\rangle}$$

$$\text{it} \quad \overline{\text{T}} \qquad\qquad\qquad |$$

$$\qquad\qquad\qquad\qquad\qquad \text{yesterday}$$

$$\text{T} \qquad \text{VP}$$

$$\text{V} \qquad \text{AP}_{\langle st\rangle}$$

$$\text{AP}_{\langle v,st\rangle} \qquad <1,v>$$

$$\text{important}$$
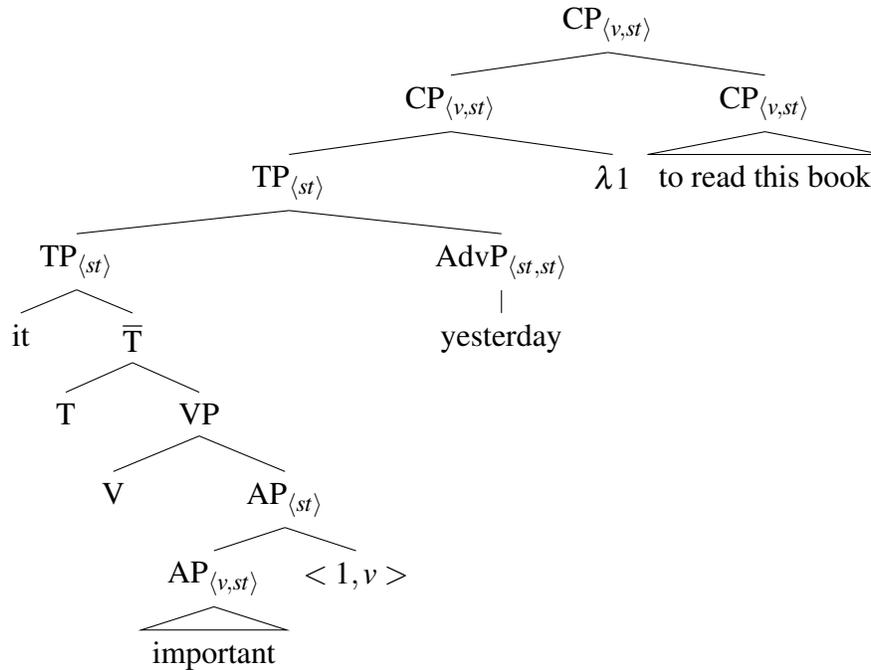
In the case without a gap, the variable merely saturates the first argument of the predicate. The case we care about though is why extraposition is impossible when there's a gap in the *for*-CP. Let's take Category Neutral Trace Conversion at face value and suppose that now what's left behind is a variable that ranges over individuals, since this is the first argument that the *for*-CP needs.

(77) a. Quantifier removal: $[_{CP_{\langle e\langle v,st\rangle\rangle}}$ Op$_y$ for John to read $y]_4 \rightarrow [_{CP_{\langle e\langle v,st\rangle\rangle}}$ Op$_y$ for John to read $y]_4$ (vacuous)

 b. Index interpretation: $[_{CP_{\langle e\langle v,st\rangle\rangle}}$ Op$_y$ for John to read $y]_4 \rightarrow [<4,e> \mid <4,e> = $ Op$_y$ for John to read y]

What is the variable now? It's denotes an individual-entity such that for all worlds in the contents of an event, John reads this individual-entity. Observe now what happens when we compose this variable with the AP. [27]

(78) a. *This book was important yesterday to read *e*.

---

[27]Note also that there is no position above *yesterday* to which the *for*-CP could move. Moreover, we would not fix the problem if we assumed that the variable ranged over events instead of individuals.

b.

$$CP$$
$$CP_{\langle e,\langle v,st\rangle\rangle}$$

TP

$\lambda 1$ Op_x to read this book x

TP

AdvP

this book $\overline{\text{T}}$

yesterday

T   VP

V $\boxed{\text{VoiceP}_{??}}$

t_e $\overline{\text{Voice}}_{\langle v,st\rangle}$

$\overline{\text{Voice}}_{\langle e,\langle v,st\rangle\rangle}$ $<1,e>$

important+Voice
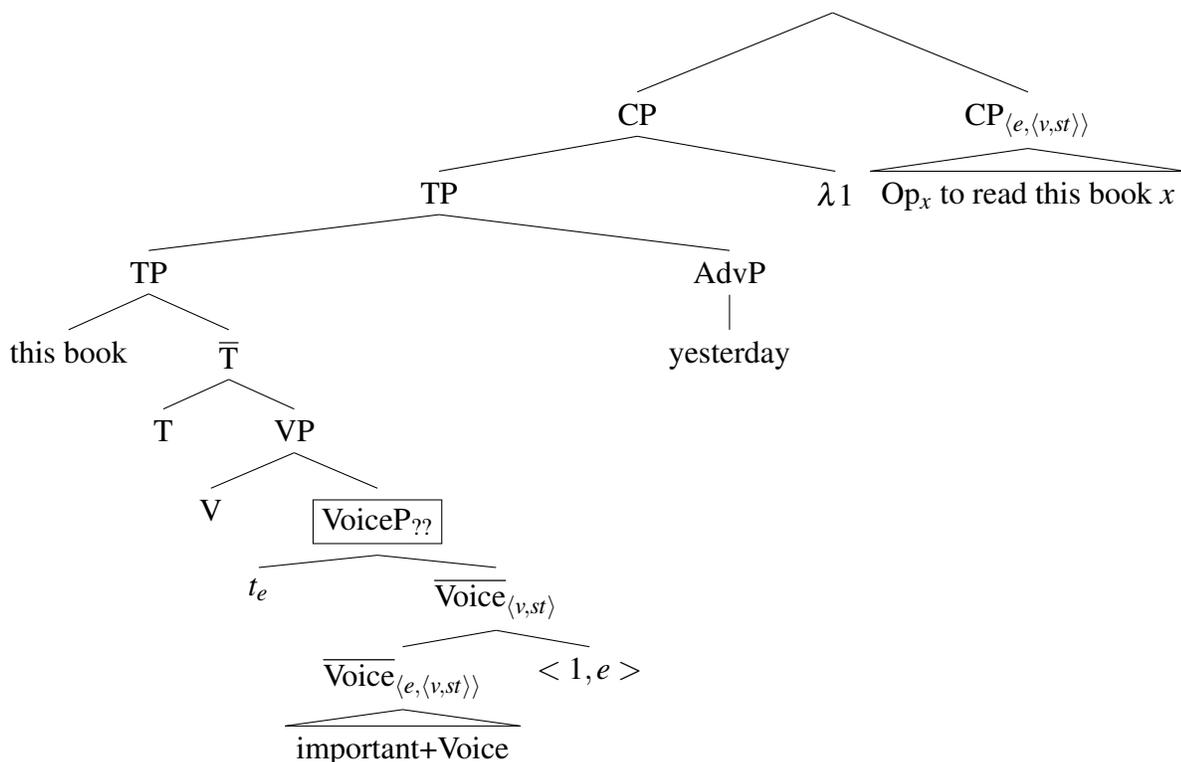
The issue that arises is that the variable left behind when we moved the *for*-CP saturates the individual slot of the *tough*-predicate, and so the proleptic argument cannot combine. Thus, we correctly rule out all extraposition of the *for*-CP.

For supporting evidence that this is the correct way to think about movement of *for*-CPs, consider *for*-CPs in subject position. Based on the data in (Stowell, 1981), it was argued that *for*-CPs can't be "natural" subjects, because they cannot be the subject of small clause. Nonetheless, they can be subjects of finite clauses.[28]

(79)   a.   For John to come home would be easy

      b.   *I consider for John to come home easy

(80)   a.   To start a new club is difficult.

      b.   *I believe to start a new club difficult

---

[28]In Stowell's account, they aren't in the subject position of the finite clause, rather, they've moved to a case-less position.

This makes perfect sense if we think in terms of types. As the subject of a small clause the *for*-CP cannot saturate the event variable of the predicate. Thus, *for*-CPs which remain in a theta-position are ruled out. But if the *for*-CP can move to spec-TP, then it leaves an eventive trace in a position where it can saturate the predicate, i.e., just like a "normal" event nominal.

(81) $[_{CP_{\langle st \rangle}}$ $[_{CP}$ to start a new club $]$ $\lambda < 1, v > [_{T'_{\langle st \rangle}}$ is $[_{AP} < 1, v > [_{A'_{\langle v,st \rangle}}$ difficult $]]$

We might ask whether there is any configuration in which extraposing a gapped-*for*-CP is grammatical. The answer is yes: a short movement where the *for*-CP extraposes directly above the variable it has created is permitted, as long as the movement is below where the event argument is saturated. This seems to be required to derive the sentences in (82), where a degree clause intervenes between the *tough*-subject and the gapped *for*-CP.

(82)   a.   This problem was more difficult than I thought to solve *e*.

      b.   Mary is more important than Bill to talk to *e*.

Head-final languages, like German provide additional evidence for this short step. As pointed out in (Wurmbrand, 2001, fn 11), infinitival clauses in the *tough*-construction must occur after the adjective, not in front of it.[29]

(83)   a.   Dieser Text   ist schwer zu lesen
              this   text.NOM is hard   to read
              'This text is hard to read *e*.'

      b.   Diese Texte   sind leicht zu lesen
              these texts.NOM are   easy to read

---

[29]I'll note that Wurmbrand uses the data in (83) and in (i) to argue that the *tough*-construction, at least in German, involves restructuring. However, it's important to note that these data merely show an issue with the movement step in the infinitival clause. It does not comment on the nature of the link between the gap in the infinitival clause the subject position.

(i)   *Dieses Buch ist schwer Hans zu überzeugen zu lesen
      this   book is difficult Hans to convince   to read
      ✓'This book is difficult to convince Hans to read *e*.'

These texts are easy to read *e*.   (Wurmbrand, 2001, ex (15), p. 27)

This would indicate that, at least in German, extraposition is, in fact, required. Note that Moulton takes similar facts from German to argue that *that*-CPs obligatorily extrapose. It's not clear to me whether such movement is required, rather than simply an option in English.[30]

9. Conclusion

The above analysis has provided a comprehensive syntax and semantics of a notoriously intransigent issue in syntax. To my mind, the most pressing open question is the overall distribution of *for*-CPs. Are they always predicates of events—even when the combine with verbs, e.g., *John waited for the bus to arrive*? Moreover, are they always modal? These issues may be answered in future work.

One particular point of the analysis I'd like to stress again is that I have a shown how two independent lines of research on complement clauses and events converge in the analysis of the *tough*-construction. If this is on the right track, it may ultimately be possible to derive a single unified theory of clausal complementation.

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[30]It's possible that extraposition is the derivation for the sentences like (i). See (Fleisher, 2008) for a study of these constructions.

(i)   a.   a difficult book to read *e*
        b.   ??a difficult to read *e* book

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