Actuality Entailments and the Conditional Analysis*

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1 Introduction

Consider the following ability ascription.

(1) Luc was able to lift the suitcase last night.

On one prominent interpretation, (1) entails that Luc lifted the suitcase. This implication of (1) is known as an *actuality entailment*. Actuality entailments are associated with *perfective aspect*: past perfective ability claims have actuality entailments; past imperfective ability claims do not.[1]

We give a new theory of this phenomenon. In the first part of the paper, we present a new observation: that ⌜S was able$_{\text{perfective}}$ to V⌝ presupposes that S tried to V. And we show that, given a conditional analysis of ability, we can derive the actuality entailment—that S Ved—from the presupposition—that S tried to V.

The second part of the paper concerns the source of the trying presupposition. We say that perfective aspect carries a *settledness presupposition*: ⌜Perfective P⌝ presupposes that P is settled true or settled false. The conditional analysis tells us that it is either settled true or false that S is able to V at t only if (2) is settled true or false at t.

(2) If S tried to V at t, S would V at t.

We argue that, in any ordinary circumstance, a conditional like (2) is settled true or settled false at t only if its antecedent is true. And so, in any ordinary circumstance, speakers will accommodate the settledness presupposition by presupposing that S tried to V at t.

2 Actuality Entailments and Perfective Aspect

We said past perfective ability ascriptions carry actuality entailments and that past imperfective ones do not. We can see this in a language like French in which there is an overt morphological distinction between past perfective ability ascriptions and past imperfective ones. (English does not overtly mark perfective and imperfective aspect on modals.) Consider the following sentence.

(3) #Luc a pu soulever la valise, mais il ne l'a pas soulevée parce qu'il avait peur de se faire mal au dos.
Luc was able$_{\text{perfective}}$ to lift the suitcase, but he didn't lift it because he was afraid of hurting his back.

(3) is unacceptable: you cannot say that Luc was perfectively able to lift the suitcase and, at the same time, say that he did not lift the suitcase. Contrast (3) with (4), which replaces the perfective ability claim with an imperfective one.

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[1]For this observation, see Bhatt (2006). For some existing theories, see Hacquard (2009) and Homer (2021).

(4) Luc pouvait soulever la valise, mais il ne l'a pas soulevée parce qu'il avait peur de se faire mal au dos.
Luc was able$_{\text{imperfective}}$ to lift the suitcase, but he didn't lift it because he was afraid of hurting his back.

(4) is acceptable: you can say that Luc was imperfectively able to lift the suitcase and, at the same time, say that he did not lift it.[2]

3 A New Observation

We observe that ⌜S was able$_{\text{perfective}}$ to V⌝ presupposes that S tried to V.

To test whether a proposition P is a presupposition of a sentence S, we check whether it projects through various embeddings: in particular, through S's negation ⌜not S⌝, the question ⌜S?⌝, and the conditional ⌜if S, ...⌝? Our trying presupposition passes these tests.

(5) Luc n'a pas pu soulever la valise.
Luc was not able$_{\text{perfective}}$ to lift the suitcase.

(6) Est-ce que Luc a pu soulever la valise?
Was Luc able$_{\text{perfective}}$ to lift the suitcase?

(7) Si Luc a pu soulever la valise, ses parents doivent être heureux.
If Luc was able$_{\text{perfective}}$ to lift the suitcase, his parents must be thrilled.

Each of these suggests that Luc tried to lift the suitcase. Moreover, you cannot say that he was not perfectively able and, at the same time, say that he did not try: (8) is unacceptable.

(8) #Simplement en le regardant, Luc savait qu'il n'a pas pu soulever la valise. Donc il n'a pas essayé.
Just looking at it, Luc knew he wasn't able$_{\text{perfective}}$ to lift the suitcase. So he didn't try.

Only perfective ability ascriptions generate the trying presupposition: you can say that Luc was not imperfectively able and, at the same time, say that he did not try.

(9) Simplement en le regardant, Luc savait qu'il ne pouvait pas soulever la valise. Donc il n'a pas essayé.
Just looking at it, Luc knew he wasn't able$_{\text{imperfective}}$ to lift the suitcase. So he didn't try.

4 Deriving the Actuality Entailment

We show that, given a conditional analysis of ability claims, we can derive the actuality entailment of ⌜S was able$_{\text{perfective}}$ to V⌝ from its trying presupposition.

Here is the Conditional Analysis.

> *Conditional Analysis*
> ⌜S is able to V⌝ is true if and only if: if S tried to V, S would V.

To see how to derive the entailment, suppose that I truly and felicitously assert:

(1) Luc was able$_{\text{perfective}}$ to lift the suitcase last night.

[2]It is standardly assumed that aspect is covert in English ability claims and that (1) is ambiguous. On one disambiguation, it contains a covert perfective operator; on another, it has a covert imperfective one. This is why the actuality entailment of (1) appears cancellable: the imperfective disambiguation has no actuality entailment.

Since my assertion of (1) is felicitous, its presupposition is satisfied: (10) is true.

(10) Luc tried to lift the suitcase last night.

Since my assertion of (1) is true, it follows from the Conditional Analysis that:

(11) If Luc tried to lift the suitcase last night, he did lift the suitcase last night.

It follows from (10), (11), and Modus Ponens that:

(12) Luc lifted the suitcase last night.

In what follows, we sharpen this account and give a story of how the presupposition arises. We state precisely the Conditional Analysis (§6) and we give our semantics for perfective aspect (§7). We then explore our theory's predictions: for perfective eventive sentences (§8) and for perfective ability sentences (§9). We begin, in §5, with the syntax of tense and aspect.

5 Syntax of Tense and Aspect

Following Cable (2021), we assume the syntactic tree of an atomic finite complementiser phrase — that is, a finite CP that does not contain any other CP — consists of a verb phrase VP dominated by an aspectual phrase AspP, which is in turn dominated by a tense phrase TP:

(13) $[_{CP}\ \emptyset_C\ [_{\mathrm{TP}}$ Tense $[_{\mathrm{AspP}}$ Aspect $[_{\mathrm{VP}}$ VP]]]]

The VP denotes a *temporal proposition*: a function from times to a function from worlds to truth values. For example, 'Matt walk to the store' denotes a function that takes a time t and returns a function that takes a world w and returns true if and only if an event of Matt walking to the store occurs at t in w. We assume the VP does not contain any expressions referring to times. Those occur higher in the tree: they modify tense. The VP combines with aspect to produce an aspectual phrase. This aspectual phrase denotes another temporal proposition—one that situates the time at which VP is true with respect to a *reference time*. In the absence of temporal modifiers like 'last night', we assume that the reference time is the time supplied by tense. Finally, the aspectual phrase combines with a tense morpheme to produce a tense phrase, which denotes an *atemporal proposition*—a function from worlds to truth values.

The VP may be *eventive* or *stative*. For example, 'Matt walk to the store' is eventive, whereas 'Matt know the answer' is stative. An *eventive sentence* is a sentence with the LF in (13) that has an eventive VP. An *eventive proposition* is the semantic value of an eventive sentence. A *stative sentence* is a sentence with the same LF with a stative VP. A *stative proposition* is the semantic value of a stative sentence.

6 Semantics for Ability Verb Phrases

We assume that an ability verb phrase has a syntactic structure that looks like this:

(14) $[_{\mathrm{VP}}\ [_{\mathrm{DP}}$ Luc] able to $[_{\mathrm{VP}}$ Luc lift the suitcase]]]

We say that 'able' denotes a function that takes a temporal proposition P to a function that takes a subject S and returns another temporal proposition—one that is true at a time t and world w if and only if, if S tried to bring about P at t in w, S would bring about P at t in w.

We make this more precise using a conditional operator $>$. Following Stalnaker (1968), the semantics for $>$ is given in terms of a *selection function* s that takes a world w and an atemporal proposition A and returns another world— the way things would be if A were true.

Semantics for $>$.
$> =_{df} \lambda A_{\langle s,t\rangle}\lambda C_{\langle s,t\rangle}[\lambda w.C(s(A,w)) = 1]$

We assume that the selection function obeys *Minimality*: if $w \in A$, then $s(A,w) = w$. Minimality ensures that conditionals obey *Strong Centering*: ⌜A and B⌝ is true if and only if ⌜A and if A, then B⌝ is true.

Following Thomason (2005), we use this semantics for $>$ to state our semantics for 'able'.

Conditional Analysis.
$[\![\text{able}]\!] = \lambda P_{\langle i,st\rangle}\lambda S_e\lambda t. > (\lambda w.S \text{ tries to bring about } P \text{ at } t \text{ in } w)(\lambda w.S \text{ brings about } P \text{ at } t \text{ in } w)$.

Let $Try_t = \lambda w.$Luc tries to lift the suitcase at t in w. Let $Lift_t = \lambda w.$Luc lifts the suitcase at t in w. Then the truth conditions for (14) are:

$[\![(14)]\!] = [\![\text{able}]\!]([\![\text{Luc lift the suitcase}]\!])([\![\text{Luc}]\!]) = \lambda t\lambda w.Lift_t(s(Try_t, w)) = 1$

7 Semantics for Tense and Aspect

We assume a referential theory of tense. Tense morphemes are indexed to free variables ranging over times, whose values are supplied by a variable assignment g. Following Heim (1994), we assume that the past tense morpheme Past_i carries a presupposition of temporal precedence: $g(i)$ precedes the time of utterance t_c. This gives us the following entry for Past_i.

Semantics for Past.
$[\![\text{Past}_i]\!]^{g,c}$ is defined only if $g(i) < t_c$. If defined, $[\![\text{Past}_i]\!]^{g,c} = g(i)$.

Aspect in eventive sentences concerns the relationship between two times: the *event time* and *reference time*. Perfective aspect says the event time is contained in the reference time. Imperfective aspect says the reference time is contained in the event time. Compare:

(15) Matt walked to the store last night.

(16) Matt was walking to the store last night.

(15) has perfective aspect: it says that the time of Matt's walk is contained in the reference time—in this case, last night. (16) has imperfective aspect: it says the time of Matt's walk contains the reference time.

We offer a referential theory of aspect that closely resembles referential theories of tense. Aspectual operators are indexed to free variables ranging over times, whose values are given by g. ⌜Perf_j P⌝ says that P is true at $g(j)$. Perf_j carries two presuppositions. First is the *temporal presupposition*: $g(j)$ must be contained within the reference time. Second is the *settledness presupposition*. Where P be any temporal proposition, and $P_{g(j)}$ is the atemporal proposition that results from saturating P's temporal input with $g(j)$, ⌜Perf_j P⌝ presupposes that $P_{g(j)}$ is settled true or settled false by the end of $g(j)$.

To state the settledness presupposition, we introduce a class of *settling operators*: for any time t, $\Box_t A$ says that A is settled true by the end of t. Following Thomason (1984), we state the semantics of $\Box_t$ in terms of a historical modal base H_t that takes a world w and returns the set of worlds that are exactly like w with respect to matters of particular fact up to the end of t.

Settling Operators.
$\Box_t A = \lambda w.\text{for all } w' \in H_t(w) : A(w') = 1$

Note that very few, if any, propositions about the future are settled: if A_{t^+} is a proposition about times after t, then, almost always, there will be worlds that are exactly like the actual world in matters of particular fact up to t in which A_{t^+} is true, and worlds that are exactly like the actual world in matters of particular fact up to t in which A_{t^+} is false.

We can now state our semantic entry for Perf_j.

Semantics for Perfective.
$[\![\text{Perf}_j]\!]^{g,c} = \lambda P_{\langle i,st \rangle} \lambda t : g(j) \subseteq t \lambda w : \Box_{g(j)} P_{g(j)}(w) \vee \Box_{g(j)} \neg P_{g(j)}(w).P_{g(j)}(w)$

8 Predictions: Eventive Sentences

The eventive sentence (15), repeated below, has the logical form in (17).

(15) Matt walked to the store.

(17) Past_i [Perf_j [Matt walk to the store]]

Let $W = \lambda t \lambda w$. Matt walks to the store at t in w. Then we have the following entry for (17).

If defined, $[\![(17)]\!]^{g,c} = [\![\text{Perf}_j]\!]^{g,c}(W)([\![\text{Past}_i]\!]^{g,c})$
$= \lambda w : \Box_{g(j)} W_{g(j)}(w) \vee \Box_{g(j)} \neg W_{g(j)}(w). W_{g(j)}(w)$; and $g(j) \subseteq g(i)$ and $g(i) < t_c$

The truth conditions and the temporal presupposition tell us that (17) is true only if Matt walked to the store at $g(j)$—a time that is contained in the time supplied by tense.

The settledness presupposition says that (17) is defined only if whether Matt walked to the store by the end of $g(j)$ is settled by the end of $g(j)$. We will show that this presupposition is trivially satisfied: it is satisfied no matter what world we're in. Thus the settledness presupposition is not felt to contribute anything to the meaning of (17), and so (17) is felt to be true if and only if Matt walked to the store.

The VP 'Matt walk to the store' does not contain any expressions referring to times. This has an important consequence: $W_{g(j)}$ is *entirely about* times up to $g(j)$. If $H_{g(j)}(w) = H_{g(j)}(w')$, then $W_{g(j)}(w) = W_{g(j)}(w')$. With this in mind, it is easy to see that (17)'s settledness presupposition is trivially satisfied: satisfied no matter what world we're in. Consider any world w. Either $W_{g(j)}$ is true in w or $\neg W_{g(j)}$ is true in w. Suppose $W_{g(j)}$ is true. Then, since $W_{g(j)}$ is entirely about times up to $g(j)$, it's true in all $w' \in H_{g(j)}(w)$. That is to say, $W_{g(j)}$ is settled true by the end of $g(j)$. Suppose $\neg W_{g(j)}$ is true in w. Since $W_{g(j)}$ is entirely about times up to $g(j)$, $\neg W_{g(j)}$ is also entirely about times up to $g(j)$. It follows that $\neg W_{g(j)}$ is true in all $w' \in H_{g(j)}(w)$. That is to say, $\neg W_{g(j)}$ is settled true by the end of $g(j)$. This reasoning generalizes. It is easy to show:[3]

Eventive Settling.
For any eventive proposition P, time t, and world w: either $\Box_t P_t(w) = 1$ or $\Box_t \neg P_t(w) = 1$.

9 Predictions: Ability Sentences

The following perfective ability ascription, (18), has the logical form in (19). .

(18) Luc a pu soulever la valise hier soir.

(19) Past_i [Perf_j [Luc be able to lift the suitcase]]

[3] *Proof.* Let P be an eventive proposition, t a time and w a world. Either $P_t(w) = 1$ or $\neg P_t(w) = 1$. Suppose $P_t(w) = 1$. Then since P_t is entirely about times up to t, it follows that $P_t(w') = 1$ for all $w' \in H_t(w)$, and so $\Box_t P_t(w) = 1$. Suppose $\neg P_t(w) = 1$. Since P_t is entirely about times up to t, $\neg P$ is also entirely about times up to t. It follows that $\neg P_t(w') = 1$ for all $w' \in H_t(w)$, and so $\Box_t \neg P_t(w) = 1$.

Let $Able = \lambda t \lambda w.Lift_t(s(Try_t, w))$. Then we have the following semantic entry for (19).

If defined, $[\![(19)]\!]^{g,c} = [\![\text{Perf}_j]\!]^{g,c}(Able)([\![\text{Past}_i]\!]^{g,c})$
$= \lambda w : \Box_{g(j)}Able_{g(j)}(w) \vee \Box_{g(j)}\neg Able_{g(j)}(w).Able(g(j))(w);$ and $g(j) \subseteq g(i)$ and $g(i) < t_c$

We said that (19) presupposes that Luc tried to lift the suitecase. And we showed that, given the Conditional Analysis, we can derive the actuality entailment of (19)—that Luc lifted the suitcase—from its presupposition—that Luc tried to lift the suitcase. In the remainder of the paper, we will show how the settledness presupposition of (19) combines with the semantics of 'able' to generate the trying presupposition. We begin by showing that, given the Conditional Analysis, *one* way for hearers to accommodate the settledness presupposition of (19) is to presuppose that Luc tried to lift the suitcase. We then show that, in any ordinary circumstance, this is the only way to accommodate the settledness presupposition.

Why presupposing trying is one way to accommodate the settledness presupposition.
We show that if $Try_{g(j)}$ is true in w, then the settledness presupposition of (19) is satisfied in w: $\Box_{g(j)}Able_{g(j)}(w) = 1$ or $\Box_{g(j)}\neg Able_{g(j)}(w) = 1$. Suppose $Try_{g(j)}$ is true in w. It follows from Eventive Settling that $\Box_{g(j)}Try_{g(j)}$ is true in w. There are two cases: either $Lift_{g(j)}$ is true in w or $\neg Lift_{g(j)}$ is true in w. First suppose $Lift_{g(j)}$ is true. By Eventive Settling, $\Box_{g(j)}Lift_{g(j)}$ is true, and so $\Box(Try_{g(j)} \wedge Lift_{g(j)})$ is true in w. Strong Centering tells us that the conjunction $Try_{g(j)} \wedge Lift_{g(j)}$ entails the conditional $Try_{g(j)} > Lift_{g(j)}$. So, by the semantics for $\Box_{g(j)}$, it follows that $\Box_{g(j)}(Try_{g(j)} > Lift_{g(j)})$ is true in w: $\Box_{g(j)}Able_{g(j)}(w) = 1$. Now suppose $\neg Lift_{g(j)}$ is true in w. It follows from Eventive Settling that $\Box_{g(j)}\neg Lift_{g(j)}$ is true in w, and so $\Box(Try_{g(j)} \wedge \neg Lift_{g(j)})$ is true in w. Strong Centering tells us that the conjunction $Try_g(j) \wedge \neg Lift_{g(j)}$ entails the conditional $Try_{g(j)} > \neg Lift_{g(j)}$. So, by the semantics for $\Box_{g(j)}$, it follows that $\Box_{g(j)}(Try_{g(j)} > \neg Lift_{g(j)})$ is true in w. And finally, by the semantics for $>$, it follows that $\Box\neg(Try_{g(j)} > Lift_{g(j)})$ is true: $\Box_{g(j)}\neg Able_{g(j)}(w) = 1$.[4]

Why presupposing trying is the only way to accommodate the presupposition.
We now show that, in any ordinary circumstance, $Able_{g(j)}$ is settled true or settled false only if if $Try_{g(j)}$ is true. We begin with an assumption about when counterfactuals are settled. A counterfactual antecedent that concerns a particular time t shifts the world of evaluation to worlds that match the actual world up to some time t^- shortly before t. This time is known as the *time of the fork*. We assume that whenever the antecedent A_t of a counterfactual is false, the counterfactual $A_t > C_t$ is settled true at t only if the material conditional $A_t \supset C_t$ is settled true at the time of the fork. We call this principle *Conditional Settling*.[5]

Let $g(j)^-$ be the time of the fork for the counterfactual $Try_{g(j)} > Lift_{g(j)}$. Given Conditional Settling, this counterfactual is settled true or settled false in w only if at least one of the following conditions obtains: (a) $Try_{g(j)}$ is true in w; (b) $\Box_{g(j)^-}(Try_{g(j)} \supset Lift_{g(j)})$ is true in w; or (c) $\Box_{g(j)^-}(Try_{g(j)} \supset \neg Lift_{g(j)})$. But, in any ordinary circumstance, both necessitated material conditionals are false. That is, in any ordinary circumstance, it is possible, at the time of the fork, that Luc will try and succeed in lifting the suitcase, and it is possible that Luc will try and fail to lift the suitcase. It follows that, in any ordinary circumstance $Able_{g(j)}$ is settled true or settled false only if $Try_{g(j)}$ is true.

Acknowledgements. Thanks to audiences at the Center for Human Abilities, PhLiP 9 and NYU and to Nathaniel Baron-Schmitt, Cian Dorr, Matt Mandelkern, Barbara Vetter and the referees for the Amsterdam Colloquium.

[4]Here we assume: $\Box_{g(j)}\Diamond_{g(j)}Try_{g(j)}$, guaranteeing that $\Box_{g(j)}(Try_{g(j)} > \neg Lift_{g(j)})$ entails $\Box_{g(j)}\neg Able_{g(j)}$.
[5]See Thomason and Gupta (1980) for a similar constraint.

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