

Causal necessity and sufficiency in implicativity *

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Abstract Karttunen’s (1971) implicative verbs are notable for generating inferences over their complements. English *manage to X*, for instance, entails the truth of *X*: the entailment reverses with matrix negation and seems tied to the elusive presuppositional contribution of the implicative predicate (Coleman 1975). Building on Baglini & Francez (2015), and drawing on implicative data from Finnish, I propose an account of the implicative class which links the lexical presuppositional content of an implicative verb to inferences over the truth-value of its complement via a model of causal relationships between contextually-salient variables (Schulz 2011). Unlike previous proposals, this account extends naturally to the commonalities between *manage* and weaker one-way implicatives like Finnish *jaksaa*(=have.strength), which only entail under one matrix polarity.

Keywords: implicative verbs, *manage*, Finnish, causality, causal entailment, necessity and sufficiency, lexical semantics, circumscription, conditional perfection

1 Introduction

Karttunen (1971) distinguishes a class of complement-taking **implicative** verbs which generate systematic inferences over the truth of propositions expressed by their complements. As shown in (1), a positive assertion of English *manage* or Finnish *onnistua*(=succeed) licenses the inference that the implicative complement holds. The distinctive feature of implicative verbs (in contrast to, e.g., *factives*; Kiparsky & Kiparsky 1970) is exemplified in (2): negating an implicative assertion reverses the polarity of the associated inference.

- (1) a. He **managed** to flee. † *He fled.*
b. Hän **onnistu-i** kuitenkin pakenema-an.
he.NOM succeed-3sg.PST however flee-INF.ILL
'He succeeded in fleeing.' † *He fled.*

* Thanks are due to Cleo Condoravdi, Lauri Karttunen, and Itamar Francez for helpful discussion of these ideas, and to Sven Lauer for comments on an earlier version of the manuscript. Additional thanks go to my Finnish informants, and to Ida Toivonen and Karoliina Lohiniva for assistance with glossing and case.

- (2) a. He did not **manage** to flee. ⊢ *He did not flee.*
 b. Hän e-i **onnistu-nut** kuitenkin pakenema-an.
 he.NOM neg-3sg succeed-PP.sg however flee-INF.ILL
 ‘He did not succeed in fleeing.’ ⊢ *He did not flee.*

The entailments in (1-2) set up an interesting puzzle. Given implicative I and proposition X composed into implicative construction $I(X)$, we have the following entailments: (i) $I(X) \vdash X$, and (ii) $\neg I(X) \vdash \neg X$. Since (ii) is the logical converse of (i) and should imply $X \vdash I(X)$, we derive the conclusion that $I(X)$ is logically equivalent to an assertion of its complement: (iii) $I(X) \equiv X$. Comparison of (1a) and its entailment, however, suggests that they are not equivalent. The challenge for a semantic analysis of implicatives, then, is to capture the relationships (i) and (ii), while simultaneously blocking the entailment $X \vdash I(X)$, which leads to the “intuitively unacceptable conclusion” that $I(X) \equiv X$ (Karttunen 1971: p.343).

In this paper, I aim to address this challenge by framing the lexical semantics of implicative verbs in terms of *causal dependence*. My proposal owes its central insight to Baglini & Francez (2015)’s account of English *manage*, which invokes a causal *dynamics* (cf. Schulz 2011) to connect *manage*’s presuppositional content to the actualization of its complement. Motivated largely by data from Finnish, I offer a revised version of Baglini & Francez’s proposal which extends to the full implicative class: implicatives background the causal necessity of a particular prerequisite for the truth of their complements. This makes good on the intuition, anticipated by Karttunen, that the entailment $X \vdash I(X)$ is blocked by implicative presuppositions. It also provides an account of the similarities between predicates like *manage* and *onnistua* and Karttunen (2012)’s “one-way” implicatives (e.g., *be able*), which share the overall inferential structure of the verbs in (1-2), but weaken the inference under one matrix polarity. More broadly, in drawing on recent work which demonstrates the utility of causal frameworks for modeling the relations of consequence and entailment that are relevant to counterfactual conditionals (Schulz 2011; Kaufmann 2013), a causal account of implicativity suggests that causal dependencies are central to linguistic reasoning writ large, and factor into lexical semantics and inference outside of the domain of conditionals.

2 Presupposition and causal dependence

2.1 Implicatives and obstacles

Karttunen (1971) suggests a role for presupposition in blocking the inference from *manage*-complement to the full implicative construction. Others have pursued this approach as well: for example, Karttunen & Peters (1979) propose that an assertion like (3) presupposes effort on its subject’s part (see also Bhatt 1999).

(3) Solomon **managed** to build the temple.

a. *Presupposes*: It was effortful for Solomon to build the temple.

As (4-7) show, implicatives in general invoke some attribute that plays a role in determining whether the complement is actualized. While the nature of the attribute evidently varies from verb to verb, in each case the implicative predicate suggests that that attribute (or rather, the lack thereof), presents a potential “obstacle” for the truth of *X* (see also Karttunen 2014).

(4) a. Hän **uskals-i** avat-a ove-n.

he.NOM dare-PST.3sg open-INF door-GEN/ACC

b. He **dared** to open the door. ⊢ *He opened the door.*

(5) a. Hän e-i **viitsi-nyt** vastast-a.

he.NOM neg-3sg bother-PP.sg answer-INF

b. He didn't **bother** to answer. ⊢ *He didn't answer.*

(6) He **condescended** to meet the petitioners. ⊢ *He met the petitioners.*

(7) Hän e-i **ehhti-nyt** ampu-a karhu-a.

he.NOM neg-3sg have.time-PP.sg shoot-INF bear-PART

'He didn't have time to shoot the bear.' ⊢ *He didn't shoot the bear.*

Dare, along with Finnish counterpart *uskaltaa*, presupposes that *X* requires courage on the subject's part; similarly, *bother/viitsiä* presupposes that a lack of interest or concern might prevent *X*. For *condescend*, the obstructing factor is something like disdain, while for *ehitiä*(=have.time) it is (a lack of) time. Compared to the verbs in (4-7), *manage* and *onnistua* are semantically bleached – they presuppose only a potential difficulty for *X*, but are unspecific about the nature thereof.

Based on this evidence, I take (I)-(III) to be the central facts of implicativity:

(I) An assertion $I(X)$ conditions *X* on overcoming the presupposed obstacle for *X*. This will ultimately block entailment from *X* to $I(X)$.

(II) Given both (i) $I(X) \vdash X$ and (ii) $\neg I(X) \vdash \neg X$, surmounting the obstacle must be both sufficient and necessary for *X* in context.

(III) An assertion $I(X)$ or its negation conveys unequivocally that *X* or $\neg X$, respectively.

The task, then, is to determine the correct “division of labour” between at-issue and not-at-issue content that results in the above facts.¹

¹ I do not take a position here on what type of not-at-issue content implicative verbs invoke; *presupposition* here can simply be taken to mean “not-at-issue”. I leave investigation of whether this content is best classified as presupposition or conventional implicature (in the sense of Potts 2005) for future work.

2.2 Malleable presuppositions and causal dependence

The account pursued by Karttunen & Peters (1979), Bhatt (1999), and others aims to establish Fact (III) by setting the at-issue contribution of $I(X)$ directly to X . This move takes its justification from Karttunen's observation that "... *managing to do* is inseparable ... from *doing* ..." (p. 349-50), as well as from the facts shown in (8): the complement of (3) projects through *discover*, but the presupposed content (3a) does not (see 8b).

- (8) I just discovered that Solomon **managed** to build the temple.
- a. $\not\vdash$ I just discovered that building the temple was effortful for Solomon.
 - b. \vdash I just discovered that Solomon built the temple.

The direct assertion proposal faces two immediate problems. First, Coleman (1975) observes that *manage*-assertions license surprisingly malleable inferences about the nature of the obstacle for their complements. Although (9-10) are not unusual uses of *manage*, both fail to presuppose that X is effortful for their subjects.

- (9) Harry **managed** to insult Ursula without even trying.
- (10) My neighbors **managed** to schedule their one wild party of the year on the night before my German exam.

(9) explicitly denies effort, while (10) certainly does not require malintent on the part of my neighbors. Instead, both examples suggest unexpectedness or unlikelihood. Consequently, Coleman suggests that *manage*'s presupposition can vary between one of effort, difficulty, and/or sheer coincidence, as driven by the context of utterance.

Facts about certain adverbial modifiers raise a second problem for the direct assertion approach. Karttunen (1971) notes that a *because*-clause modifying a *manage*-statement is interpreted very differently than the same clause attached to the proposition expressed by the *manage*-complement instead:

- (11) a. John **managed** to open the door because it was unlocked.
- b. John opened the door because it was unlocked.

In keeping with the pattern established in (1), we might expect an entailment from (11a) to (11b), but there is no such entailment. Ostensibly, this is because the modifying clause attaches to different content in each case. In (11a), it is construed as explaining the means by which a potential obstacle was overcome, whereas in (11b) it addresses John's motivation for opening the door. On the direct account, then, we are forced to conclude that the not-at-issue content of an implicative utterance is available for adverbial modification.

Data points like (9-11) motivate Baglini & Francez’s (2015) claim that the direct approach does not fully account for the inferential profile of *manage*. They argue that Coleman’s “vanishing” presuppositions demonstrate that the not-at-issue structure of *manage* must be treated at a relatively abstract level – and, in particular, one which is subject to input from the discourse context. Moreover, they argue against a direct approach to Fact (III) on the grounds that examples like (11) show that the at-issue contribution of *manage*(*X*) differs non-trivially from that of its complement. Their proposal, given in (12), aims to capture both of these requirements: the central insight is that the relationship between the potential obstacle invoked by *manage* and the accomplishment of the *manage*-complement is one of **causal dependence**.

- (12) **Baglini & Francez (2015)**. A sentence of the form *manage*(*X*):
- a. presupposes the familiarity of a “catalyst,” or *causally necessary but causally insufficient situation C* for the truth of *X*.
 - b. asserts that the catalyst *C* *actually caused X* in the world of evaluation

The weight of this proposal lies in the formalizations provided for the relevant notions of **causal necessity**, **causal sufficiency**, and **actual cause**. These are built on Schulz’s (2011) framework for **causal entailment**.

Schulz (p.244) defines a **dynamics** *D* which represents causal relationships over a set *P* of propositions. A subset $B \subseteq P$ are distinguished as *background* variables, which do not depend on any other propositions for their truth-values. For all other variables $X \in P - B$, the dynamics encodes both the set Z_X of *causal ancestors* for *X* (those propositions on which *X*’s truth value depends), as well as the function f_X , which maps from truth-value assignments on Z_X to a truth value for *X*. Informally, *D* keeps track of what is known about causal links between contextually-relevant propositions. For Baglini & Francez, the dynamics is a feature of the discourse context. The use of *manage* highlights certain aspects of *D*: in particular, (12a) holds that a *manage* assertion will be infelicitous in any context where the dynamics does not support the existence of a *catalyst situation* for the *manage*-complement.

A *situation*, cf. Schulz, is an incomplete valuation of the proposition symbols in *P* (a map from *P* to $\{0, 1, u\}$, where *u* is *undetermined*). Given such a valuation *s*, we can use *D* to calculate its *causal consequences*. Schulz shows that a finite number of applications of the update process will exhaust the set of consequences that follow from any situation *s*. This allows us to define *causal entailment*:

- (13) In a dynamics *D*, a set of literals Σ **causally entails** a proposition $\phi \in P$ ($\Sigma \models_D \phi$) if $\phi = 1$ is a (finite) causal consequence of the situation where $\forall p \in P, p = 1$ if $p \in \Sigma$, and $p = u$ else.

These definitions can be extended to handle relationships between situations and propositions, as needed for (12) (see Baglini & Francez: p.550).

- (14) For any situation s , and any $X \in P - B$, let Σ_s represent the set of literals that are true in s , and let $Z_X|_s \subseteq Z_X$ be the subset of X 's causal ancestors which are determined by s .
- a. s is **causally sufficient** for X if and only if $\Sigma_s \models_D X$
 - b. s is **causally necessary** for X if and only if there is no alternative situation s' which differs from s on the value of $Z_X|_s$ and for which $s'(X) \neq 1$ and $s' \models_D X$.

Finally, *actual cause* is evaluated in a world w , which is a full 0-1 valuation of P (Baglini & Francez: p. 554):

- (15) In a dynamics D , a situation s **actually causes** a proposition $X \in P - B$ if X is undetermined in s ($s(X) = u$), X is true in w ($w(X) = 1$), and w respects the 0-1 values and causal consequences of s , as encoded in D .

(14-15) complete the scheme in (12), and produce the desired entailments between $manage(X)$ and X . The presupposition (12a) holds that assertions or denials of $manage(X)$ are only felicitous when the context establishes the truth of a causally necessary but insufficient catalyst C for X ; this prevents an automatic entailment from X to $manage(X)$. The at-issue question handled by the assertion $manage(X)$ is whether *actual cause* holds between C and X – that is, whether C suffices for X in context. A positive assertion answers affirmatively, so (15) gives us $w(X) = 1$, and we conclude X from $manage(X)$. Conversely, $\neg manage(X)$ denies that C actually caused X . Since the catalyst is presupposed to hold, the only part of definition (15) which can fail is the truth of X : this gives us $w(X) = 0$, and we conclude $\neg X$.

The entailments (i) $manage(X) \vdash X$ and (ii) $\neg manage(X) \vdash \neg X$ capture Fact (III). Baglini & Francez's presupposition of a contextually-familiar, causal catalyst also appears to capture Facts (I) and (II). Since C is causally insufficient, the problem of achieving sufficiency in context can be construed as Karttunen's potential obstacle for X , and since C is presupposed to be necessary for X , the conditioning relationship ultimately involves both necessity and sufficiency, as desired. Crucially, Baglini & Francez argue that framing the presupposition (12a) purely in terms of the causal relations in a dynamics allows them to account for the context-sensitivity of $manage$'s presuppositions (cf. Coleman), while preserving Karttunen's intuitions about the relationship between *managing* and *doing*. Broadly, the context-dependence of D allows the precise composition of a familiar catalyst to variously invoke notions of effort, difficulty, or unlikelihood, as supported by discourse context. In other words, the malleability of $manage$'s presupposition is explained by the context-dependent manner in which the background dynamics sorts X 's causal ancestors into those which belong to the familiar catalyst, and those which do not.

3 Refining the causal account

Besides the introduction of a causal background, the most important feature of proposal (12) is the claim that the at-issue contribution of *manage*(X) is not simply the entailed proposition X . According to Baglini & Francez, this provides an explanation of the facts in (11): since the at-issue content of the implicative statement is about a causal chain for X , it follows that the *because*-clause in (11a) addresses how or why X was actually caused, rather than the how or why of X itself, as in (11b).

- (11) a. John **managed** to open the door because it was unlocked.
 b. John opened the door because it was unlocked.

If this is correct, (11a) holds both that a discourse-familiar catalyst *actually caused* John to open the door, and that the relation of actual cause was achieved via the door's being unlocked. For simplicity, assume that the catalyst in this context is simply John's attempt to open the door (e.g., turning the knob and pushing). His attempt is certainly necessary for him to open the door, but it may not be sufficient for any one of a number of reasons – the door may be very heavy, there may be boxes piled against it, or it may be locked. The positive *manage*-assertion (11a) conveys that the attempt to open the door was sufficient in context, and we conclude that no potential obstacle had effect. Moreover, if the *because*-clause modifies the assertion of actual cause as suggested, it must convey that the contextually-relevant potential obstacle was whether the door was locked. The door's being unlocked was, therefore, the decisive factor permitting the catalyst's sufficiency for X . As a result of this, (11a) conveys that no other relevant factors were in question with regards to opening the door. Since a *manage*-statement presupposes the truth of its catalyst regardless of matrix polarity, the door being unlocked appears to be the proximate cause of X , rather than John's attempt to open the door. Thus, whether or not the door was successfully opened does not hinge (in context) on John's attempt, but rather on a catalyst-independent causal factor: the state of the lock.

Examining the role that *because*-clauses play in *manage* statements reveals something important about Baglini & Francez's proposal. The preceding discussion illustrates that (12) mandates the existence of a catalyst-independent causal ancestor (or set thereof) for X which constitutes the decisive factor for X in contexts where the truth of the catalyst is presupposed. Since the catalyst is insufficient for X , the relation of actual cause as defined in (15) can only hold if all catalyst-external causal ancestors for X are set in an X -ensuring way. In a negative *manage* statement, we must assume that these variables were set in a X -preventing way. In other words, a consequence of proposal (12) is that in any context where a *manage* assertion or denial is made felicitous by the truth of a catalyst C , there must be some factor (variable or set thereof) which is causally independent of C , and is simultaneously

both necessary and sufficient for X with respect to the utterance context. This factor must then be the proximate or contextually-relevant cause of X .

Consequently, the catalyst presupposition gets at [Karttunen's \(2014\)](#) notion of a potential obstacle in a rather roundabout way. The catalyst itself cannot represent the obstacle. Rather, it is the insufficiency of the catalyst that represents the obstacle – however, as we have seen, this translates into the observation that it is the resolution of some catalyst-external factor which determines the truth value of X in context. It is this factor, then, which represents [Karttunen's](#) obstacle.

3.1 Attribute-specific implicatives

As noted, *manage* is semantically bleached compared to the majority of other implicatives. In particular, where the verbs in (4-7) name the factor that represents the potential obstacle for their complements, *manage* is unspecific with respect to the obstacle's nature. This means that the catalyst presupposition as framed in (12a) runs into trouble once we consider more attribute-specific predicates.

- (16) a. He **dared** to kill the cat. ⊢ *He killed the cat.*
 b. He didn't **dare** to kill the cat. ⊢ *He didn't kill the cat.*
- (17) a. Hän **henno-i** tappa-a kissa-n.
 he.NOM have.heart-PST.3sg kill-INF cat-GEN/ACC
 'He had the heart to kill the cat.' ⊢ *He killed the cat.*
- b. Hän e-i **henno-nut** tappa-a kissa-a.
 he.NOM neg-3sg have.heart-PP.sg kill-INF cat-PART
 'He didn't have the heart to kill the cat.' ⊢ *He didn't kill the cat.*

Dare and *hennoa*(=have.heart) highlight a particular causal prerequisite as the determining factor for their complements. In (16), the presence or absence of courage decides the fate of the cat, while in (17) it is the presence or absence of "heart." These examples suggest that the attribute which is "named" (lexically specified) by an implicative in fact represents the contextual obstacle, in a manner analogous to the state of the lock in (11a).

[Baglini & Francez's](#) proposal, therefore, cannot immediately account for all implicatives. A straightforward extension of (12) would subsume the named attribute under the catalyst, but this would produce the wrong inferences. Where [Baglini & Francez](#) presuppose the truth of a catalyst regardless of matrix polarity, the named attribute cannot be assumed to hold. (16-17) show that the courage or "heart" required for killing the cat is present *only* in positive matrix contexts; the negative assertion conveys that the absence of these attributes prevents actualization of X . The same is true of the named attributes in positive and negative statements with the

verbs in (4-7). In general, then, the lexical content of an implicative verb appears to highlight the fact that a particular (contextually) necessary and sufficient causal factor for *X* is in question. That is, implicative presuppositions focus our attention directly on the nature of the potential obstacle, rather than on “catalyst” variables.

This brings Coleman’s problem back to the forefront. If implicatives describe the obstacle for their complements, we still need to account for the “vanishing” presuppositions of *manage*. I suggest that *manage* represents a special case. As with other implicatives, use of *manage* highlights the existence of a potential obstacle (i.e. a contextually necessary and sufficient factor which is in question) for its complement, but *manage* deviates from the attribute-specific verbs above in failing to state the nature or make-up of this factor. Finnish *onnistua*(=succeed) is similar, in presupposing only that an obstacle exists. In either case, matrix polarity determines whether the obstacle was overcome. Due to lack of specificity, *manage* and *onnistua* allow the discourse context to supply information about the nature of the obstacle, leading variously to presumptions of effort, difficulty, unlikelihood, etc.

This discussion does not question the key insights of Baglini & Francez’s analysis: I aim to preserve the causal basis for their explanations of Coleman’s observations and the adverbial modification facts. Instead of taking the catalyst presupposition as basic, however, I show that the existence of a catalyst follows from a more direct characterization of the implicative obstacle; this allows the proposal to extend to additional implicative verbs. I suggest that the composition of neither catalyst nor obstacle need be explicitly known; rather, the choice of a matrix verb in an implicative construction is governed by what, if anything, is known about the nature of the obstacle. The bleached character of *manage* and *onnistua* allows them to be used as generic choices when a speaker is either uncertain or does not wish to communicate about the nature of the obstacle for the implicative complement.

3.2 One-way implicatives

Further issues for (12) are posed by “one-way” implicatives (Karttunen 1971, 2012):

- (18) a. Hän **pysty-i** tappel_{ma}-an.
 he.NOM able-PST.3sg fight-INF
 b. He **was able** to fight. ⊢ (↗) *He fought.*
- (19) a. Hän e-i **pysty-nyt** tappel_{ma}-an.
 he.NOM neg-3sg able-PP.sg fight-INF
 b. He **was not able** to fight. ⊢ *He did not fight.*

Finnish *pystya* and English *be able* share the overall inferential pattern of the (two-way) implicatives so far discussed. Crucially, however, while the inferences gener-

phrasal) predicates that replicate the inferential profile of *be able/pystya*. What is particularly striking, however, is that *jaksaa* mimics two-way predicates like *hennoa*(=have.heart; 17) and *ehtiä*(=have.time; 7) in identifying the nature of the potential obstacle for their complements. This points to the robustness of Karttunen’s joint lexical classification of one- and two-way implicatives. While Baglini & Francez’s proposal makes some headway in capturing the semantics of some implicatives (*viz.* two-way predicates) more precisely than the direct-assertion approach, the preceding discussion shows that proposal (12) must be modified and refined substantially in order to handle one-way verbs as well.

4 Causal necessity, sufficiency, and implicativity

What we are after is an account of implicativity that preserves the causal basis of Baglini & Francez, but focuses on the “obstacle” (i.e. the in-question, contextually-decisive prerequisite) instead of a catalyst. As before, this account should derive Facts (I)-(III), with the caveat that one-way implicatives do not exhibit the entailment $I(X) \vdash X$. This difference between one-way and two-way implicatives should follow from a (minimal) difference in the not-at-issue background encoded in the lexical semantics of the predicates, since the similarity between one- and two-way predicates strongly supports a single account of the at-issue contribution of both types.

4.1 The proposal

The preceding discussion motivates the following proposal:

- (22) A statement of the form $I(X)$, with implicative I and complement X :
- a. presupposes the existence of a causal factor (ancestor or set thereof) A for X , where A is *causally necessary* for X in the context of utterance
 - b. asserts that A was met in the world of evaluation. Consequently, $\neg I(X)$ asserts that A was not met.
 - c. If I is a two-way implicative, $I(X)$ also presupposes that A is the only open prerequisite for X in the utterance context (all A -independent causal ancestors are presumed to be resolved in the X -conductive way)

The presupposition of A ’s existence crucially does not presuppose that A holds. Instead it highlights, as desired, that given what is known to the speaker about the settings of A -independent causal ancestors for X , A is both causally necessary for X to occur and in question (prior to the implicative utterance). I have deliberately not built the intuition that A is unresolved in context into the explicit presuppositional

contribution of *I*: I suggest that this arises as an implicature from the use of an implicative construction *I* instead of the simpler alternative *X* (or its negation).

The entailment $\neg I(X) \vdash \neg X$ is derived from the combined contribution of (22a) and (22b). The presupposition (22a) tells us that if *A* is not met in the world of evaluation, *X* cannot be actualized. The assertion (22b) tells us whether or not *A* was met. For instance, if $I=jaksaa$, *A* is strength, and $I(X)$ tells us (only) that the requisite strength was present. Since a negative assertion carries the at-issue information that *A* was not met, it follows that *X* did not occur. Here, $\neg X$ is not directly included in at-issue content, but is logically entailed in any context where $\neg I(X)$ is felicitous.

On the other hand, a positive assertion $I(X)$ carries the at-issue content that *A* was met in the world of evaluation. Absent any additional knowledge about the causal ancestry of *X*, we cannot conclude anything about *X*'s truth value. This is precisely what we want for one-way predicates. The presence of *A* may suggest that *X* occurred (by conveying that that at least one potential barrier to *X* was removed), but it does not entail *X*. If *I* is a two-way implicative, however, we do have some additional information: namely, the presupposition (22c). (22c) essentially carries the presumption that *A* is contextually sufficient for *X* – practically speaking, it conveys that all other necessary causal conditions were met. As a result, *A* is the only potential obstacle for *X*, and its resolution determines the value of *X*. If *A* is met, it follows that *X* occurred. We again derive the desired entailment $I(X) \vdash X$ from the joint contribution of assertion and presupposition.

On this proposal, it is straightforward to encode the additional contribution of various implicative predicates in their lexical semantics, as constraints on possible values for the potential obstacle *A*. For example, where *jaksaa* names strength as the factor *A*, *darelviitsiä* names courage or perhaps temerity. Moreover, implicatives vary in the degree of specificity which they impart to *A*: *ehtiä*(=have.time) is very specific, but *be able/pystya* are not precise about the type of ability required for their complements, and *manage* is predicted to be felicitous even in contexts where a potential obstacle exists but nothing more specific is known.

Proposal (22) preserves the key gains of Baglini & Francez (2015). Specifically, I maintain the causal connection between the presupposition of *I* and the actualization of *X*: because the causal backbone of both proposals is based on a contextually-derived dynamics, I retain the explanation of Coleman's observations. (22) also captures the intuition behind Baglini & Francez's explanation of the adverbial modification facts. It improves on this in explicating why *because*-clauses in *manage* sentences aid in pinning down the nature of the decisive factor *A*; this results from focus on an open, rather than a satisfied, causal prerequisite.

4.2 Supporting evidence

Proposal (22) meets the desiderata in Facts (I)-(III), and captures the differences between one- and two-way implicatives without dividing them on the basis of at-issue content. I present here some empirical evidence supporting the new account.

For a one-way implicative *I*, (22) makes two claims. First, a positive assertion *I(X)* states that the factor *A* was met. Second, the presence of *A* is not enough to permit the conclusion that *X* occurred. (23) realizes both of these behaviours:

- (23) Lily **was able** to answer her teacher’s question. Despite her ability, she decided to let her friend Violet answer instead, so that Violet could get credit.

Similarly, the non-contradictory denial of the implicative complement in (24) shows that *X* need not follow from a one-way implicative assertion. Nevertheless, (24) conveys that the requisite strength was present, independently of inferences drawn regarding the implicative complement.

- (24) Hän **jakso-i** tappelema-an, mutta päätt-i
 he.NOM have.strength-PST.3sg fight-INF, but decide-PST.3sg
 sitä vastaan.
 he.PART against.ILL
 ‘He had the strength to fight, but he decided not to.’

X’s deniability in (24) is not contested by Baglini & Francez, who do not aim to capture verbs like *jaksaa*. Since both proposals (12, 22) capture the two-way entailments in Fact (III), the most promising ground for adjudication is at the not-at-issue level. In particular, (22) predicts infelicity from two-way implicative utterances in contexts where causal factors for *X* independent of the named attribute are known to be in question. This does not follow from Baglini & Francez’s proposal (12).

On (22), then, we expect infelicity to result from using a two-way implicative in contexts where the dynamics is explicitly constructed with unresolved, *A*-independent causal prerequisites for *X*. This prediction is borne out in the following examples, for Finnish *ehsiä*(=have.time) and *kehdata*(=be.unashamed).

- (25) a. **Context:** A hunter in the forest had lost count of the number of times he had fired his gun and was not sure if he had used all the bullets or not. He decided to check after eating something, and put the gun down to get some food from his bag. While he had both hands in the bag, he caught sight of a bear coming towards him.
- b. #Hän **eht-i** ampu-a karhu-n.
 he.NOM have.time-PST.3sg shoot-INF bear-GEN/ACC
 ‘He had enough time to shoot the bear.’ (⊢ *He shot the bear.*)

(26) a. **Context:** Two versions of a survey were prepared for a policy consultant to take door to door. One version had unusually detailed questions about sexual preferences which were not included on the other. The policy consultant was only given one version, but we are not sure which one. We are wondering whether he asked the personal questions.

b. #Hän **kehtas-i** kysy-ä niin henkilökohtais-i-a
 he.NOM unashamed-PST.3sg ask-INF such personal-PL-PART
 asio-i-ta.
 thing-PL-PART

‘He was unashamed to ask something so personal.’

(← *He asked the personal questions.*)

(25a) explicitly suspends a necessary and time-independent condition for shooting the bear – namely, whether or not the hunter had any bullets remaining. This results in the infelicity of (25b): one informant explained this by saying she could not use *ehtiä* because “if he didn’t have any bullets, he could not have shot the bear.” She identified the same problem with a negative *ehtiä* assertion in the same context, even where the speaker intended to convey that the bear was not shot. Similarly, use of *kehdata* in (26b) was judged inappropriate in the context of (26a). As in (25), the context provides an unresolved potential reason which might have independently prevented the actualization of the implicative complement: namely, the consultant might not have had the version of the survey which included the offending questions.

(25) and (26) support proposal (22)’s prediction: in both cases, two-way verbs are infelicitous when a causally necessary factor independent of the implicative-named one explicitly remains unresolved. This contrasts, crucially, with contexts where other factors are not made salient. In a neutral context – for instance, one where the background contains only the information that the hunter in (26) was reaching for food and not holding his gun when he spotted the bear – (26b) is not only felicitous, but allows us to infer (a) that the only potential obstruction to the complement was time, and (b) that the bear was in fact shot. Taken together with the evidence from (25-26), this suggests that the presupposition outlined in (22c) is on the right track.

4.3 Circumscription and implicature

The distinction made in proposal (22) between one- and two-way implicatives raises the following question: why do verbs like *manage*, *bother*, and *ehtiä* encode (22c) as part of their not-at-issue content, while *be able*, *jaksaa*, and *mahtua* do not? I will not attempt to provide a definitive answer here, but instead examine some consequences of the formulation of (22) which are promising with respect to future investigation.

Once the connection between implicativity and causality has been established,

the most straightforward way of describing the difference between one- and two-way predicates is as the difference between necessity alone, on the one hand, and necessity and sufficiency together, on the other. The presupposition (22c), however, is not formulated as one of sufficiency, but rather primarily as one of circumscription. Specifically, (22c) circumscribes *A* as the *only* necessary causal factor for *X* that is in question (i.e. not already resolved in an *X*-conducive way) in context.

This formulation is motivated by the observation, marked in examples (18) and (20), that one-way implicatives under many circumstances strongly implicate their complements in the non-entailing direction.

- (18) a. Hän **pysty-i** tappelema-an.
 he.NOM able-PST.3sg fight-INF
 b. He **was able** to fight. ↔ *He fought.*
- (20) Hän **jakso-i** noust-a.
 he.NOM have.strength-PST.3sg rise-INF
 ‘He had the strength to rise.’ ↔ *He rose.*

Karttunen (2012) draws a parallel between these implicatures and the well-known pragmatic phenomenon of **conditional perfection** (Geis & Zwicky 1971). In conditional perfection, a statement of the form *if P, (then) Q* is interpreted biconditionally, as *Q if and only if P*. The analogy between perfection and the implicatures in (18) and (20) follows from the fact that, in both phenomena, the listener infers from the highlighting of a single condition (*P* or *A*) that it is in fact the *only* contextually relevant condition for the relevant conclusion (*Q* or *X*). For perfection, this gives us implied necessity on top of asserted sufficiency; for one-way implicatives, we infer sufficiency in addition to presupposed necessity. Both implicatures are licensed by the speaker’s mention of a single condition.

This move – to interpret the only condition given as the only condition there is – is known as circumscriptive reasoning (McCarthy 1980), and can be captured by an operation along the lines of pragmatic **exhaustive interpretation** (Groenendijk & Stokhof 1984; Schulz & van Rooij 2006). From a one-way implicative utterance *I(X)*, we infer *X*, as long as the context does not block the assumption that only the *I*-invoked factor was in question for *X*.

We have seen that two-way implicatives are infelicitous when an *A*-independent factor is explicitly left unresolved. Moreover, I noted that (22c) is accommodated in cases where non-*A* factors are left unmentioned. From use of a two-way implicative, listeners will infer a background in which all non-*A* causal factors for *X* are met. As a result, formulating (22c) as circumscriptive creates a natural continuity between one- and two-way predicates.

On this view, two-way implicatives can be seen as having lexicalized the circumscriptive reasoning, which then produces two-way entailments. One-way im-

plicatives have not (yet) reached this stage: but circumscription can nevertheless be licensed readily in contexts where no alternative causal factors for X are made salient. Crucially, while two-way verbs are infelicitous when alternative factors are salient, one-way verbs simply fail to generate the inference to their complements. This hypothesis remains to be properly investigated, but is supported to some extent by Flint's (1980) classification scheme for Finnish verbs of possibility and sufficiency: she ranks implicatives with seemingly similar lexical content by the strength with which they invite the conclusion that their complements hold. On this view, the presupposition/implicature divide may be somewhat fluid (see also White 2015). The degree of malleability involved, which verbs are subject to it, and the presence of any frequency/usage effects are left as matters for future investigation.

5 Conclusions and questions

This paper proposes that causal dependence relations underlie the lexical semantics of implicative verbs. Building on Baglini & Francez's (2015) insight about the relationship between *manage*'s presuppositional content and the actualization of its complement, I have argued that implicative verbs background the existence of a causally necessary prerequisite for their complements, and assert whether or not this requirement was met. The prerequisite lexically encoded by an implicative may vary with respect to both its nature and its specificity. What all implicatives have in common is that the presupposed causal necessity combined with the at-issue contribution guarantees entailment from the negative assertion $\neg I(X)$ to the negation of the the implicative complement. For two-way predicates, the account proposed here (see 22) also presents a solution to Karttunen's (1971) puzzle: the subclass of two-way predicates carries an additional, circumscriptive presupposition that amounts, in context, to the sufficiency of the indicated prerequisite for the actualization of the implicative complement. This produces the positive entailment $I(X) \vdash X$, which is realized by verbs like English *bother*, *dare*, and their Finnish counterparts *viitsiä* and *uskaltaa*, but avoids simultaneously enforcing the undesirable conclusion that $I(X) \equiv X$ for any I and X . The scheme outlined in (22), then, not only captures the implicative behaviours described in Karttunen (1971) (see also 2012; 2014), but also provides an explanation of the peculiar presuppositional facts observed by Coleman (1975). In formulating the sufficiency presupposition as one of circumscription *a la* McCarthy (1980) and Schulz & van Rooij (2006), (22) sketches a natural connection between the inferential profiles of one- vs. two-way implicatives.

Proposal (22) is also promising with respect to accounting for **polarity-reversing** implicatives, which I have not discussed here. Karttunen (1971, 2012) observes that verbs like *neglect/laiminlyödä* inherently push a logical negation into their

entailments. For these verbs, a positive assertion $I(X)$ entails the negation of the complement, $\neg X$, while a negative matrix assertion $\neg I(X)$ entails the positive complement X .

- (27) a. Hän **laiminlö-i** korjat-a virhee-n
 he.NOM neglect-PST.3sg repair-INF error-GEN/ACC
 b. He **neglected** to correct the error. \vdash *He did not correct the error.*
- (28) a. Hän e-i **laiminlyö-nyt** korjat-a virhe-ttä.
 he.NOM neg-3sg neglect-PP.sg repair-INF error-PART
 b. He did not **neglect** to correct the error. \vdash *He corrected the error.*

There are two straightforward ways to extend (22), each involving only a minor change to the not-at-issue content ascribed to an implicative verb. One possibility is to describe prerequisite A as causally necessary for the negation of X : this will derive the negative-assertion entailment in (28) directly, and the positive-assertion entailment in (27) as the result of a second, circumscriptive presupposition. Alternatively, the absence of factor A may be backgrounded as the causally necessary element: this will derive the positive-assertion entailment directly, and leave the negative-assertion entailment to follow from a circumscriptive presupposition. It is not immediately obvious which of these options is to be preferred. One reason for this uncertainty is that polarity-reversing implicatives in Finnish and English are generally less specific about the nature of the prerequisites they highlight than their polarity-preserving counterparts. Nevertheless, closer examination and empirical investigation of the implications of various polarity-reversing implicatives seems likely to indicate whether the basic relationship between A and X is one of prevention or (by A 's absence) enablement.

Perhaps the most interesting (and potentially revealing) examples are one-way polarity-reversing implicatives, which – at least in English – appear to come in types conforming to both of the above options. English has a set of phrasal one-way implicatives like *be too shy* and *be too weak*, which entail the negation of their complements under positive matrix polarity, but fail to entail under negative matrix polarity. The inferential profile of these verbs is shared by **causatives** (e.g., *prevent*), although in both English and Finnish the grammatical structure of causative complements differs from the infinitival form required by implicatives. At a superficial level, this suggests that the positive-entailment polarity-reversers may not represent the “base case”. On the other hand, while both Finnish and English have one-way polarity-reversers of the type privileged by this view, example (29) shows that the implicature patterns of this type are more malleable than those associated with the *too-A-to-X*-type, and can even tend towards a factive-style implicature pattern instead of an implicative one.

- (29) John **hesitated** to ask for help.
- a. *Implicative-type*: \rightsquigarrow John did not ask for help (because hesitation cost him the opportunity).
 - b. *Factive-type*: \rightsquigarrow John asked for help (after some deliberation).

Examples like (27-29), as well as the *too-A-to-X* polarity-reversers, leave open a number of avenues for further investigation of the underlying structure of implicativity, and the coverage achieved by a proposal like (22). Two important issues raised by this brief discussion include the relationship between implicatives and regular causatives, (which will likely be informed by data from languages with causative morphology such as Hindi or Japanese), as well as the sharpness of the distinction between implicatives and factives. The idea that there is a relationship between these verb classes is reminiscent of results from Karttunen (2014) indicating variability in inferencing associated with phrasal factive constructions such as *be lucky to X*.

Finally, the entailments and implicatures associated with implicatives seem closely related to **actuality entailment** patterns produced by ability modals in certain contexts. Although *be able* behaves like a one-way implicative at a general level, Bhatt (1999) observes that under certain past tense uses, it is extremely marked to cancel the positive-assertion implicature:

- (30) Last week at the World's Strongest Man competition, John **was able** to lift a fridge . . . ??but he lost the competition because he refused to do it.

In languages which morphologically mark the distinction between perfective and imperfective aspect (e.g., French, Greek, Hindi) the implicature that an ability modal's complement is realized strengthens to an entailment in the perfective, but remains at best an implicature under imperfective aspect (see Bhatt 1999; Piñón 2003; Hacquard 2006; Mari & Martin 2007; Homer 2011).² In the extensive literature on this topic, an account which makes good on the similarity between ability modals and implicatives is so far lacking. The connection between actuality entailments and the inferential profile of one-way predicates suggests a fertile ground for future research, especially in light of the causal approach to implicativity suggested by Baglini & Francez (2015) and pursued here. The usefulness of causal models originally developed for treating entailment in counterfactual conditionals (Schulz 2011) in capturing the notion of a "potential obstacle" at the root of Karttunen's characterization of implicativity suggests that causal dependence relations may underlie linguistic inference in a wide variety of lexical phenomena, including the interesting and complex case of actuality entailments.

² A similar effect can be achieved in Finnish by using the genitive/accusative case instead of the partitive on an object included in the ability modal's complement proposition.

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