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# The Implications of Managing

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## Abstract

Since Karttunen's original observations about the two-way implicative verb manage, there has been no consensus as to the descriptive and analytical characterization of the implicational behavior of this verb. This short paper presents a reevaluation of the relevant descriptive generalizations, and proposes an analysis, couched within the causal modeling approach to causation developed by Schulz (2011). We propose that manage sentences presuppose the familiarity of a 'catalyst'—a causally necessary but insufficient condition for the truth of the propositional argument of manage, and assert that the catalyst actually caused this truth. Various more specific implications mentioned in the literature—trying, difficulty, unlikelihood—are shown to be either special cases of our proposed presupposition, or else cancelable pragmatic inferences. The analysis is argued to account for some new empirical observations as well.

## 1 INTRODUCTION

Karttunen (1971a) famously recognizes two classes of implicative verb which he terms *one-way* and *two-way* implicatives. The verb *manage* is an example of a two-way implicative, giving rise to an implication, which we call here a polarity implication, in both positive and negative contexts. For example, in (1), the sentence intuitively corresponding to the complement of the verb is true in the positive case (1-a), and false in the negative case (1-b). (2) shows that the polarity implications are not cancelable.

(1) a. Solomon managed to build the temple $\rightsquigarrow$ Solomon built the temple.
b. Solomon didn't manage to build the temple $\rightsquigarrow$ Solomon didn't build the temple.

(2) a. *Solomon managed to build the temple, but he didn't build it (in the end).
b. *Solomon didn't manage to build the temple, but he built it (anyway).

Polarity implications have been taken to indicate that *manage* contributes no truth-conditional content beyond that of its semantic complement. Karttunen (1971a:350) writes: 'All that takes place when John manages to do something is that he does it. While intending to do is one thing and doing another, managing to do is inseparable in space and time from doing; it is the same event.'

Karttunen further observes that *manage* gives rise to projective implications. The sentences in (1) are both felt to imply (3-a), and perhaps also one or both of the implications in (3-b) and (3-c).

(3) a. Solomon tried to build the temple.
b. To build a temple is difficult (for Solomon).
c. It was unlikely/unexpected that Solomon would build a temple.

The literature offers no explicit analysis of what the projective implications of *manage* are and what their theoretical status is. In fact, there is no consensus even as to their descriptive characterization. Karttunen (1971a), Stephenson (2010), Bhatt (1999) suggest that managing implies trying, and that this implication is a presupposition.[1] Karttunen and Peters (1979) take managing to imply difficulty, and take this implication to be a conventional implicature. Coleman (1975) offers a sophisticated and empirically rich discussion of the implications of *manage* sentences as presuppositions ordered by decreasing semantic strength. However, she does not attempt to formulate the presuppositions involved in a way that reflects the assumed strength relations, and we show below that her predictions are not borne out. The overall inferential profile of the verb *manage*, therefore, remains largely obscure.

The goal of this short paper is to sharpen the empirical picture about the semantic behavior of *manage*, and to propose an explicit analysis of this verb's lexical semantics, including its inferential profile.[2] We propose that *manage* makes a nontrivial truth conditional contribution, and is associated with a very weak and highly context-dependent, but explicitly characterizable projective inference, which we take to be a presupposition.[3] Making the simplifying assumption that *manage* takes a proposition, the *prejacent*, as its semantic complement, our proposal, in intuitive terms, is that a nonquantified, past tense *manage* sentence

[1] van Leusen (2012) suggests that the presupposition is *effort*, a weaker notion than *trying*.

[2] Ultimately, an analysis of *manage* should be part of a more general theory of implicativity and the typology of implicative verbs. Such a theory is beyond the scope of a short paper.

[3] While we treat the projective inference as a presupposition, we remain tentative about its particular characterization, acknowledging that it might in fact be better viewed as a conventional implicature. See discussion in section 3.5.

presupposes the contextual familiarity of a *catalyst*[4], a condition the obtaining of which is causally necessary but insufficient for the truth of the prejacent. A *manage* sentence asserts that this catalyst has causally lead to the truth of the prejacent. Other implications associated with *manage* sentences, such as difficulty or unlikelihood, are analyzed as pragmatic inferences based on contextual information. We sketch how the analysis can be formalized in the framework for causality proposed in Schulz (2011), inspired by the causal modeling approach of Pearl (2000).

## 2 PREVIOUS CHARACTERIZATIONS

Karttunen (1971b) demonstrates that *manage* is associated with a presupposition or conventional implicature by observing that *manage* sentences and corresponding sentences without *manage* resist modus tollens. If (4-a) were equivalent to, and hence entailed, (4-b), then by modus tollens, (5-a) would be equivalent to, and hence entail (5-b). The entailment does not go through, since the presupposition that Dreyfus attempted to spy for Germany is, according to what is generally taken to be historical fact, not satisfied.

(4) a. Dreyfus managed to spy for Germany.
b. Dreyfus spied for Germany.

(5) a. Dreyfus didn't spy for Germany. $\not\Rightarrow$
b. Dreyfus didn't manage to spy for Germany.

However, there is no consensus in the literature about what exactly the content and status of this 'background assumption' is, or about what other inferences *manage* sentences give rise to. To a large extent, this is because the empirical facts surrounding the interpretation of *manage* have not been fully and accurately described. In this section, we reevaluate existing characterizations of the implicational *manage*. We use the term *implication* not only for the specific relation Karttunen identified between (4-a) and (4-b), but for any kind of semantic or pragmatic inference associated with a particular lexical item.

The claim that *manage* presupposes *try* is not generally correct. This is arguably demonstrated by the compatibility of *manage* with inanimate subjects, as in (6).

[4] There are several important issues that we leave unaddressed here and that ultimately would have to be part of any complete analysis of *manage*. One is how the prejacent proposition is compositionally obtained from the subject and complement of *manage*. Another is how the analysis we propose fairs when the data-set is broadened to include quantification, tense and aspect. These issues must await further research.

(6) The campaign launch went well yesterday – despite the looming rain clouds, it managed not to rain during the event.
*(http://livewire.amnesty.org/2009/09/23/)*

Perhaps such examples can be viewed as metaphorical, and hence not inconsistent with the proposal that *manage* implies *try*. It is difficult, however, to see how such a line of analysis could be extended to examples like (7). Similar examples abound.

(7) How did my car manage to get vandalized in the 20 minutes I was in Walmart?
*http://www.proteacher.net/discussions/showthread.php?p=2940949*

Furthermore, Coleman (1975) notes that, even with volitional subjects, *trying* is not always implied. In (8), there is no implication that the neighbors tried to schedule the party on the night before the exam.

(8) Our neighbors managed to schedule their one wild party of the year the night before my German exam.

Instead, what is implied is only that the neighbors' doing so was unlikely (perhaps further implying that this constitutes a remarkable stroke of bad luck for the speaker). However, *manage* does not generally presuppose unlikelihood; in particular, in standard cases where trying is implied, unlikelihood is often not. Thus, (9) does not imply that my opening the door was unlikely.

(9) I managed to open the door.

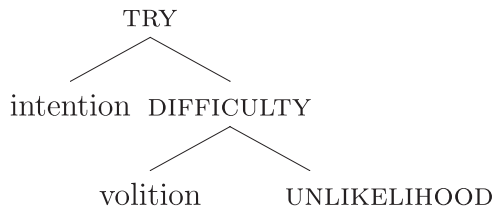
Finally, examples of *manage* sentences with an explicit denial of trying, such as (10), are also easy to come by.

(10) Archer couldn't help but think about all the trouble they managed to get into, without even trying.

Coleman put forth a clever solution to this apparent inconsistency surrounding the implications of *manage*. She proposes that the presuppositions of this verb are ordered hierarchically, such that if a presupposition is incompatible with the given context, it is canceled in favor of the next strongest presupposition which *is* compatible. The proposed hierarchy consists of *trying*, *difficulty* and *unlikelihood*. Trying is taken to be analyzable, at some level, as volition and difficulty. Difficulty in turn is analyzed as intention and unlikelihood. If a context is incompatible with a certain presupposition, it is canceled, leaving the next strongest presupposition. This hierarchy of presuppositions is given in (11). An example from Coleman (1975) is given in (12), where a single *manage* sentence is

presented along with three different contexts which may license it, but give rise to different presuppositions.

(11)




(12) Harry's dog manages to wake him up whenever he dozes off on the couch.
   a. The dog was trying intentionally to wake Harry up.
   b. The dog was just howling at a siren, but waking Harry up is difficult.
   c. Waking Harry up is easy, but it is unlikely that the dog would bark *every time* Harry dozes off.

Dalrymple *et al.* (1998) take Coleman's observations and analysis to show that *manage* exemplifies their Strongest Meaning Hypothesis, a general principle which requires a hearer to select the strongest meaning for a sentence consistent with the available contextual information. However, it is not clear in what sense the readings in (12) form a strength scale, since none of the sentences in (13) entails the next.

(13) a. The dog was trying intentionally to wake Harry. $\not\Rightarrow$
   b. To wake Harry up is difficult.$\not\Rightarrow$
   c. That Harry will wake up every time he dozes off is unlikely.

Furthermore, presuppositions that are weaker in Coleman's hierarchy are cancelable even when stronger ones are not. In (14) and (15), trying is implied but difficulty is explicitly denied, an impossibility on Coleman's account.

(14) Clad in civilian clothes and having passports, they easily managed to get back over the Volga.
*(Beevor, Antony. Stalingrad: The Fateful Siege: 1942-1943.)*

(15) I managed to make my way through customs. It was pretty easy, actually.
*(http://www.crazyorgenius.com/articles/2005/08/28/the-new-jersey-adventure-part-1/)*

A similar pattern is observed in (16) and (17). In both, the implication of unlikelihood or unexpectedness is explicitly canceled, without affecting the supposedly stronger presupposition of intention.

(16) Once Klaus captured Bonnie, it was painfully obvious that Stefan would manage to kill Finn but that the plan itself would be a failure.
*http://www.ign.com/articles/2012/03/30/the-vampire-diaries-the-murder-of-one-review*

(17) Now it's becoming obvious that Fork will manage to kill someone important.
*http://lowermidtable.wordpress.com/2010/06/26/blogging-legend-of-the-galactic-heroes-episode-78/*

Thus, even if Coleman's appealing intuition could be modeled explicitly in terms of a strength hierarchy, her predictions are not borne out.

From these considerations we conclude that *manage* cannot be said in general to presuppose trying, and that cases where trying is not presupposed cannot be explained as pragmatically motivated presupposition filtering. Furthermore, the fact that implications of difficulty, unlikelihood, and unexpectedness arise only in some contexts, and are generally cancelable, indicates that they should not be treated as presuppositions. In short, the existing theoretical literature on *manage* does not establish a clear picture of the inferential profile of this verb.

## 3 A CAUSATION BASED ANALYSIS

In this section, we propose an analysis of both the truth-conditional and presuppositional content of *manage*. First, we make the simplifying assumption that *manage* is semantically a one-place operator, taking a propositional complement, called the *prejacent*, which is derived somehow from the infinitival complement and the subject. Given this assumption, we can give a pre-theoretical statement of our analysis in (18).

(18) A sentence of the semantic form *manage(p)*:
   a. Presupposes the familiarity of a "**catalyst**", a *causally necessary*, but *causally insufficient* condition for the truth of *q*.
   b. Asserts that the catalyst *actually caused* the truth of *p*.

In what follows, we discuss the two aspects of this analysis – the presupposition and assertion, sketching a formalization, and demonstrating how it explains the basic inferential behavior of *manage*, and some additional observations.

### 3.1 *The presupposition*

Intuitively, our proposal is that a *manage* sentence presupposes the obtaining of a condition which is causally necessary but insufficient for the truth of the prejacent. By *a condition which is causally necessary but insufficient* we mean a situation that, according to a contextually assumed causal model, that is, a set of generalizations about causal relations between relevant variables, can develop into one in which the prejacent is a fact. This presupposition is satisfied whenever the truth of a proposition is a contingent fact. However, it is not always satisfied when the falsity of a proposition is a contingent fact. This is why the projective presupposition of *manage* becomes apparent in negated *manage* sentences.

As an example, consider (5-b) above, repeated in (19).

(19) Dreyfus didn't manage to spy for Germany.

Example (19) implies something that contradicts commonly assumed historical facts about the Dreyfus affair. Descriptively, one might say it implies that Dreyfus tried to spy for Germany. On our account, what this sentence implies is that at some point things were such that, if the world were to run according to a contextually assumed model of the causal relations between a set of relevant variables, it could develop into a world in which Dreyfus spies for Germany. In this case, presumably, having the intention to spy for Germany is considered causally necessary for spying for Germany. A simplified but natural causal generalization about such situations might be that if someone plans to spy for Germany, they will collect information, contact German agents, and then transfer the information to the agents. Since, by assumption, Dreyfus never had such an intention, there was never a situation that, according to the contextual causal generalization, could turn into one in which Dreyfus spies for Germany.

Importantly, our claim is *not* that (19) is odd because it was never metaphysically or epistemically possible for the world to develop into one in which Dreyfus spies for Germany. Rather, it is odd because it presupposes the actual, historical occurrence of a catalyst—a situation that could, solely according to the dictations of the contextually assumed generalizations about the causality of spying situations described above, develop into one in which Dreyfus spied for Germany. Such a situation would have to include the fact that Dreyfus intended to spy for Germany. Since such a situation never arose historically (though it could have), the sentence implies something we presuppose to be false.

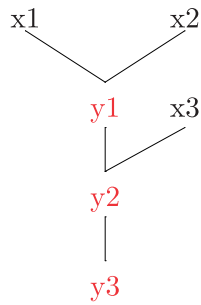
Characterizing more explicitly what a catalyst is, requires elaboration of the notions of causal necessity and sufficiency. Lewis (1979) proposed to define causal necessity in terms of counterfactuality. On this approach, a proposition $p$ is a necessary cause of a proposition $q$ when $q$ would not be true unless $p$ were. However, recently, building on causal modeling theories of causation like Pearl (2000), there have been suggestions to reverse the relation, and model counterfactuality in terms of causal dependence rather than the other way around (see e.g. Condoravdi (2009) for an analysis of the progressive based on this idea). We adopt the framework for causality suggested by Schulz (2011), which employs a simply propositional language and a three-valued logic. We do not provide a full exposition of the framework or of the philosophical and semantic work it is intended to perform, describing only as much of it as is needed to explicate our analysis of *manage*.

The notions in Schultz's framework that are important for our purposes are that of a *dynamics* and that of a *situation*. A dynamics is a generalization about the assumed causal dependencies between a given set of variables, represented as propositional letters. The dynamics dictates how the values of certain variables can be determined given the values of other variables they causally depend on. The variables within a dynamics are divided into background and inner variables. The background variables represent facts that are taken to be causally independent of any other facts in the dynamics. The rest of the variables in the dynamics are the inner variables, representing facts that causally depend on others. In addition to the variables, the dynamics also supplies a function representing the assumed causal laws. For every inner variable, this function specifies how its truth value depends on the value of the variables it causally depends on.

(20) **Dynamics**: A dynamics $D$ consists of:
   a. A set $B$ of background variables
   b. A set $I$ of inner variables
   c. A function $F$ associating any inner variable $p$ with:
      1. a set $Z_p$ of propositions that $p$ causally depends on.
      2. a 2-valued truth function $f_p$, determining the truth value of $p$ based on those of the propositions in $Z_p$.

A graphic representation of a dynamics is given in (21), with background variables in black and internal variables in grey.

(21) **Example dynamics**:




$B = \{x_1, x_2, x_3\}$
$I = \{y_1, y_2, y_3\}$
$F(y_1) = \langle Z_{y_1} = \{x_1, x_2\}, f_{y_1} = (y_1 \Leftrightarrow x_1 \wedge x_2)\rangle$
. . .

A **situation** is a valuation of the propositional letters in a three-valued logic. The logic includes the values $\{u, 0, 1\}$, where the value $u$ is to be read as *undetermined*. A *world* is a situation in which no propositional letters are undetermined.

We propose to define a catalyst for the prejacent of a *manage* sentence as a dynamics-relative situation $s_D$, which is causally necessary but causally insufficient for the truth of the prejacent. Intuitively, a situation relative to a dynamics is causally necessary for the truth of the prejacent when the causal laws of the dynamics dictate that if the value of any of the determined variables were determined differently, the prejacent would not be true. A situation $s_D$ is casually sufficient for the truth of the prejacent when it *causally entails* it, that is, when there is no way for the situation to develop in accordance with the causal generalizations of the dynamics without the prejacent being true.

Formally, causal entailment is defined by Schultz in terms of an operation $\mathcal{T}_D$ that determines the values of undetermined variables in any given situation in accordance with the rules given by a dynamics $D$ (specifically by the function $F$). Intuitively, this operator determines what things would be like if everything that the contextually assumed causal rules say should happen happens, and nothing else does. The operator is defined in (22).

(22) **The operator** $\mathcal{T}(s)$
a. For any situation $s$, $\mathcal{T}(s)$ is also a situation.

b. Given a variable $p$, situation $s$ and a dynamics $D$, the value of $p$ in the new situation $\mathcal{T}_D(s)$ as follows:
   1. if $p$ is a background variable, its value remains unchanged.
   2. If $p$ is an inner variable undetermined in $s$, and the dynamics determines a value for $p$ based on its direct causes, then $p$ is set to this predicted value. Otherwise the value of $p$ is left unchanged.

A situation $s$ is said to causally entail a proposition $p$ given a dynamics $D$ when $p$ is true at the *least fixed point* $s^*$ of $\mathcal{T}_D$ relative to $s$. The least fixed point is the point at which further applications of $\mathcal{T}_D$ have no effect. In other words, this is the unique point at which all undetermined internal variables whose value is predicted by the dynamics are determined.

(23) **Causal entailment**: $s \models_D p$ iff $s^*(p) = 1$
*s causally entails p given D if p is true on the least fixed point s**

We can now define what it means for a catalyst $s_D$ to be causally necessary but insufficient for the truth of the prejacent of a *manage* sentence. A catalyst $s_D$ is **causally sufficient** for a variable $p$, $s \rightsquigarrow p$, when it casually entails it, that is, when $s \models_D p$. A catalyst $s_D$ is causally necessary for the truth of a variable $p$, $p \triangleleft s_D$, when no $s'$ that differs from $s$ in the value of determined variables causally relevant for $p$ and in which $p$ is undefined causally entails $p$. We use the notation $s \neq_{p,(0,1)} s'$ to mean 'there is at least one variable $q$ such that $p$ causally depends on $q$ and $s(q) \neq s'(q) \neq u$'.

(24) **Causal necessity**: $p \triangleleft s_D$ iff $\neg\exists s' : s \neq_{p,(0,1)} s' \;\&\; s'(p) \neq 1 \;\&\; s' \models_D p$.

The presupposition of *manage* is then stated in (25).

(25) **Presupposition of** *manage*:
*Manage(p)* presupposes the familiarity of a catalyst $s_D$ such that $s_D \not\rightsquigarrow p \;\&\; p \triangleleft s_D$

An utterance of a *manage* sentence thus requires a context that is not just compatible with the existence of a catalyst, but in which a particular catalyst is familiar, or assumed by the speaker to be familiar. Both the dynamics and the relevant situation are thus contextual parameters, and when a speaker utters a *manage* sentence, they are assuming that certain causal generalizations about familiar contextually relevant variables are common ground.[5]

[5] How exactly the dynamics and the catalyst is determined is of course an interesting question. Presumably, this is an extra-grammatical, pragmatic process that relies heavily on world knowledge

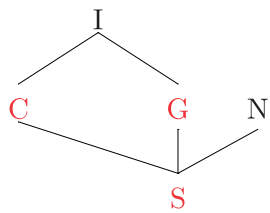
As an example, consider how this analysis applies to the Dreyfus scenario described above. A simplified but plausible catalyst for a speaker to assume in that example is the one in (26).

(26) **Dreyfus catalyst** (cf. sentence (19))

a. Dynamics $D_\delta$:

- Background variables: $I$ = Dreyfus intended to spy for Germany, $N$ = Dreyfus wasn't caught
- Internal variables: $C$ = Dreyfus collected information, $G$ = Dreyfus contacted German agents, $S$ = Dreyfus spied for Germany.
- The function $F$:

$Z_C = \{I\}, f_C = C \Leftrightarrow I$
$Z_G = \{I\}, f_G = G \Leftrightarrow I$
$Z_S = \{C, G\}, f_S = S \Leftrightarrow C \,\&\, G \,\&\, N$




b. Catalyst $s_\delta$: $I = 1,\ C = 1,\ G = u,\ S = u,\ N = u$

Intuitively, the dynamics specifies that if Dreyfus intends to spy for the Germans, he will gather information and contact German agents, and if he is not caught, he will spy for Germany. The catalyst situation $s_\Delta$ based on this dynamics is one in which Dreyfus has the intention to spy, has collected information, but it is undetermined whether he will contact German spies, whether he will be caught, and whether he will spy. Clearly, $s_\Delta$ is not causally sufficient for (does not causally entail) the truth of $S$, the prejacent, since that depends on the value of $N$, which is undetermined, so that $s^*_\Delta(S) = s_\Delta(S) = u$. Similarly, $s_\Delta$ is necessary for the truth of $S$, since no situation in which the determined variables of $s_\Delta$, $I$ and $C$, are false instead of true, and in which $S$ is not already true, is causally sufficient for the truth of $S$.

Crucial to this analysis of the Dreyfus scenario is the choice of dynamics. In particular, the dynamics has to include a division of the variables into background and inner variables in a way that ensures the causal necessity and insufficiency of the catalyst. For example,

and specific assumptions in the conversational context. What seems clear is that it is not determined by the lexical meaning of *manage*.

causal insufficiency is ensured by the fact that whether or not Dreyfus is caught is taken to be a background variable, not causally predictable from Dreyfus' actions. Of course, this does not mean that whether or not Dreyfus is caught is not a causally determined issue, or even that it does not causally depend on his actions. Rather, it means that he being caught is an issue that is taken to be causally independent of the other variables in the contextually relevant set.

This analysis thus predicts a strong context-dependence for *manage* sentences. Their felicity depends on the availability of a catalyst, and that in turn depends on the contextually assumed dynamics, specifically on which facts are taken to causally depend on others. We believe this prediction is borne out, and consider this to be an important evidence for our analysis.

The context-dependence of *manage* sentences can be diagnosed by considering contexts that differ minimally in whether a single variable is taken to be an automatic result of a process or not. An automatic process is one whose necessary causes are also taken to be sufficient. Such a process is therefore incompatible with the existence of a necessary but insufficient condition. In a context in which the complement of *manage* is taken to be automatic, infelicity results. This is illustrated in (27), where pressing a button on an automatic door is taken to secure its opening.

(27) CONTEXT: John presses the button on a fully functional automatic door and the door opens.
   a. #John managed to open the door.

The same utterance becomes completely natural in a different context, such as the one described in (28), in which a catalyst is made salient which is distinct from pressing the button, and which is construable as causally necessary but insufficient for opening the door.

(28) CONTEXT: For centuries, many have tried and failed to open the door, ignorant of the hidden button. One day a child inadvertently discovers and presses the button.
   a. After centuries, a child managed to open the door.

On the proposed analysis, the difference between (27) and (28) is captured in terms of the different contextually given dynamics. The context in (27) can be described as including the dynamics in (29).

(29) Dynamics and catalyst for (27):
   a. Dynamics $D_1$:
      - Background variables: $M$ = Automatic mechanism is functional, $P$ = Button is pressed

- Internal variable: $D$ = Door opens.
- The function $F$:
  $Z_D = \{M,\ P\}$, $f_D = D \Leftrightarrow M\ \&\ P$

b. Catalyst $s_1$: $M = 1,\ B = 1,\ D = u$

Here, whether the button is pushed is a background variable, and is not taken to be causally dependent on anything else. The dynamics $D_1$ makes available only one potential catalyst, the situation $s_1$, which causally entails the opening of the door and is hence ruled out as a catalyst.

The context in (28) differs only in that pressing the button, which is equally causally necessary and sufficient, is taken to be an internal variable, causally dependent on the button's discovery. This discovery is necessary, but not sufficient, for the door to open, and so this context makes available a catalyst, the situation $s_2$ in (30), to satisfy the presupposition of *manage*. In this situation, which the dynamics predicts to develop into the one described in (28), the child has discovered the button, but has not yet pressed the button.

(30) Dynamics and catalyst for (28):

a. Dynamics $D_2$:

- Background variables:
  $M$ = Automatic mechanism is functional, $B$ = Button is discovered
- Internal variables: $P$ = Button is pressed, $D$ = Door opens.
- The function F:
  $Z_P = \{B\}$, $f_P = P \Leftrightarrow B$
  $Z_D = \{M,\ B,\ P\}$, $f_D = D \Leftrightarrow M\ \&\ B\ \&\ P$

b. Catalyst $s_2$: $M = 1,\ B = 1,\ P = D = u$

This analysis allows a natural explication of the contexts in which *manage* sentences are taken to imply trying. We propose that this implication is a special case of the proposed presupposition, in which the contextually familiar catalyst situation includes the carrying out of an intentional act as a background variable. The Dreyfus scenario just discussed is such a case. Whether such an intentional act can be considered a background variable depends on the nature of the eventuality described by that prejacent of *manage* as well as contextually assumed information. For example, the description of the context in (28) explicitly states that the discovery of the button, a background variable, is an inadvertent act, and this is why the trying implication does not arise.

### 3.2 *The assertion*

On our proposal, *manage* sentences assert that the catalyst situation actually caused the truth of the prejacent. For example, (31-a) asserts (31-b).

(31) a. John managed to build a house.
b. The catalyst, which was necessary but not sufficient for John to build a house, actually caused John having built a house.

We assume that 'actually causes' is a relation defined between situations and internal variables within a dynamics. A situation $s$ *actually causes* the truth of a variable $p$ in a world $w$ given a dynamics $D$ when $s$ does not determine $p$, $p$ is true at $w$, and $w$ is super situation of $s$, that is, $w$ agrees with $s$ on all the variables determined by $s$, notated $w =_{(0,1)} s$.

(32) **Actual cause**: A situation $s$ actually causes a variable $p$ in $w$ iff $s(p) = u$, $w(p) = 1$ and $w =_{(0,1)} s$.

Clearly, if a *manage* sentence is true, the truth of the prejacent is entailed. The negation of a *manage* sentence asserts that the catalyst did not actually cause the truth of the prejacent in the world of evaluation $w$. Since the familiarity of the catalyst is presupposed, as is the causal dependency between catalyst and prejacent, it is ensured that $w$ is a super situation of the catalyst and that $s(p) = u$. The only way, therefore, for it to be the case that the catalyst did not to actually cause the prejacent is for the prejacent to be false in $w$. Thus, our analysis preserves Karttunen's original observations about why *manage* is a two-way implicative verb.

3.2.1 *The assertion is not trivial* On the proposed analysis of the assertion of *manage* sentences, they assert something more than the truth of the complement, namely that a trajectory from the catalyst to the truth of the prejacent has been crossed.[6] Consequently, this analysis affords an explanation for contrasts in the way modifiers interact with *manage* sentences and the way they interact with their prejacents. Here we give two examples.

The first example involves *because*-clauses. The contrast in (33) is attributed by Karttunen (1971a) to John Kimball.

(33) a. John managed to buy the ring because it was cheap $\nrightarrow$
b. John bought the ring because it was cheap.

[6] Interestingly, if anecdotally, in modern Hebrew, the verb for *manage* or *succeed*, *lehacli'ax*, is derived from a root meaning 'to cross'.

Karttunen observes that the contrast has to do with an ambiguity of *because*-clauses, between describing a *motivation* and describing a causal *explanation*. The motivation reading is preferred in (33-b). Karttunen does not suggest an explanation for this preference. On our proposal, the contrast falls out naturally. Example (33-b) describes an action, whereas (33-a) describes a causal chain or relation. Actions can have a motivation, but a causal chain can only have an explanation.

The second example involves the modifiers *barely* and *hardly*, which exemplify a similar contrast, shown in (34).

(34) a. John hardly/barely managed to eat his dinner. $\nrightarrow$
b. John hardly/barely ate his dinner.

The fact that (34-a) does not entail (34-b) follows straightforwardly on the proposed analysis. On one reading of (34-a), the trajectory from catalyst to eating event that is said to have been barely or hardly crossed.[7] In (34-b), the eating event is said to have barely or hardly happened. Since *eat* is an incremental theme verb, the most salient reading of (34-b) is, roughly, that the incremental theme, the porridge, was only very partially consumed. Even without a precise understanding of the meaning of *barely* and *hardly*, it is clear that the difference between the two sentences in (34) has to do with the fact that the verb phrases *managed to eat his porridge* and *ate his porridge* do not convey the same content.

### 3.3 *Pragmatic implications*

We propose that implications of *difficulty*, *unlikelihood* and *unexpectedness* are pragmatic inferences rooted in properties of specific contexts. Since the catalyst is presupposed to be causally insufficient for the truth of the prejacent, any context in which a *manage* sentence is felicitous is one in which there is a contextually salient time at which it is, or was, not settled that the causal trajectory leading from the catalyst to the truth of the prejacent would be crossed. In other words, in any such context, it is assumed that there was, at a contextually specified time, a situation in which the truth of the prejacent was undetermined, and the contextually assumed dynamics did not guarantee it. Different contexts supply different possible causes for this development to fail.

Difficulty implications arise when world knowledge dictates that some of the variables on which the prejacent causally depends in the

[7] In fact, this is a simplification, since even though our analysis implies a trajectory, no such trajectory is actually made available for compositional manipulation in our semantics of *manage*. A full analysis would have to specify an explicit semantics for modifiers like *barely*, and this would likely entail a more articulated version of our notion of *actual cause*.

contextually assumed dynamics themselves depend on effort, physical or mental, exerted by the agent. For example, (35) gives rise to a difficulty implication because world knowledge tells us that opening an old and rusty iron gate depends on exerting significant force.

(35) John finally managed to push open the old iron gate.

Implications of unlikelihood arise when world knowledge dictates that one or more of the variables causally responsible for the occurrence of the prejacent causally depends are determined false in the worlds ordered highest by a stereotypical or metaphysical ordering source. An examples of this is (8) above, repeated as (36).

(36) Our neighbors managed to schedule their one wild party of the year the night before my German exam.

Here the implication of unlikelihood and unexpectedness arises because the chances that the neighbors would choose the particular evening before the exam, out of all the evenings of the year, to hold their party are low. The example can be captured by assuming the contextual dynamics $D_3$. This dynamics says that if the neighbors are planning a party, and if their considerations cause them to favor the date $d$, and if $d$ is also the night before the exam, then they will schedule their party on the night before the German exam.

(37) Dynamics for (36)
   a. Dynamics $D_3$:
      - Background variables:
        $N$ = the neighbors plan a party, $E = d$ is the night before the German exam, $C$ = the neighbors' considerations favor date $d$.
      - Internal variables: $S$ = The neighbors schedule on the night before the exam.
      - The function $F$:
        $Z_S = \{N, E, C\}$, $f_S = S \Leftrightarrow N \,\&\, C \,\&\, E$
   b. Catalyst $s_3$: $N = 1,\ E = 1,\ C = u,\ S = u$

In this case, clearly the catalyst $s_3$ is necessary for $S$, as changing any of the determined variables will lead to $S$ not being entailed. It is also not sufficient, since $s_3$ does not entail $S$, since it is undetermined whether the neighbors' considerations favor $d$. Assuming that the world of utterance of (36), $w_@$, is one in which the neighbors are not coordinating their party with the exam but in which their considerations favor $d$ nevertheless (i.e. $w_@(C) = 1$), it follows that in this world $s_3$ actually caused $S$,

since $s(S) = u$, $w_{@}(S) = 1$, and $w_{@}$ respects $D$. What is unlikely and/or unexpected is that the neighbors' consideration would favor $d$ of all available days, even though they are not coordinating with the exam.

Finally, the analysis encompasses cases like (38), which are felt to be sarcastic, and in which the prejacent does not causally depend on any contextually relevant actions at all, intentional or otherwise.

(38) Several months ago, I pulled into a parking space in downtown Sydney, Nova Scotia, got out and went into my bank. Upon returning to my car, I discovered that I had managed to lose my keys. I retraced my steps a dozen times and could not find them. (http://www.waramps.ca/about/words-kt.html)

In this case, the speaker has gone from a situation in which her keys were in a known, fixed location—the ignition of a car—to one in which they are being moved around, a necessary but certainly insufficient condition for misplacing them. The sarcasm of this kind of example is due precisely to the fact that, since the truth of the prejacent is not guaranteed, crossing the trajectory from catalyst to prejacent is normally construed as a positive achievement. *Manage* sentences are sarcastic when the prejacent is undesirable.

### 3.4 *Change of heart contexts*

Peter Klecha (personal communication) makes the interesting observation that negative *manage* sentences with a telic prejacent are infelicitous in what we call 'change of heart' contexts, that is, contexts in which the telos has been aborted midway. For example, suppose that Claire sets out from her office to buy a cup of coffee, but, on the way, changes her mind, realizing she does not want coffee after all. In this context, upon returning to the office, Claire cannot felicitously utter (39).

(39) # I didn't manage to get coffee.

The proposed analysis offers an explanation for this behavior. In the context as described above, in which Claire sets out to buy coffee, her intention to buy coffee[8] is taken to be a background variable, that is, a variable not causally dependent on any others. In asserting (39), the speaker indicates she believes that the catalyst failed to actually cause the prejacent. This can only be the case if some variable in the causal chain between catalyst and prejacent did not, in actual fact, have the value required by the dynamics for the truth of the prejacent. However,

[8] Importantly, it is intention, and not desire, that is required. Claire can perfectly well set out with the intention to get coffee but without any desire to do so (e.g. if forced at gun point).

Claire's intention to get coffee cannot be one of these variables, since the context specifies it to be a background variable with the right value (i.e. 1) for bringing about the truth of the prejacent. And yet, the context also specifies that the value of this variable changes and that this change is what disturbs the causal chain. This, we propose, is what makes (39) an odd utterance in the relevant context. The kind of causal reasoning involved in the interpretation of a *manage* sentence does not allow for background variables, or any other variables whose value has been determined, to change.

### 3.5 *Presupposition or conventional implicature?*

As mentioned in the introduction, we assume here without argument that the projective implication of *manage* is a presupposition, rather than a conventional implicature. This is a controversial assumption, and here we briefly mention some of the considerations that might argue one way or the other.

The existence of a catalyst is more like a conventional implicature than a presupposition in that it does not seem to be a precondition on the common ground (i.e. not an admittance condition in the sense of e.g. Heim 1990). For example, (40) can be used to inform the hearer that the speaker has been trying to win in chess.

(40) I finally managed to beat my mother in chess.

Furthermore, contexts like (27) above, which are incompatible with the existence of a catalyst, give rise to oddity rather than to an intuition of truth-valuelessness. This has been proposed as a diagnostic for conventional implicature (CI) by Abbott (2006) and Potts (2005).

On the other hand, the implication is more like presupposition in its projective behavior. For example, it does not project past plugs.

(41) a. Henri claimed that Dreyfus managed to spy for Germany.
b. If Dreyfus was planning to spy for Germany, he didn't manage to.

The typology of projective meanings, and the distinction between presupposition and conventional implicature, is currently being reexamined, and is a matter of debate (see e.g. Tonhauser et al. 2011; Potts forthcoming). A more conclusive resolution of this issue, which we leave for future research, would have to take into consideration the possibility that we are dealing with a false dichotomy and that a finer range of categories is required.

## 4 CONCLUSIONS AND FUTURE WORK

This short paper set out to demonstrate that the literature does not provide a descriptively and theoretically satisfactory analysis of the inferential profile of the implicative verb *manage*, and to provide a preliminary analysis that sharpens our understanding of this verb's semantic and pragmatic behavior. We proposed a precise statement of the presupposition and assertion of sentences involving this verb, arguing that this affords a better explanation of the various descriptive generalizations about the implications they gives rise to. In the process, we have reorganized some old observations, and pointed out some new ones. However, our discussion remains preliminary, and many questions remain for future investigation. These include the possibility of extending a causal modeling analysis to other verbs with similar implicational patterns, such as English *get*, and a more refined exploration of the status of the projective implication of *manage*. Another set of issues that remain to be examined in detail has to do with the syntax of *manage*, and the possibility of anchoring the semantics we propose in a compositional framework. Related to compositionality, there are many questions about the interpretation of *manage* that have not yet received serious attention in the literature, such as the interaction of implicatives with sentential modifiers, and with quantificational arguments. Furthermore, we have completely ignored issues of the interaction between causality and temporality, which a full analysis would have to address. With the analysis proposed here, we hope to have opened up a potentially fruitful line of inquiry into these questions.

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