Prospective Result of Causative Predicates: A Uniform Analysis

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Abstract

This study is devoted to pursuing a principled organization of the lexicon. It aims at explaining one aspect of causative predicates from semantic perspective. It has been noticed that some of the causative predicates have a modal component, making the caused eventuality "prospective" - whether or not the caused event/state holds in the actual world is undetermined. However, exactly which predicate contains modality and which does not has been a mystery, and even has not been discussed as far as I know. I will describe how the prospectivity is determined and argue that no idiosyncrasy is involved here.

1   Introduction

One remarkable fact about human language is that it takes only two or three years for children to acquire the basics of the grammar and vocabulary of their native language. That is, language learning requires only a small number of experiences. The smallness of experiences children need has inspired the work on the theory of Generative Grammar. It argues that human beings are born with Universal Grammar, the set of knowledge shared by every human language. Once UG is properly defined, it should predict a considerable number of the grammatical properties of human language. Linguists in the generative enterprise have struggled to determine exactly what constitutes UG. They pursue a theory with maximum explanatory power with minimum necessity of experiences.

However, there is an area in which necessity of experiences is irrefutable: The lexicon. As a mental dictionary, the lexicon consists of the words and morphemes of a language and their syntactic, phonetic, morphologic, and other idiosyncratic information. Since it would not make any sense to assume that, for example, an English word *dog* is a universal word to refer the certain animal, acquiring the lexicon definitely calls for experiences. In fact, since the starting point of the generative enterprise, the linguists has tended to regard the lexicon as a list of idiosyncrasies: A list of unpredictable facts which children must learn and memorize through experiences, for which no theory or even generalization is possible.

The above tendency is not totally unreasonable. Since the lexicon is finite, memorizing all the list is not logically impossible. Nevertheless, more recent study emphasizes that work on the lexicon should be "guided by the perception that there are generalizations relating apparently distinct items, which could not be simply accidental," (Reinhart, 2000) and we should "proceed from the null hypothesis that *nothing* is acquired through experience" (Pesetsky, 1995). They show that seemingly random morphological or theta-theoretic alternations are indeed predictable by their syntactic properties (Pesetsky) or a general theory of theta system (Reinhart).

Following their intuition, this study is devoted to pursuing a more principled organization of the lexicon. It aims at explaining one aspect of causative predicates from semantic perspective. It has been noticed that some of the causative predicates have a modal component, making the caused eventuality "prospective" - whether or not the caused event/state holds in the actual world is undetermined. (Koenig and Davis, 2001; Beavers,

2011; Martin, 2015; Martin and Schäfer, 2017; Harley and Jung, 2015, among others). However, exactly which predicate contains modality has been a mystery, and even has not been discussed as far as I know. I will describe how the prospectivity is determined and argue that no idiosyncrasy is involved here.

1.1 Theoretical Background

There are two major assumptions underlying this study. Firstly, I assume that verbs are represented with a Lexical Conceptual Structure, or LCS (Levin and Rappaport Hovav, 2011; Rappaport Hovav and Levin 2010), and this structure is formally analyzed by Neo-Davidsonian event semantics (Parsons, 1990).

An LCS is a decomposed structure of verbs. It is composed of a limited set of primitive predicates, like **act**, **become**, **have**, and **cause**. The idiosyncratic component of a verb, called *a verbal root*, may be associated with LCS in two ways, either it modifies a primitive predicate, or it becomes an argument of a primitive predicate. Typically, the former case is for an action verb like *run* represented as (1a), whereas the latter case is for a change of state verb like a transitive use of *break*, represented in (1b). (The variables *x* and *y* represent participants of the event.) Combined with the event semantics, the verbs in (1) have the denotations (2).

(1) a. *run* = [x **act**$_{<run>}$]
     b. *break* = [x **act**] **cause** [y **become** <break>]

(2) a. [[*run*]] = λx.λe. **act**(e) & **run**(e) & **subject**(e, x)
     b. [[*break*]] = λy.λx.λe. **act**(e) & **subject**(e, x) & $\exists$e'[**cause**(e, e') & **break**(e') & **theme**(e', y)][1]

The denotation (2b) is closely related with my second assumption. I define *a causative predicate* to be a semantically complex predicate which contains *two* eventualities: causing and caused

eventualities. In short, a causative predicate is *bi-eventive*.

The bieventivity is tested with an adverb *again* (Dowty, 1979). If a verb has a bieventieve structure, it induces a scopal ambiguity in the interpretation. To see this, consider the following sentence.

(3) a. John opened the door again.
     b. $\exists$e[**act**(e) & **subject**(e, J) & $\exists$e'[**cause**(e, e') & **open**(e') & **theme**(e', the-door)]]
     c. *again*($\exists$e[**act**(e) & **subject**(e, J) & $\exists$e'[**cause**(e, e') & **open**(e') & **theme**(e', the-door)]])
     d. $\exists$e[**act**(e) & **subject**(e, J) & *again*($\exists$e'[**cause**(e, e') & **open**(e') & **theme**(e', the-door)])]

The transitive use of *open* is a typical instance of causative predicates. The sentence (3), ignoring *again*, has the denotation (3b). Notice that (3a) has two interpretations. It means either John caused the door open and he had opened it before, or John caused the door open and it had been open before (not necessary opened by John). *Again* modifies the whole sentence in the former interpretation, while in the latter case it modifies only the resultant state. Each interpretation has the denotation (3c) and (3d), respectively. This ambiguity is absent in a mono-eventive construction such as *John hit Mary again*. Hence, *hit* is not a causative predicate.

With the above assumptions in mind, I will pursue the theory of causative predicates which requires the minimal amount of experiences. The rest of this study is organized as follows. In the section 2 I will lay out the relevant data and detect a generalization. I will formalize it in section 3. An important implication for Manner/Result Complementarity will also be discussed there. The section 4 deals with the data which apparently poses a problem to the proposal. In section 5, I will extend the analysis to a peculiar class of verbs, namely the defeasible causative verbs. The section 6 concludes this paper.

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[1] There are lot of ways to represent a change of state verb. Since the present proposal does not hinge on any specific representation, I do not commit which of them is licit.

2 Prospectivity

2.1 The Data

For some of the causative verbs, the resultant eventuality is only prospective: Whether it happens in the actual world or not is undetermined. Take ditransitive predicates, for example. Many authors have proposed that ditransitive predicates have an underlying causal relation, with a resultant state "a recipient has a theme" (Pesetsky, 1995; Harley, 2002; Harley and Jung, 2015; Beavers, 2011). As Pylkkänen (2008) and Beavers (2011) observe, whether the resultant state is entailed or not depends on the verb. Consider the following sentences and their LCS.

(4)   a. John gave Mary a ball, #but she never
         received/got it.
      b. [[John **act**] **cause** [Mary **have** a ball]]

(5)   a. John threw Mary a ball, but she never
         received/got it.
      b. [[John **act**_{<throw>}] **cause** [Mary **have** a ball]]

Though g*ive* and *throw* have the same LCS except for contribution of the verbal root, they show an interesting difference in an entailment pattern. G*ive* entails the resultant state *[Mary **have** a ball]* and negating that state (*but...*) leads to contradiction. On the other hand, for *throw* the resultant state is only prospective and negating it raises no contradiction. The result of *throw* may or may not happen in the actual world.

   Since Koenig and Davis (2001), it is common to assume that verbs with a prospective result have a sublexical modal component. According to this analysis, the LCS of *throw* is represented as (6), with the resultant state being under the scope of a modal operator ◊ (Beavers, 2011).

(6)   [[John **act**_{<throw>}] ◊**cause** [Mary **have** a ball]]

   Although this resolution is widespread and assumed by many authors (Beavers, 2011; Martin, 2015; Martin and Schäfer, 2017; Harley and Jung, 2015), a question much less frequently addressed is which verb has a modal component. Since the lex-

icon is finite, it may not be totally unreasonable to conclude that the presence or absence of modality is idiosyncratically determined and we have to memorize this. However, as pointed out in the previous section, we should start a linguistic enterprise with the null hypothesis that nothing requires experiences. Below, I will argue that the prospectivity of causative verbs is actually predictable. In the rest of this section I will lay out the relevant data from various kinds of causative predicates.

2.1.1. Lexical Causative Verbs

Pylkkänen (2008) observes that lexical causative verbs in English always entail a resultant state.

(7)   a. #I flew the kite over the field but it didn't
         fly.
      b. #I broke the vase but it didn't break.
      c. #I cooked the meat but it didn't cook.
                              (Pylkkänen, 2008: 15)

2.1.2. Periphrastic causative verbs

Kartunnen (1971) claims that *make* entails the resultant event. On the other hand, Jackendoff (1990) observes verbs like *urge*, *goad*, *pressure* do not carry the entailment. These verbs can be used with *unsuccessfully*, and negating their resultant event does not lead to contradiction.[2]

(8)   a. John made Mary leave, #but Mary didn't
         leave.
      b. Harry pressured/urged/goaded Sam to go
         away, but he didn't go away.
      c. Harry unsuccessfully urged/pressured/goad
         Sam to leave.

2.1.3. Ditransitive Verbs

As observed above, *give* entails the resultant state (possession) while *throw* does not. Pylkkänen

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[2] One may think that a non-manner counterpart of *urge/goad/pressure* is *force*. Indeed, Jackendoff and Kartunnen claim that *force* have the result entailment. However, literature has reported contradictory judgements on this. Koenig and Davis (2001) and Martin (2018) claim that the result of *force* can be negated (at least certain circumstances). In order to avoid complexity, I leave the analysis of *force* for another occasion.

(2008) further observes that *write* and *send* do not entail the resultant state.

(9) a. I sent Bill the letter but he never got it.
     b. I wrote Sue a letter but she never got it.

<div align="right">(Pylkkänen, 2008: 15)</div>

2.2 Generalization

With the set of data above, we can now detect a generalization about presence/absence of the result entailment, namely (10).

(10) If a manner of the causing event is specified in the lexicon, then the resultant event/state becomes prospective. If not, the resultant event/state is obtained in the actual world.

In order to see what (10) is supposed to mean, consider again the ditransitive verbs. *Give*, a verb with the result entailment, does not specify any manner on its causing event. Any event that causes the recipient to have the theme can be a causing event of this verb. On the other hand, *throw*, *send*, and *write* require a certain manner. In a sentence *I threw Mary a ball (and she got it)*, the causing event must be implemented in throwing manner. The same requirement exists in *send* and *write*.

The generalization (10) can be extended to the other group of verbs. The lexical causative verbs, which always entail their resultant state, have no specification on a manner of the causing event. *Make* does not require any manner on the causing event, while *urge*, *goad*, and *pressure* do. For example, *urge* requires its causing event to be implemented by verbal recommendation or persuasion. As predicted, among these verbs only *make* carries the result entailment.

3 Proposal

In this section I will formalize the generalization (10) with the proposal summarized in (11).

(11) a. All causative predicates have a modal component.
     b. The generalization (10) follows from the characterization of a modal base and an ordering source of causative predicates.

(11a) states that a modal component is a universal property of causative predicates. Thus, there is no such variation that some verbs introduce modality while others do not. I state a general definition of causative predicates as in (12)[3].

(12) Let φ be a causative predicate with a resultant event (or state) ψ. Then,

$[[φ]]$ = $λx.λy.λe.λw.$ **act**(e, y, w) & $∀w'∈max_{g(e)}(∩f(e))$ [∃e'**cause**(e, e', w') & $ψ(e', x, w')$], where

a. *f(e)* is a circumstantial modal base:
   $f(e)$ = {p | p is a proposition denoting the laws of nature and other relevant facts of the world where *e* happens}

b. *g(e)* is an ordering source: $g(e)$ = {q| q is a proposition denoting the norms inherently associated with *e*}

c. $max_{g(e)}$ selects the most ideal world(s) from $∩f(e)$, given the ordering source *g(e)*.

The types of the modal base and the ordering source are lexically specified, not provided from a context. I will argue that when no norms are inherently associated with *e*, the effect of the ordering source and $max_{g(e)}$ becomes vacuous. Below, I describe how (12) works and how it derives the generalization (10).

Consider first a construction with *throw*, a ditransitive verb with a manner specification on the causing event.

(13) a. John threw Mary a ball (but she never got it).

b. ∃e **act**$(e$, John$, w_0)$ & *throwing*(e) & $∀w'∈max_{g(e)}(∩f(e))$ [∃e' **cause**(e, e', w') & **have**$(e'$, Mary, a ball$, w')$]

Throw does not entail the resultant possession. This is due to the effect of the ordering source. Since the verb has a manner specification, *g(e)* contains propositions denoting the norms associated with the manner, e.g. [[*the agent throws with a proper form*]]*,* [[*the agent put enough amount of energy*]]*,*

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[3] The definitions of *f*(e) and *g*(e) are based on Kratzer (2013). The definition of *max* operator is based on Hacquard (2011). Following Hacquard (2006, 2010), I assume that a modal base and an ordering source take an event argument.

etc. Given $g(e)$, the resultant state e' happens in all of the ideal worlds. Since the actual world may not be such an ideal world (i.e. w_0 may not be contained in $\max_{g(e)}(\cap f(e))$), the resultant state is not entailed in the actual world. The same reasoning applies to *send*, *write*, *urge*, *goad*, and *pressure*.

Turning to cases where the resultant state is obtained, consider a sentence with a lexical causative verb *break*.

(14) a. John broke the window.
    b. $\exists e$ **act**(e, John, w_0) & $\forall w' \in \max_{g(e)}(\cap f(e))$
      [$\exists e'$ **cause**(e, e', w') & **break**(e', the window, w')]

Recall that lexical causative verbs always entail their resultant state. Thus, in (14b), the broken state of *the window* must be obtained in the actual world (w_0). Actually, this is exactly what (12) predicts. Notice that $\cap f(e)$ always contains the actual world: Since $f(e)$ is a circumstantial, realistic modal base, for all the propositions p in $f(e)$, $w_0 \in [[p]]$. Moreover, lexical causative verbs do not have any specification on a manner of the causing event (e), so in (14b) the effect of $\max_{g(e)}$ is vacuous. Thus, (14b) just requires that the resultant state e' is caused by e in all the worlds contained in $\cap f(e)$. Since $\cap f(e)$ contains the actual world, the resultant state is correctly entailed. *Give* and *make* entail the resultant state/event by the same reasoning.

Summarizing the proposal, the definition (12) derives the property of causative predicates discussed in this study. My proposal has at least two advantages. First, we can treat causative predicates uniformly by stating that they all introduce a modal component. Second, presence/absence of the result entailment is predictable from the property of the causing event. In the next subsection I will argue that as a consequence of the proposal we can derive Manner/Result Complementarity.

3.1 Manner/Result Complementarity

One of the most influential and widely shared constraints in lexical semantics is Manner/Result Complementarity (Rappaport Hovav and Levin, 1998, 2010). This constraint banns a verbal root to specify *both* manner and result. Although I believe

this constraint is real and on the right track, why there is such a constraint is not frequently discussed: It is just a stipulated statement.

The present proposal offers an answer to the question. Imagine that there is a verb which specifies both manner and result. Since that verb necessarily has a causative component ("result" cannot be defined without it), the verb has the modal base and the ordering source proposed here. The manner specification makes the result prospective by the same reasoning described above, so no specific result is entailed. Thus, even if the verb specifies a result as well as a manner, that cannot be observed in the entailment pattern and the verb seems to specify only a manner. In short, Manner/Result Complementarity is an illusion caused by the modal component.

4 Discussion

In this section I will discuss two sets of data. One is about verbs *hand* and *pass*, which at first sight seems to be a counterexample of the present analysis. The other one is about a verb *force*, for which literature have reported contradictory judgements.

4.1 *hand, pass (the salt)*

Beavers (2011) points out that the resultant possession is entailed with *hand* and *pass (the salt)* [but not *pass (the ball)*. See below.]

(15) #John handed Mary the salt, but he dropped it before she got it.

Since *hand* and *pass (the salt)* clearly encode a manner of the causing event, this data seems to pose a problem to my proposal.

However, the judgement is not that clear-cut. Christopher Tancredi (p.c.) notes that a sentence like *John handed Mary a book, but she refused to take it* is acceptable. Thus, I argue here that *hand* and *pass (the salt)* basically get the same analysis as the one given to *throw*: their resultant state is prospective. The strong result implicature comes from the nature of their manner. As Beavers himself points out, these predicates "necessarily involve two people in close proximity […] in such events it is unlikely there would be a failure of

transfer." (p. 30) Thus, the successful possession in (15) comes not from logical entailment, but from pragmatic inference generated due to the nature of the manner of *hand*.

This argument is supported by the fact I briefly mentioned above: Although *pass (the salt)* seems to imply the resultant state, *pass (the ball)* does not. This is because, I argue, one is more likely to stand in close proximity to the recipient when s/he passes the salt than when s/he passes the ball. Again, the resultant sate of *pass* is prospective as my proposal predicts, but the result is strongly inferred by the nature of the manner.[4]

4.2 Speaker Variation

As noted in the footnote 2, Jackendoff (1990) observes that *force* carries the result entailment. The same observation is made in Kartunnen (1971). However, Koenig and Davis (2001) and Martin (2018) note that *force* does not entail any resultant state, which apparently pose a problem to my proposal. Why do the judgements differ like this?

Note here that in principle lexical information can vary from speaker to speaker. More specifically, some may have a different definition of *force* than other people. Of course, it is not desirable to assume lexical meaning can differ drastically – if *force* had a meaning assumed in the previous section to some speakers while to others it has a meaning of *prevent*, then the communication would be entirely impossible. However, assuming minor variation among speakers is not implausible. Thus, in order to account for the contradictory observation mentioned above, I argue that force specifies a manner of the causing event in some speakers' mind, but not in others'. For instance, one may believe that *force* must involve a direct verbal order in the causing event. This is just a minor change, but it is enough to activate the ordering source and to make the resultant state prospective.

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[4] Another possible explanation is that *hand* specifies an instrument, not a manner (Akira Watanabe, p.c.). As for *pass the salt*, Ayaka Sugawara (p.c.) points out that the construction is so idiomatic that it loses the prospectivity. I leave for future research an investigation on whether these proposals are valid.

5 Extension: Defeasible Causative Verbs

5.1 General Account

In this section I will extend the present proposal to a rather peculiar group of causative predicates, called *defeasible causative verbs* (Martin, 2015; Martin and Schäfer 2017). The peculiarity of these verbs can be seen in the contrast observed in the following sentences.

(16) a. Hans schmeichelte Maria, aber sie fühlte
 Hans flattered Marie, but she felt
 sich überhaupt nicht geschmeichelt.
 REFL absolutely NEG flattered.
 'John flattered Mary, but she felt absolutely
 not flattered.'
 b. #Dieses Detail schmeichelte Maria,
 This detail flattered   Marie,
 aber sie fühlte sich überhaupt nicht
 but she felt   REFL absolutely NEG
 geschmeichelt.
 flattered.
 'This detail flattered Mary, but she felt
 absolutely not flattered.'
  (German, Martin and Schäfer, 2017: 88)

Notice that(16a) and (16b) differ in agentivity of the subjects. When the verb *schmeicheln* 'flatter' takes a non-agentive subject as in (16b), the sentence entails Mary got flattered. Negating this entailment leads to contradiction. On the other hand, when the verb takes an agentive subject, no entailment exists so the whole sentence (16a) is felicitous. This property is cross-linguistically observed in verbs like *teach*, *offer*, and *discourage*, among many others (see Martin and Schäfer, 2017; Kratzer, 2013).

How does the proposal so far account for this contrast? Recall that in my analysis the resultant event/state is entailed when the effect of the ordering source *g(e)* is vacuous. Then, we have to assume that defeasible causative verbs deactivate the ordering source when they take a non-agentive subject. How can we formalize this?

Martin (2015) points out that we cannot talk about a manner of a non-agentive, inanimate subject. She notes "we do not differentiate the wind that

may blow out a fire from the wind that may close a door through distinctive features: All these winds are undifferentiated for us." (p. 257)[5] I argue with her that an inanimate subject cannot manifest a manner of action. I further argue that the defeasible causative verbs are special in that they have two possible LCS representations, one with a manner specification and the other without it. Then, we can predict that a non-agentive subject will nullify the effect of an ordering source. In order to see this, consider the following contrast and the LCSs. Again, ◊ represents the modal component with the modal base and the ordering source characterized above.

(17) a. Ivan taught me Russian, but I did not learn anything.
   b. Lipson's textbook taught me Russian, #but I did not learn anything.

<div align="right">(Martin and Schäfer, 2017: 87)</div>

(18) a. [x $act_{<teach>}$] ◊**cause** [y <learn> z]
   b. [x **act**] ◊**cause** [y <learn> z]

(17a) does not tell us anything new. The ordering source $g(e)$ contains, among others, propositions like [[*a teacher acts on students effectively*]], [[*a teacher's knowledge on the subject is enough*]], etc., the norms associated with the manner of teaching. Since the actual world may not be an ideal world, the sentence does not carry the entailment.

The argument that an inanimate subject cannot manifest a manner of action is crucial when we analyze (17b). Since *Lipson's textbook* cannot manifest a manner of <teach>, it is incompatible with the LCS (18a). Thus, it obligatorily enters the alternative LCS (18b). Since this entry does not have a manner specification, it correctly entails the resultant learning event.[6] The reasoning for the defeasible causative verbs is summarized in (19).

(19) a. Defeasible causative verbs are special in that they are associated with two possible LCSs. One specifies a manner of the causing event the other does not.
   b. Since inanimate subjects are generally incompatible with a manner-specified LCS, they have no choice but to enter the manner-less version of LCS. As a result, the predicate entails the resultant eventuality.

In this section I showed that the peculiar behavior of the defeasible causative verbs is predicted correctly by the present proposal. The presence of the result entailment with a non-agentive subject naturally follows from the interaction between the property of the subject and manner specification.

6 Conclusion

In this study, I argued that all causative predicates introduce a modal component. This analysis enables us to treat all causative predicates uniformly and to predict which verb has the prospectivity. I also showed that the present analysis can be extended to the defeasible causative verbs. Overall, the proposal demonstrates that the prospectivety and the defeasibility is not an idiosyncratic property. Rather, they are closely related with a linguistically real notion, namely a manner specification. These properties are actually predictable based on this notion. Thus, the present study contributes to the generative enterprise which aims at minimizing unpredictable facts of human language.

[5] In spite of the shared intuition, Martin takes a different path to account for the behavior of defeasible causative verbs. Comparison of the two accounts are beyond the scope of this study.
[6] In fact, verbs like *throw* and *goad* constantly resist an inanimate subject (**The heavy wind throw him a towel.* / **The situation goaded him to leave.*) Why, then, is that *teach* has an alternative manner-less LCS while *throw* does not? As Martin (2019) and Demirdache and Martin (2015) observe, there is a

crosslinguistic tendency in which verbs are counted as a defeasible causative verb. Therefore, I believe there must be a linguistically plausible answer for this question. This is an interesting issue to address, but for now I have to leave it for a future study.

helpful suggestions and criticisms. All remaining errors and misinterpretations are my own.

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