MANNERS AND CAUSATION

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Abstract

This paper is divided into two parts. In part one I apply a formal method for the establishment of cause-relations between events to cases involving manner modification. In the second part I argue that the status of a manner adverb with regard to its role in a cause-consequence sequent does not play a role for its formal representation at the sentential level. Instead, it influences a sentence's information structure. In turn, this can influence the syntactic position of a manner adverb.

1 Introduction

The manner in which things are done can have a influence on subsequent events. This fact has proofed to be fruitful in the investigation of questions such as event individuation, but it has also been used in investigations into the different readings of sentences containing manner modification as well as the formalization of such sentences. In this paper, I will mainly address this latter issue, especially with respect to the question whether or not causal relations between events can be used in order to gain insight into the correct formal representation of manner adverbs. Questions concerning the metaphysics of events and event individuation will be excluded as much as possible.

In the course of the paper, I will show that causal relations can not be used to gain insight into the formal representation of manner adverbs, though they influence information structure and in turn an adverb's syntactic position.

I will start with a short introduction into the formalization methods used to establish causal relation between events. Secondly, I will turn to the linguistic reflexes of the role a manner adverb plays with respect to causation.

Before starting with the main body of the paper, I would like to clarify what I take to be manner adverbs. Manner adverbs basically fall into two classes, namely Pure Manner Adverbs (PMA) and Agent-Oriented Manner Adverbs (AOMA), cf. (1).

(1)   Er hat **laut/schnell/wunderbar** gesungen. [Pure Manner Adverbs]
        He sang loudly/quickly/wonderfully.

(2)   Er hat sich **intelligent/geschickt** verteidigt. [Agent-Oriented Manner Adverbs]
        He defended himself intelligently/cleverly.

They can be identified with the help of the paraphrase text given in (3), taken from Bartsch (1976).

(3)   Sentences with manner adverbs can be paraphrased by *How X verbs, that is ADJ*
        cf. [s] in Bartsch (1972, p. 150), Bartsch (1976, p. 153)

2 When does manner matter? Some possible worlds

To illustrate the manner-cause interaction, take for example the situation depicted by the sentences in (4).

(4)   Weil der Wecker laut klingelte, ist das Baby aufgewacht.
        Because the alarm rang loudly, the baby woke up.

Without further information about the exact circumstances in which this sentence is uttered, it is not clear whether the baby woke up simply because of the ringing of the alarm as such, or whether it was the loudness of the alarm's ringing which was responsible for the waking up of the baby. E.g., the baby usually sleeps on when the alarm rings, but someone has turned its volume up and that woke her up today.

For the purpose of a more formal exposition, I will differentiate between three events, e_1, e_2, and e_{1b}, as in (5).

(5) e_1 = the ringing of the alarm
        e_{1b} = the loud ringing of the alarm
        e_2 = the waking-up of the baby

The consequence of the occurence of either e_1 or e_{1b} with respect to e_2 can differ in different worlds, cf. 1 which gives the constellations for three different possible worlds A, B, and C.

Occurence of	Consequences in the possible worlds		
	A	B	C
e_{1b}	e_2 does not occur	e_2	e_2
e_1	e_2	e_2	e_2 does not occur

Figure 1: Patterns for cause-consequence relations between two events in three different possible worlds

Before I begin to discuss these three possible worlds in some more detail, it is useful to think about the relationship between e_1 and e_{1b} in (5). In particular, the question is when an explicit modification such as *loudly* is used and when it is not used. Starting from the latter, there can be two reasons for the absence of explicit manner modification. If the action refered to with the help of the verbal predicate is carried out in a default manner there is no need to mention the manner explicitly. If the action is not carried out in a default manner or if in fact no default manner exists (think of *kill*, for example), the exact manner might simply not be important enough to mention, either because it has no influence on the course of events or what influence it has is not important from the point of view of the speaker. Thus, one has to bear in mind that the absense of explicit manner modification does not mean that the event in question was not carried out in some manner, quite on the contrary, in principle the manner in which something was carried out can always be specified, but the factors mentioned above prevent this in practise.

In world A, the chain of events connected to the three events can be expressed with the help of the two conditional sentences in (6).

(6)   If the alarm rings, the baby wakes up.
        If the alarm rings loudly, the baby does not wake up.

What strikes one as strange in the case of the two conditionals is related to our default assumptions about alarm ringings. Firstly, the ringing of an alarm is, usually, loud. Consequently the explicit mention of the ringing being loud seems to be almost superfluous as far as causal relationships are concerned. Furthermore, the louder it is, the better are its effects as far as the waking up of sleeping persons is concerned. That is, the world described with the help of the two conditional sentences seems highly implausible. However, it is not the constellation as such that is implausible, compare the sentence (7) where *quietly* has been used instead of *loudly*.

(7)   Because the alarm rang quietly, the baby did not wake up.

This does make sense, as it is a common experience that people do not wake up if their alarm is too quiet. In addition, *quietness* is not a default attribute of alarm ringings.

The causal relationship expressed in (7) has been called pseudo-causality in Eckardt (1998), who differentiates between REAL-CAUSAL STATEMENTS and PSEUDO-CAUSAL STATEMENTS.[1]

Events referred to in Pseudo-causal sentences do not pass the classical criteria for causal dependence introduced by Lewis (1986). Lewis introduced (8) as a definition of causation between two events c and e. Or, in other words, if (8) holds, than c causes e.

(8) $O(c) \,\square\!\!\rightarrow O(e)$
       and $\neg\, O(c)\,\square\!\!\rightarrow \neg\, O(e)$
       cf. Lewis (1986, pp. 164ff)

$O(e)$ is a proposition which holds in a world w when e occurs in that world w.

The symbol $\square\!\!\rightarrow$ is defined as given in (9).

(9) $\square\!\!\rightarrow=$df. A $\square\!\!\rightarrow$C is true (at a world w) iff
       (1) there are no possible A-worlds (A $\square\!\!\rightarrow$C is *vacuous*), or
       (2) some A-world where C holds is closer (to w) than is any A-world where C does not hold.
       cf. Lewis (1986, pp. 164ff)

We can easily apply the definition in (8) to the constellation referred to by (7), cf. (10).

(10)   *Baby's not waking up* depends causally on *the alarm ringing quietly* iff
        $O(bnw)\square\!\!\rightarrow O(arq)$ and
        $\neg O(arq)\square\!\!\rightarrow \neg O(bnw)$

In prose: The event c "the alarm ringing quietly" causes the event e "Baby's not waking up" in a world w if and only if (A) some world w' where e and c hold is closer to w than any world w'' where e but not c holds and (B) a world w' where e and c do not hold is closer to w than any world w'' where e does not hold but c holds.

These criteria are clearly not met by (7), since the event e "the baby not waking up" is very likely to be true in a world where the alarm does not ring at all.

World B can be described with the help of the following conditionals, cf. (11).

(11)   If the alarm rings, the baby wakes up.

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[1]The discussion in Eckardt (1998) uses mostly sentences containing temporal adverbials, such as *delayed* and *late*, whereas the examples used here exclusively contain manner adverbs. I believe, however, that they are constructed parallel enough to justify this discussion.

> If the alarm rings loudly, the baby wakes up.

The notable property of this world is that the presence or absence of the explicit manner modification clearly has no impact on the causal chain of events. In addition, the events e_1 and $e_1 b$ can refer to the same event in this world, though this must not necessarily be the case. In the case were both events are identical, the explicit modification given for $e_1 b$ corresponds either to some default modification or is deemed irrelevant for the context at hand. Such a case would correspond to Davidson's claim in Davidson (1996) which holds that events are the same if they have the same causes and effects (relative to what we know from just the two sentences alone).

Below I give another example which makes clear that a sentence containing a modification with null-effect on the causal relation can nevertheless be judged as informative, cf. (12).

(12)   Weil Peter während der Aufführung leise/heimlich den Saal verlassen hatte, war er beim Empfang nicht mehr da.
        Because Peter quietly/secretly left the room during the concert, he was absent at the reception.

Clearly, it is Peter's leaving the room which stands in a causal relation to his absence at the reception, and the manner modification gives just some additional information, inconsequential for the causal relation.

World C is the most interesting for the discussion of manner in interaction with causation, as here manner plays a decisive role. Again, the world can be described with the help of the two conditionals in (13).

(13)   If the alarm rings, the baby does not wake up.
        If the alarm rings loudly, the baby wakes up.

With the help of the formal framework for the establishment of causal relations between events by Eckardt (1998)[2] (adopting Dowty (1979, p. 108, ex. 128-130) to events case), reproduced here as (14), the event e_b *the loud ringing of the alarm* can be established as the causing event for the waking up of the baby.

(14)   i. e depends causally on c iff $O(e)$, $O(c)$ and $\neg O(c) \square\!\!\rightarrow \neg O(e)$
        ii. c is a causal factor for e iff there is a series of events, $c, c_1, \ldots, c_n, e$ (for n $\geq$ 0) such that each member of the series depends causally on the previous member.
        iii. c CAUSE e is true iff
        -c is a causal factor for e and
        - for all other c' such that c' is a causal factor for e: for all worlds w where $\neg(O(c) \wedge O(c'))$ is true and $\neg O(c')$ in w, there is some world w' which is equally or more similar [to the actual world w_0] among the $\neg(O(c) \wedge O(c'))$-worlds than w and $\neg O(c)$ is true in w'. As a formula:
        $\forall w (w \models \neg(O(c) \wedge O(c')) \wedge w \models \neg O(c') \rightarrow$
        $\exists w' (w' \models \neg(O(c) \wedge O(c')) \wedge w' \models \neg O(c)) \wedge d(w_0, w') \leq d(w_0, w)))$
        where d measures the distance ($\approx$ similarity) of worlds to the actual world w_0
        = D.II in Eckardt (1998, p. 62)

$O(e)$ stands here for 'e occurs', and the notion of distances between worlds is meant to talk about the similarity of worlds: the closer the distance from a world w to the actual world w_0,

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[2]The same argumentation can be found in Eckardt (2000).

the greater the similarity of these two worlds.

The main achievement of this definition is the selection of the cause from a set of causal factors. A simple example will make this clearer. We have three events, e_1, e_2, and e_3, cf. (15), which are situated in time as in (16).

(15) e_1 = a baby is born, little Ann
        e_2 = an alarm is ringing in little Ann's bedroom
        e_3 = little Ann wakes up

(16) $e_1 < e_2 < e_3$

According to the definition given in (14), e_3 causally depends on e_1 and e_2, and e_1 and e_2 are both causal factors for e_3.

However, it is e_2 (=*alarm*) and not e_1 (=*birth*) which CAUSEs e_3, cf. the true (17) and the false (18).

(17) $\forall w\,(w \models \neg(O(alarm) \wedge O(birth)) \wedge w \models \neg O(birth) \rightarrow$
        $\exists w'\,(w' \models \neg(O(alarm) \wedge O(birth)) \wedge w' \models \neg O(alarm)) \wedge d(w_0, w') \leq d(w_0, w)))$

(18) $\forall w\,(w \models \neg(O(alarm) \wedge O(birth)) \wedge w \models \neg O(alarm) \rightarrow$
        $\exists w'\,(w' \models \neg(O(alarm) \wedge O(birth)) \wedge w' \models \neg O(birth)) \wedge d(w_0, w') \leq d(w_0, w)))$

In prose: A world where little Ann is born and the alarm does not ring in her bedroom is more similar to the actual world than the world where although little Ann has not been born at all the alarm is ringing in her bedroom.

Looking at world C with the help of the formal definition of causation just introduced, we arrive at the following result (where: (*arl*)= *the alarm rings loudly* and (*ar*)=*the alarm rings*):

(19) $\forall w\,(w \models \neg(O(arl) \wedge O(ar)) \wedge w \models \neg O(ar) \rightarrow$
        $\exists w'\,(w' \models \neg(O(arl) \wedge O(ar)) \wedge w' \models \neg O(arl)) \wedge d(w_0, w') \leq d(w_0, w)))$

(20) $\forall w\,(w \models \neg(O(arl) \wedge O(ar)) \wedge w \models \neg O(arl) \rightarrow$
        $\exists w'\,(w' \models \neg(O(arl) \wedge O(ar)) \wedge w' \models \neg O(ar)) \wedge d(w_0, w') \leq d(w_0, w)))$

That is, (21-a) is true but (21-b) is false.

(21)   a.   arl CAUSE baby wakes up
        b.   ar CAUSE baby wakes up

Interestingly, Eckardt, in the discussion of an example containing temporal modification, cf. (22), argues that the results achieved through the application of the formal definition (14)[D.II] are not reliable. Eckardt tries to show this for the scenario given in (22), discussing whether here the event *csl* "cooking spaghetti late" or the event *cs* "cooking spaghetti" cause the event *ncp* "neighbour calling the police".

(22)   Pat came home late last night, due to a traffic jam. She started cooking spaghetti at 11pm which caused the neighbour to call the police.
        = 3 in Eckardt (1998, p. 63)

According to D.II, *csl* is the cause for the *ncp*, while *cs* is not the cause. While Eckardt agrees that "This in and of itself does not violate against our intuition."Eckardt (1998, p. 63), she argues

that it leads to problems when counterfactuals come into play, cf. (23).

(23)   If Pat's cooking had occured earlier, it would not have caused the neighbour to call the police.
= 12 in Eckardt (1998, p. 63)

According to Eckardt, the subordinate clause in (23) cannot refer to (*csl*), because "wherever (*csl*) occurs, it occurs late." (Although, strictly speaking, the subordinate clause should then be absolute, e.g. *If Pat's cooking had occured early*). Reference to (*cs*) is, in contrast, easily possible, the second sentence taking up the event with the anaphoric pronoun *it*.

The same argumentation can be carried over to the manner-modified example sentence, compare (24).

(24)   If the alarm had rang more quietly, it would not have caused the baby to wake up.

Applying Eckardt's line of argumentation, the subordinate clause in (24) cannot refer to (*arl*), as it specifies that the alarm had rang *more quietly*. Consequently, *it* in the main clause does not refer to (*arl*) but, most likely, to (*ar*). Following Eckardt's line of thought, the fact that (24) counterfactually states that *it* would not have stood in a certain causal relation presupposes that *it* actually does stand in that causal relation in the actual world. "The sentence [her comment on (23)] counterfactually states that '*it*' would not have stood in a certain causal relation. This presupposes that '*it*' actually does stand in that causal relation in the actual world."(Eckardt 1998, p. 63f.). This argument, in my view, is not convincing. Consider eg. (25).

(25)   If the alarm had not rang, it would not have caused the baby to wake up.

Here, *it* in the matrix sentence cannot refer to the ringing of the alarm, as this is explicitly negated in the subordinate sentence. However, letting *it* refer to (*ar*) seems to me the most natural interpretation. Similar problems for Eckardt crop up if we look at counterfactuals with multiple modification, cf. (26).

(26)   If the alarm had not rang loudly in her room, it would not have caused the baby to wake up.

Applying Eckardt's argumentation, *it* should be taken as refering to (*arl*) but not to (*arlr*), proving that it is (*arl*) which stands in the CAUSE relation to the *waking up of the baby*.

3   Causality and the formal representation of manner adverbs

In the previous section, I argued that activities which are carried out in different manners are best regarded as different events, as the different manner can play a role for the causal conseqences of the actions refered to. In this section, I investigate whether the status of a manner adverb with regard to causality plays a role in its formal description. In particular, I will discuss and refute the proposal from Peterson that this is indeed the case.

Peterson (1997) discusses data with patterns similar to those discussed above; he argues that event nominalization containing adverbs such as (27) are ambigue and "may simply refer to the non-complex event that is a particular ringing **or** it may (evidently on the preferred use) refer to another event- the complex event of the alarm's ringing *being loud*"Peterson (1997, p. 187, his markup). In the latter case, the subject of (27) is co-referential with that of (28).

(27)   The alarm's ringing loudly awakened Susan.
          =7 in Peterson (1997, p. 187)

(28)   The loudness of the alarm's ringing awakened Susan.
          =6 in Peterson (1997, p. 187)

Peterson finds further support for the ambiguity of (27) by looking at sentences like (29), where the construction is similar, but arguably no reading corresponding to the one in (28) is available, cf. (30).

(29)   The alarm's ringing early awakened Susan.
          =8 in Peterson (1997, p. 187)

(30)   *The earliness of the alarm's ringing awakened Susan.

While here again a non-manner adverb, *early*, is used, this effect corresponds to the finding for (13), consider also the nominalized variants in (31) vs. (32).

(31)   The alarm's ringing quietly awakened Susan.

(32)   The quietness of the alarm's ringing awakened Susan.

The difference between the two readings corresponds to readings differences discussed by Peterson later on, where he uses the labels RESTRICTIVE versus NON-RESTRICTIVE readings, in anology to the terminology of relative clauses. I will take over his terminology.

Peterson's representation of the restrictive reading of (27) is given in (33).

(33)   *The alarm's ringing loudly* [complex event reading]
          $\exists e_2[\text{LOUDLY}(\iota e_1[\text{RING}(\text{Alarm}, e_1)], e_2)]$

The formula in (33) makes use of two events, e_1 and e_2. e_1 is a simple event, where the alarm exemplifies the property of RINGING, and e_2 is a complex event, build up from e_1 exemplifying the property LOUD.

Peterson (1997, p. 187) does not offer a solution for the non-restrictive cases, besides saying that the subordinate sentence in those cases does not refer to a complex event.

I believe that Peterson's argumentation for the association of restrictive readings with complex events leads into the wrong direction. Although I agree with Peterson that there is a interpretational difference between the two cases, I think that this is a phenomenon which should be treated exclusively at the superclausal level. That is, the modified event is the same event, regardless of wether the modification is restrictive or not. This is especially so in view of the fact that even for (29) on can construe a situation in which it is the *earliness* of the ringing of the alarm which causes the surprise.

3.1   Causality and syntactic position

Wickboldt (2000) gives data that shows that the presence of manner modification influences the interpretation of *since*-clauses, cf. (34).

(34)   a.   Since John entered the room, he's been looking for a seat. [=temporal]
          b.   #Since John entered the room quietly, he's been looking for a seat.
          c.   Since John entered the room quietly, no one noticed him. [=causal]

= 1-3 in Wickboldt (2000). # marks the sentence as pragmatically anomalous "in the sense that it would not be used in ordinary situations or would be dispreferred."p. 359

While she does not give formal details, her explanation for the observed pattern rans as follows: The effect of the manner adverb is to make subevents of the event refered to by the verbal predicate accessible for further commentary. In a certain sense, the telicity of the event is suspended, cf. also the data in (35).

(35)   a. #John died. For hours he struggled for breath.
        b. John died slowly. For hours he struggled for breath.
        b=23b in Wickboldt (2000)

This suspension of telicity has consequences for the interpretation of *since*: *since* needs a temporal anchor for its temporal interpretation, but there is no such anchor if a manner adverb suspends the telicity.

Shaer (2003) builds on Wickboldt's data, but adds a very important piece of evidence to the data, cf. (36), especially (36-a).

(36)   a. Since John quietly entered the room, he's been looking for a seat. [=temporal]
        b. #Since John entered the room quietly, he's been looking for a seat.
        c. Since John entered the room quietly, no one noticed him. [=causal]
        = 48 in Shaer (2003)

What this data shows is that it is not the presence of a manner adverb in the subordinate sentence as such which influences the interpretation of *since*, but also its position.

We find the same pattern in German, cf. (37) and (38).

(37)   a. Weil Peter während der Aufführung leise den Saal verlassen hatte, war er beim Empfang nicht mehr da.
            Because Peter quietly left the room during the performance, he was absent at the reception.
        b. ??Weil Peter während der Aufführung den Saal leise verlassen hatte, war er beim Empfang nicht mehr da.
            ??Because Peter left the room during the performance quietly, he was absent at the reception.

(38)   a. ??Weil Peter während der Aufführung leise den Saal verlassen hatte, hat ihn niemand gehört.
            ??Because Peter quietly left the room during the performance, nobody noticed him.
        b. Weil Peter während der Aufführung den Saal leise verlassen hatte, hat ihn niemand gehört.
            Because Peter left the room during the performance quietly, nobody noticed him.

If the difference is not made clear through the syntactic position of the modifier, prosody can be used, cf. (39), where in (39-a) manner is important for the cause-relation, in (39-b) not.

(39)   a. Weil der Wecker LAUT geklingelt hat, ist das Baby aufgewacht.
        b. Weil der Wecker laut geKLINGELT hat, ist das Baby aufgewacht.

If the manner adverb in question is unable to appear in different syntactic positions, prosody is the only way to indicate its status with regard to causation. This seems to hold for some agent-oriented adverbs, cf. e.g. (40) and (41), where, again, in (40) *intelligent* is decisive for the cause-relation, in (41) it is not.

(40) Weil er das Problem intelliGENT gelöst hat, bekam er einen Sonderpreis.
Because he solved the problem intelligently, he was awarded a special award.

(41) Weil er das Problem intelligent geLÖST hat, konnte ein Zusammenstoß verhindert werden.
Because he solved the problem intelligently, an accident could be avoided.

4   Conclusion

This paper had two aims. In the first part, I showed how the definition from Eckardt (1998) can be applied to cases involving manner modification. As it turned out, the manner in which an event is carried out can be decisive for its consequences. Whenever this is the case and the manner adverb does not describe a default manner, one is likely to find explicit manner modification in a sentence. In the second part of the paper I argued that the status of a manner adverb with respect to causation has no consequences for the formal representation of the manner adverb at the clausal level, but does have influence on the information structure of the sentence and in turn on the syntactic position of the adverb.

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