

Lexical Pragmatics and Unification: The semantics of German causal 'durch' ('through')

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Abstract

Modelling the semantics of the German causal preposition *durch* ('by', 'by means of', 'through') poses a challenge to formal-semantic analyses applying mechanisms of strict compositionality. To deal with this challenge, a formalism which is based on recent important developments in Discourse Representation Theory is developed, including a more elaborate analysis of presuppositional phenomena as well as the integration into the theory of unification as a mode of composition. It is argued that the observed unificational phenomena belong in the realm of pragmatics, providing an argument for presuppositional phenomena at the sentence-internal level.

1 Introduction

There is a growing insight in the formal-semantic literature that not all linguistic phenomena can or should be expected to adhere to principles of strict compositionality. Typically, such phenomena involve the multiple marking of e.g. tense (Sailer 2004) or negation (Richter and Sailer 2004). In this paper, empirical substance is added to the view that strict compositionality cannot always be upheld. The data mainly consist of combinations of causative and inchoative predicates with the German causal preposition *durch* ('by', 'by means of', 'through'). The discussion centres around the status of the abstract element CAUSE and its origin in identical complex semantic structures which can be argued to be differently composed.

Many of the formalisms introduced to handle phenomena which are taken to be problematic for strict compositionality, involve some sort of unification (Bouma 2006). In the present analysis, making an argument for unification will also be of some importance. Another of its contributions concerns the mechanisms argued to provide the means for an adequate analysis of the phenomena in question. These are argued to be of a pragmatic rather than semantic nature in the case of *durch*, involving presuppositional phenomena at the sentence-internal level.

The paper is structured as follows: first, the intuitions behind the challenge of trying to build a compositional semantics for the combination of causal-instrumental *durch*-phrases with both causative and inchoative predicates are presented in section 2. Second, after a brief discussion of some proposed solutions in section 3, an alternative analysis which is held in a Discourse Representation Theory bottom-up formalism (Kamp 2001), applying unification as a mode of composition (Bende-Farkas and Kamp 2001, Sæbø to appear) is offered in section 4. In section 5, based on the original use of the formalism, it is discussed how the unificational analysis can be restated in pragmatic terms as involving presupposition verification and accommodation. The paper concludes in section 6 with a brief outlook on the generality of the approach as well as further applications of the presented formalism.

2 The variant problem

Certain kinds of adverbials do not only modify a predicate, they may also alter its properties to various extents. The main focus of the present analysis is on adverbials headed by the German causal-instrumental preposition *durch*, having both these properties.¹ This twofold behaviour of *durch* is seen as a challenge to strict compositionality and alternative ways of formalising its semantics will be considered. In this section, the data motivating the present analysis, are introduced. The syntactic complement of *durch* is referred to as its semantic internal argument, and the modified phrase as the semantic external argument of *durch*. Syntactically, the *durch*-phrase can be adjoined to verbal, adjectival and nominal phrases. Only the two former syntactic configurations will appear here.

The function of causal-instrumental *durch* is to specify the causing event in a causal relation between events, as exemplified in (1)-(2):

- (1) *Ein Polizist wurde durch einen Schuss aus der eigenen*
 a policeman was through a shot from the own
Dienstwaffe getötet.
 service weapon killed
 'A policeman was killed by a shot from his own service weapon.'
- (2) *Durch bloßes Handauflegen versetzte sie den*
 through mere laying-on-of-hands transferred she the
Sowjetmenschen in Glückseligkeit.
 Soviet individual in blessedness
 'By a mere laying-on-of-hands she could induce a state of bliss in the Soviet individual.'

In (1), the causative predicate *töten* ('kill') is used. It will be assumed that the semantics of *töten* involves a causal relation between two events, one of which is

¹*Durch* also has spatial, temporal and agentive uses.

the caused event, a transition of an individual to a state of being dead, and one of which is the causing event of this transition. The causing event is not specified in any way, concerning e.g. how the transition was brought about. Such causatives are thus termed *manner-neutral* causatives (Pusch 1980, Sæbø to appear).

In (1), it can be seen in what way the contribution of the *durch*-phrase specifies the causing event: it is stated that the policeman was killed by *a shot from his own service weapon*. A simplified semantic representation for *einen Polizisten töten* ('to kill a policeman'), could be as in (3), p representing the policeman, e_2 the caused transition and e_1 the causing event:

$$(3) \quad \lambda e_1 \exists e_2 [\text{BECOME}(\text{dead}(p))(e_2) \wedge \text{CAUSE}(e_2)(e_1)]$$

Analysing a causative this way, the *durch*-phrase specifies e_1 in (3), contributing nothing else to the formula. Thus, a preliminary semantics of *durch* only needs to involve an identity relation between events, where the event of the *durch*-phrase is identified with the unspecified causing event of the causative predicate. Common to the occurrences of *durch*-phrases with causative predicates is that the adverbial *durch*-phrase only seems to modify the predicate it is adjoined to, adding some conditions or restrictions to it (cf. (7) on this page, see also e.g. Chung and Ladusaw (2004)).

Importantly, in addition to occurring with causative predicates, *durch* can also be used with inchoatives as illustrated in (4)-(5).

$$(4) \quad \text{Ohnesorg starb durch einen gezielten Schuss.}$$

Ohnesorg died through an accurate shot
'Ohnesorg died through an accurate shot.'

$$(5) \quad \text{Der Verlust an Vielfalt und Eigeninitiative ist durch die}$$

the loss of diversity and one's-own-initiative has through the
Verstaatlichung gesellschaftlicher Bedürfnisse in Schweden entstanden.
nationalisation social.GENITIVE needs in Sweden emerged
'The loss of variety and initiative has resulted from the state taking over
responsibility for social needs in Sweden.'

For inchoative predicates like *sterben* ('die') as in (4), a semantics as in (6) is assumed, i.e. without an underlying CAUSE:²

$$(6) \quad \lambda y \lambda e_2 \text{BECOME}(\text{dead}(y))(e_2)$$

After composition with *durch*, though, a semantics like in (3) intuitively seems to be the most plausible one: including a CAUSE and adding a specification for the causing event e_1 : an accurate shot is the cause of Ohnesorg's death. The examples in (1) and (4) could thus be given a common semantic representation as for example in the neo-Davidsonian style of Pylkkänen (2002), indicated in (7):

$$(7) \quad \lambda e_1 \exists e_2 [\text{BECOME}(\text{dead}(p))(e_2) \wedge \text{CAUSE}(e_2)(e_1) \wedge \text{SHOOT}(e_1)]$$

²Härtl (2003) presents an alternative view, cf. section 3.

This means that the semantics of an inchoative predicate like *sterben*, which is not specified for a cause, and normally excludes an agent, can be included in a formula where the resultant state expressed in *sterben* is caused to occur by some event, as with *töten*. If the event described by the internal argument of *durch* is modified such that it is obvious that the event in question is deliberately performed, e.g. by *accurate*, a CAUSE analysis seems as justified for the *sterben* example in (4) as for *töten* in (1). In fact, sentence (4) makes stronger claims about agentivity and intentionality than (1). It is in the sense of adding a CAUSE-relation and implying the presence of an agent that the *durch*-adverbial is claimed to radically alter the predicate *sterben*.

However, the CAUSE element of the semantic representation in (7) for the sentences in (1) and (4) must have different sources on the semantic representations assumed for causatives and inchoatives here. For (1) it originates in the causative predicate, whereas for (4) its source cannot be the inchoative predicate. This suggests that, in the latter case, *durch* may itself introduce a CAUSE element, it being the most plausible other candidate for it (see also section 3). After all, if the semantic representation of a sentence which contains a non-causative predicate is assumed to contain a CAUSE element, the source of this CAUSE cannot be the predicate itself. Under the assumption that no two CAUSE elements are present when *durch* is combined with a causative predicate, potentially yielding an interpretation of indirect causation in a cause-to-cause-relation, this would seem to enforce the postulation of two different lexical items *durch*. One of these would be used in combination with causatives, and the other with inchoatives and other non-causative predicates, which do not include a CAUSE element on their own. This will be referred to as the *variant problem*.

Dealing with two different lexical items *durch* is clearly counterintuitive from the point of view of lexical semantics, though. The contribution of *durch* is parallel in the two cases: *durch* specifies the causing event in a causal relation. To assume two lexical items *durch* to be able to represent both (1) and (4) as in (7) is not very desirable. The main motivation for the assumption of such an ambiguity would seem to lie in the restrictions of the formalism. It is thus preferable to look for alternative formalisms as a way of giving a unified analysis of the two combinations in question.

3 Alternative approaches

There exist approaches which could be seen as avoiding the variant problem. Two of these will be briefly discussed here. It should be added that in these approaches, the semantics of *durch* is not discussed. A first alternative would be to assume a principle of *temporal coherence* as Wunderlich (1997, p. 36) does. This way a CAUSE can enter into semantic composition whenever there is a constellation where a process (immediately) precedes a resultant state, where the predicate BECOME occurs. The CAUSE element occurs as a result of the combination of the BECOME in the representation for inchoatives like *sterben* in (6) and the event of the shot, introduced by the *durch*-phrase. This means

that *durch* itself does not need to contain a CAUSE element for sentences with either inchoative or causative matrix verbs to come out much the same when combined with *durch*.

Another alternative would be to, simplifying a view put forward by e.g. Härtl (2003) somewhat, claim that every change involves a cause at some level, under the assumption that “even if no specific causing entity or action is expressed, something must be responsible for the change of state in the affected entity” (Härtl 2003, p. 899 ff.). Härtl assumes that the presence of a CHANGE relation may motivate the introduction of a CAUSE element wherever relevant.³

However, there are some facts concerning *durch* which render these approaches less attractive. In addition to the combinatorial possibilities of casual-instrumental *durch* briefly discussed in section 2, *durch* may also be combined with stative predicates, as in (8):

- (8) *Der durch diese Haltung hohe Luftwiderstand kann auf längeren Strecken ganz schön schlauchen.*
 the through this posture high air resistance may on longer distances pretty much scrounge
 ‘The high air resistance due to this posture may put you through the mill over longer distances.’

In cases like (8), the state expressed in the lexical anchor, *hoch* (‘high’), is interpreted as the resultant state of the eventuality expressed in the internal argument of *durch*, *Haltung* (‘posture’).⁴ If the *durch*-phrase is left out, as illustrated in (9), the stative *hoch* should not be interpreted as a resultant state as such – though this could be achieved by focussing *hoch*, introducing a set of alternatives which are related to *hoch* through scales or negation, as in the alternative semantics focus theory of Rooth (1992).

- (9) *der hohe Luftwiderstand*
 the high air resistance
 ‘the high air resistance’

It can be concluded that *durch* has a similar effect here as with inchoatives. A CAUSE can be assumed to be present in examples such as (8), and the internal argument of *durch* specifies the causing event in the causal relation.

If one were to follow the above approaches, one would be left in a situation where the reinterpretation needed to achieve the wanted semantic representation (including a change of state and a cause relation), would be without any obvious triggers, since no change is present in the first place.

³It may be added that an approach as advocated by Chierchia (2004), whereby predicates which belong to a causative or unaccusative alternation pair (see e.g. Levin and Hovav 1995) like the transitive and intransitive variants of *break* both involve a CAUSE predicate, is also not a viable option in the case of *sterben* and *töten*, since these cannot be claimed to be alternating in this sense.

⁴*Haltung* has both a stative and an eventive reading. It has an eventive, intergressive (Egg 1995) reading in contexts where the position has to be upheld deliberately, as in (8).

An intuitively more plausible analysis can be developed if *durch* introduces the CAUSE element. This way, the reinterpretation follows automatically from the presence of the CAUSE element of *durch*, as in standard counterfactual analyses (see also Kratzer 2006). In addition, the fact that the internal argument of *durch* has to be reinterpreted as being an event, is expected if *durch* includes a CAUSE-predicate, which is taken to be a relation between two events.⁵ This is illustrated in (10), where the relevant phrase, towards the very end of the sentence, is printed in italics:

- (10) Wer über das erforderliche finanzielle Langzeitpolster verfügt, kann durch die Wahl des Wohnortes und die Gestaltung der Wohnung den Risiken auszuweichen versuchen (oder *durch Zweitwohnung, Ferien etc.*).
 'Whoever has the necessary long-term financial cushion at hand can attempt to avoid risk through the choice of a place of residence or the set-up of the residence itself (or *through a second house, vacations, etc.*).'

In (10) the phrase *durch Zweitwohnung* ('through a second house') is interpreted e.g. as *through the purchase of a second house*. It is possible to see this as a sortal shift from an entity to an event.⁶

In light of examples such as (8) and the reinterpretational effects of *durch* in general, it seems reasonable to assume a CAUSE-predicate to be included in the semantics of *durch*. In the next section, a possible solution to the variant problem described in section 2 is offered, i.e. a solution to how one and the same lexical item *durch*, in all its causal and instrumental uses, can be dealt with in a compositional manner, allowing for *durch* to include a CAUSE-predicate which is not always needed or wanted, as with causatives.

4 A unificational analysis

In what follows, a compositional analysis of *durch*-adverbials within Discourse Representation Theory (DRT) is presented in which assuming lexical ambiguity between one *durch* variant including a CAUSE element and another without it, is avoided.

It is fairly obvious that on standard strict compositional analyses, it is a considerable challenge to provide a general semantic analysis of *durch* in combination with all the above predicate types: causatives, inchoatives and statives. One is left in a situation where one either has to explain how the CAUSE of *durch* and the CAUSE of a causative are combined into one, or how a CAUSE element emerges with an inchoative or a stative predicate.⁷

⁵The possibility of *durch* involving a causal relation between propositions will not be discussed here.

⁶In the semantic literature, the term *type shifting*, stemming from Partee and Rooth (1983), is widely used, but the shift in (10) involves more than just an adjustment of types, hence the term *sortal shift*.

⁷It is assumed here that some consensus on the notion of strict compositionality does exist. What is intended under the notion of 'strict compositionality' here, is some (e.g. bottom-up) compositional procedure, whereby a CAUSE present in the adverbial *durch*-phrase would have

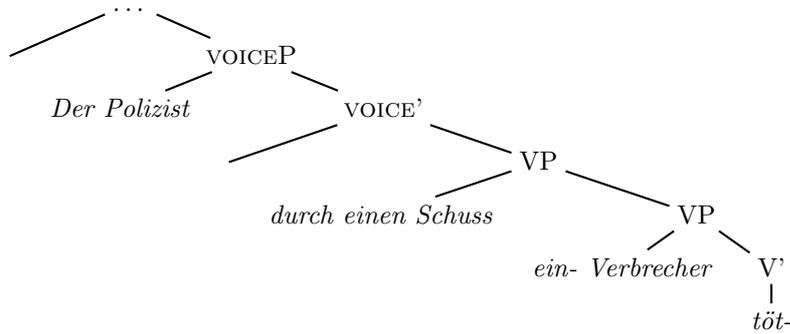


Figure 1: Simplified syntactic structure for the sentence *Der Polizist tötete einen Verbrecher durch einen Schuss*

The analysis which the present approach is based on, is in some respects based on Sæbø (to appear), where *by*-adjuncts in English are analysed. It differs from the one in Sæbø's paper in several points though, starting from the fact that the present analysis of causation is based on events, and not propositions. This is partly due to another difference between *durch* and *by*. Whereas the internal argument of *durch* is an event noun, the one of the *by*-phrases in Sæbø's paper is a VP, as in *He killed him by shooting him in the back*.

It should be added that in the formal analysis to be presented in this section, only causative and inchoative predicates will be considered, i.e. the combinations with stative predicates such as in (8) will be excluded from the discussion of the formalisation, although they will easily be incorporated based on ideas presented by Kratzer (2006) (see also section 3). Also, the semantics of tense or aspect will be ignored and voice will only be discussed to a limited degree. The semantic details included here will thus mostly be limited to the VP level, assuming a Kratzer (1996) analysis of Voice. This means that a sentence like (11) will be assigned the simplified underlying syntactic structure indicated in Figure 1.

- (11) *Der Polizist tötete einen Verbrecher durch einen Schuss.*
 the policeman killed a criminal through a shot
 'The policeman killed a criminal with a shot.'

It is assumed that the *durch*-phrase is adjoined at VP level, below any possible agents. This is well in harmony with current assumptions on the position of instrumental phrases in German (Frey 2003, p. 173 ff.).

Sæbø uses unification as a mode of composition within DRT to achieve a compositional analysis of *by*-adjuncts in English. This is a fairly recent de-

to be added to a CAUSE introduced by a decomposed causative predicate unless some meaning postulate is defined as in the style of Dowty (1979, p. 227 ff.). In a recent manuscript, Dowty (2006) discusses the notion of compositionality and some of its intricacies.

velopment within DRT, Bende-Farkas and Kamp (2001) being the first to my knowledge to advocate such an approach, although it is a such no radical shift within DRT.

Intuitively, the idea of formalising what is going on when combining *durch* with causatives or inchoatives in terms of unification, makes sense: the causative predicate and the *durch*-phrase describe one and the same (sub-)event. There is a strong intuition that the information they contribute should somehow be unified. If *durch* includes a CAUSE, unification might be used to formalise the fact that this CAUSE isn't added to the CAUSE of a causative.

There is as yet no coherent formalisation of all aspects relevant to the analysis promoted here, and many details will be left out. Though the derivation for two example sentences will be shown, the exact construction principles will only be discussed informally, but hopefully precisely enough to give a rough idea of the framework. As in Kamp (2001), a bottom-up compositional DRT analysis is applied, where Sæbø (to appear) was concerned only with the more general unificational principles of *by*-phrases with the predicates they modify. The reader is referred to Kamp (2001, especially pp. 221-231) for more details concerning the formalisation.⁸

The following general format, called a *semantic node representation*, is used for the semantic information attached to the tree nodes:

$$(12) \quad \left\langle \overbrace{\left\{ \langle \text{Variable}, \boxed{\text{Constraint}}, \text{Binding condition} \rangle \right\}}^{\text{STORE}}, \boxed{\text{CONTENT}} \right\rangle$$

The semantic node representation is a pair consisting of a CONTENT and a STORE element. The content representation is always a Discourse Representation Structure (DRS), whereas the STORE contains a set of one or more elements, each consisting of a triple of a variable, a constraint (also a DRS) and a binding condition. The binding condition provides information on the possible bindings of a variable, and the constraint adds to this, often by stating the semantic content of the variable, e.g. as gender features necessary for the correct binding of pronouns. The motivation for dividing a semantic representation in STORE and CONTENT, as opposed to just having a main DRS, is that many of the variables which are introduced in (bottom-up) composition cannot be bound right away. A storage mechanism is needed.

Next, the composition of the semantics of sentence (11) is shown, here repeated as (13) for convenience:

- (13) Der Polizist tötete einen Verbrecher durch einen Schuss.
'The policeman killed a criminal with a shot.'

⁸As will be obvious from the application of a storage mechanism in the representation to be introduced below, Kamp's (2001) paper relies strongly on the seminal paper by van der Sandt (1992), dealing with presuppositional phenomena in DRT. Some aspects of van der Sandt's paper will be briefly discussed in section 5.

As mentioned, a bottom-up composition procedure is assumed. The verb will first be combined with its internal argument, before the resulting VP is unified with the adverbial *durch*-phrase, after which e.g. the agent will be combined with the result of this unification (see Figure 1 on page 7). The representation of the lexical head of the VP, the causative predicate *töten*, is as follows:

$$(14) \left\langle \left\{ \begin{array}{l} \langle e_1, \boxed{\begin{array}{l} \text{CAUSE}(e_2)(e_1) \\ e_1 \subseteq t_{loc} \end{array}}, \text{indef.} \rangle, \\ \langle e_2, \boxed{\text{CAUSE}(e_2)(e_1)}, \text{indef.} \rangle, \\ \langle t_{loc}, \quad \quad \quad \text{loc.t.} \rangle \end{array} \right\}, \boxed{\begin{array}{l} \text{CAUSE}(e_2)(e_1) \\ \text{BECOME}(\text{dead}(y))(e_2) \\ \text{PATIENT}(y)(e_2) \end{array}} \right\rangle$$

The information in the CONTENT part to the right belongs to the invariant part of the semantics of the verb. Following Kamp and Rossdeutscher (1994), it is referred to as the *lexical anchor* of the sentence since it is the matrix verb of the sentence. Concerning the nominal arguments of the verb, only the semantic role of PATIENT is included in the representation, under the assumption that the AGENT appears outside the VP in a Voice phrase projection, cf. the structure given in Figure 1. The predicate introduces three variables in the store, one for each of the two events, and one for temporal location. The variable for temporal location will be ignored in the following, with the exception of the final DRS of the derivation.

The binding condition INDEF provides the information that the variables can, but need not enter binding relations with other variables. Importantly, when binding occurs, it is assumed that variables and constraints are unified. A variable with an INDEF binding condition will eventually enter the universe at the relevant level or, in other words, be bound existentially. In the case of indefinite noun phrases, the level of binding seems to be the topmost level of the sentence, often identified with CP. Exactly where the binding of eventuality variables takes place, is not a settled matter (Kamp 2001, p. 288, fn. 20), and it cannot be discussed in any real detail here. It is reasonable to assume that eventuality variables are existentially bound no later than at the level of aspectual projections, though. This does, however, not affect the underlying principles of the present analysis. As for the location time variable, the binding condition of this variable will not be of any concern here. More binding conditions will be discussed below.

As was mentioned above, the constraints in the STORE part include information which is necessary for the correct binding of the variables. Thus, $\text{CAUSE}(e_2)(e_1)$ occurring in both STORE and CONTENT does not mean that the semantics of the verb includes two CAUSE relations, but simply reflects the fact that this information is needed to be able to tell the two variables apart, since they relate differently to the CAUSE predicate. Technically, it would be possible to leave out the CAUSE relation in the content part, under the assumption that all information in the store will enter the content at some stage in the derivation. However, it is included to indicate that it is an invariable part of the semantics

of the verb. In the end, only constraint conditions for STORE variables which are not already present in the CONTENT part will enter it. Thus, no multiplication of conditions should occur.

Durch is represented as in (15). Kamp (2001) has nothing to say about prepositional adjuncts, but it should be rather uncontroversial to assume that *durch* on its own has no content, since it is not a lexical anchor:⁹

$$(15) \quad \left\langle \left\{ \begin{array}{l} \langle e_3, \boxed{\text{CAUSE}(e_4)(e_3)}, \lambda_1 \rangle, \\ \langle e_4, \boxed{\text{CAUSE}(e_4)(e_3)}, \lambda_2 \rangle, \end{array} \right\}, \begin{array}{|c|} \hline \\ \hline \end{array} \right\rangle$$

(15) basically states that *durch* itself adds no content to the DRS, but that it involves a causal relation between two events. Here, a third binding condition, λ , is introduced. The binding condition λ indicates that the variable needs to enter a binding relation. In this paper, variables with λ binding conditions will be bound by variables with INDEF binding conditions, resulting in a variable with another INDEF condition. Variables with INDEF binding conditions will eventually be existentially bound, as discussed briefly above. λ is used to illustrate the fact that these variables need to be bound, as opposed to the INDEF variables, although abstraction as such is not involved. The subscripted numbers on λ_1 and λ_2 indicate the binding order of the two variables involved in *durch*. The effect of this is to ensure the right binding order of the event variables in the CAUSE relation. This has its motivation in the fact that what modifies a predicate such as *töten* in example (13) on page 8, is a *durch*-**phrase**. Thus, the internal argument of *durch*, corresponding to the syntactic complement of the preposition, will be bound first, since this will already be present in the *durch*-phrase before it is adjoined to a VP.

For the internal argument of *durch*, the event noun *ein-Schuss*, the following representation is assumed:

$$(16) \quad \left\langle \left\{ \begin{array}{l} \langle e_5, \boxed{\text{SHOOT}(e_5)}, \text{indef.} \rangle, \\ \langle w, \boxed{\text{AGENT}(w)(e_5)}, \text{indef.} \rangle, \end{array} \right\}, \begin{array}{|c|} \hline \\ \hline \end{array} \right\rangle$$

The nominalisation derived from the predicate *schießen* ('shoot') is assumed to include the semantic role of an agent, but not that of a patient, since shooting events without patients are easily imaginable. The event expressed in *ein-Schuss* also needs to include a location time, but this will be ignored here.

⁹This is in accordance with assumptions both within general linguistics and formal semantics concerning functional word classes, that they have no, or a very limited *semantics*. In opposition to this view, though, it may be claimed that *durch* (and other function words) still have an important *meaning* component. It will be argued in section 5 that this meaning rather belongs to the domain of pragmatics.

The representation in (17) is the result of combining the representations for *durch* and *ein-Schuss*. The variable e_5 will bind e_3 , resulting in an INDEF binding condition for the unified variable from the representations in (15) and (16). It is as such of no importance whether the variable e_5 in the representation of *ein-Schuss* or e_3 of *durch* is retained for the causing event:

$$(17) \quad \left\langle \left\{ \begin{array}{l} \langle e_3, \boxed{\text{CAUSE}(e_4)(e_3)} \\ \text{SHOOT}(e_3) \end{array}, \text{indef.} \rangle, \right. \right. \left. \left. \begin{array}{l} \langle e_4, \boxed{\text{CAUSE}(e_4)(e_3)} \end{array}, \lambda_2 \rangle, \right. \right. \left. \left. \begin{array}{l} \langle w, \boxed{\text{AGENT}(w)(e_3)} \end{array}, \text{indef.} \rangle, \right. \right. \left. \left. \begin{array}{l} \boxed{\phantom{\text{CAUSE}(e_2)(e_1)}} \\ \boxed{\phantom{\text{BECOME}(dead(v))(e_2)}} \end{array} \right. \right\rangle$$

It may be disputed whether it makes sense to leave the DRS of the *durch*-phrase empty. What the *durch*-phrase states, is that there was a shooting event. The fact that the CONTENT is empty, is a heritage from Kamp's system, but there is room for doubt whether it has to be like that after composition of *durch* and *ein-Schuss*. Basically, this boils down to a question of where variables enter the content DRS, and whether different eventuality arguments can have different positions for such entrance, i.e. within a PP, a VP etc.

The representation of the two noun phrases, *der Polizist* ('the policeman') and *ein Verbrecher* ('a criminal') is as illustrated for *ein Verbrecher* in (18). They only differ in their binding condition, which is DEF in the case of the definite noun phrase, *der Polizist*.¹⁰ Temporal variables are left out, but they would have to be included in a fully specified formalism to account for the temporal aspects of noun phrases (Musan 1997, Tonhauser 2002):

$$(18) \quad \left\langle \left\{ \langle u, \boxed{\text{CRIMINAL}(u)} \end{array}, \text{indef.} \rangle \right\}, \begin{array}{l} \boxed{\phantom{\text{CAUSE}(e_2)(e_1)}} \\ \boxed{\phantom{\text{BECOME}(dead(v))(e_2)}} \end{array} \right\rangle$$

The VP *einen Verbrecher töten* ('kill a criminal'), which is modified by the *durch*-phrase, is represented as:

$$(19) \quad \left\langle \left\{ \begin{array}{l} \langle e_1, \boxed{\text{CAUSE}(e_2)(e_1)} \end{array}, \text{indef.} \rangle, \right. \right. \left. \left. \begin{array}{l} \langle e_2, \boxed{\text{CAUSE}(e_2)(e_1)} \end{array}, \text{indef.} \rangle, \right. \right. \left. \left. \begin{array}{l} \langle v, \boxed{\text{CRIMINAL}(v)} \end{array}, \text{indef.} \rangle, \right. \right. \left. \left. \begin{array}{l} \boxed{\text{CAUSE}(e_2)(e_1)} \\ \boxed{\text{BECOME}(dead(v))(e_2)} \end{array} \right. \right\rangle$$

The internal argument of *töten* gets a 'placeholder' inserted in the content DRS, whereas the content of the variable inserted in the DRS is specified – along with the variable's binding conditions in the STORE part. Unifying the VP with the *durch*-phrase, *einen Verbrecher durch einen Schuss töten*, the following

¹⁰In order to keep representations as simple as possible, the agent argument, *der Polizist*, will only occur in the final representation of sentence (13), cf. (22) on page 13.

representation emerges before binding applies:

$$(20) \quad \left\langle \left\{ \begin{array}{l} \langle e_1, \boxed{\text{CAUSE}(e_2)(e_1)}, \text{indef.} \rangle, \\ \langle e_2, \boxed{\text{CAUSE}(e_2)(e_1)}, \text{indef.} \rangle, \\ \langle e_3, \boxed{\begin{array}{l} \text{CAUSE}(e_4)(e_3) \\ \text{SHOOT}(e_3) \end{array}}, \text{indef.} \rangle, \\ \langle e_4, \boxed{\text{CAUSE}(e_4)(e_3)}, \lambda_2 \rangle, \\ \langle v, \boxed{\text{CRIMINAL}(v)}, \text{indef.} \rangle \end{array} \right\}, \boxed{\begin{array}{l} \text{CAUSE}(e_2)(e_1) \\ \text{BECOME}(\text{dead}(v))(e_2) \end{array}} \right\rangle$$

Now, e_2 will bind e_4 . Needless to say, the variable types have to correspond for a binding to be able to take place. Taking the constraints into consideration, which also have to match, e_4 cannot be bound by e_1 which could be a possible match, if one were only looking at the binding conditions: they are simply not in the same argument positions of the CAUSE relation. The variable e_4 represents a caused event, whereas e_1 represents a causing event.

Next e_1 and e_3 will be unified. This is not a binding in the sense of the binding which takes place between e_4 and e_2 , which is a necessary binding, where e_4 not being bound would lead to an unresolved DRS. The variables e_1 and e_3 will be unified under the assumption that one should unify all variables which are a possible match. This solution might overgenerate, though, as discussed with regard to example (31) in section 5, where the limitations of an analysis purely in terms of unification will be touched upon.

In addition, the constraints of the variables entering binding relations will be unified. This results in the following preliminary representation, before indefinites enter the universe of the content part:

$$(21) \quad \left\langle \left\{ \begin{array}{l} \langle e_1, \boxed{\begin{array}{l} \text{CAUSE}(e_2)(e_1) \\ \text{SHOOT}(e_1) \end{array}}, \text{indef.} \rangle, \\ \langle e_2, \boxed{\text{CAUSE}(e_2)(e_1)}, \text{indef.} \rangle, \\ \langle v, \boxed{\text{CRIMINAL}(v)}, \text{indef.} \rangle \end{array} \right\}, \boxed{\begin{array}{l} \text{CAUSE}(e_2)(e_1) \\ \text{BECOME}(\text{dead}(v))(e_2) \end{array}} \right\rangle$$

The indefinites enter the DRS in accordance with their binding conditions, which are different for event and individual variables. The result after the variables with INDEF binding conditions have been added to the universe of the content part and their corresponding constraints to the conditions of the DRS, can be seen in (22):¹¹

¹¹The agent of the internal argument of *durch, Schuss* ('shot'), which was included in the representations in (16) and (17), is unified with the agent of the Voice projection dominating the VP.

$$(22) \quad \left\langle \left\{ \begin{array}{|c|} \hline u \\ \hline \text{POLICEMAN}(u) \\ \hline \end{array} \right\}, \begin{array}{|c|} \hline e_1 \ e_2 \ n \ t_{(loc)} \ t'_{(ref)} \ v \\ \hline t' \prec n \\ t = t' \\ e_1 \subseteq t \\ \text{CAUSE}(e_2)(e_1) \\ \text{BECOME}(\text{dead}(v))(e_2) \\ \text{SHOOT}(e_1) \\ \text{CRIMINAL}(v) \\ \text{PATIENT}(v)(e_2) \\ \text{AGENT}(u)(e_1) \\ \hline \end{array} \right\rangle$$

The DRS $\langle \{u\}, \{\text{policeman}(u)\} \rangle$ in the left part of the representation is pre-suppositional (in the strict sense), due to the nature of the definite noun phrase *Der Polizist*. It will need to be verified in a broader context or accommodated.

Next, the above derivation is compared to the one for *durch* in combination with inchoative predicates such as in (4), repeated here as (23) for convenience:

$$(23) \quad \textit{Ohnesorg starb durch einen gezielten Schuss.}$$

‘Ohnesorg died through an accurate shot.’

Only the relevant steps where the derivation differs from the one in the previous example, will be commented on. *Sterben* is represented as:

$$(24) \quad \left\langle \left\{ \langle e_2, \text{ ,indef.}, \rangle \right\}, \begin{array}{|c|} \hline \text{BECOME}(\text{dead}(y))(e_2) \\ \text{PATIENT}(y)(e_2) \\ \hline \end{array} \right\rangle$$

The representation of *sterben* differs from that of *töten* in (14) in two respects: First of all, *sterben* includes only one event. Second, *sterben* is not specified for any causal relation, and thus has no variable constraint for the change-of-state event e_2 . In a fully specified formalisation, however, this event should be specified as being a change and involving a resultant state, a feature which it shares with the caused event in the CAUSE-relation.

Durch einen gezielten Schuss is represented as in (25), where the semantics of *accurate* is simply assumed to be a property of events.

$$(25) \quad \left\langle \left\{ \begin{array}{l} \langle e_3, \begin{array}{|c|} \hline \text{CAUSE}(e_4)(e_3) \\ \text{SHOOT}(e_3) \\ \text{ACCURATE}(e_3) \\ \hline \end{array}, \text{ ,indef.}, \rangle \\ \langle e_4, \begin{array}{|c|} \hline \text{CAUSE}(e_4)(e_3) \\ \hline \end{array}, \lambda_2, \rangle \\ \langle w, \begin{array}{|c|} \hline \text{AGENT}(w)(e_3) \\ \hline \end{array}, \text{ ,indef.}, \rangle \end{array} \right\}, \begin{array}{|c|} \hline \\ \hline \\ \hline \end{array} \right\rangle$$

When combining the representations in (24), with the addition of the proper name *Ohnesorg*, and (25), the result is the representation in (26), before binding applies. The binding condition of the variable *o*, PROPER NAME, has similar properties to the DEF condition:

$$(26) \left\langle \left\{ \begin{array}{l} \langle e_2, \quad , \text{indef.} \rangle, \\ \langle e_3, \begin{array}{|c|} \hline \text{CAUSE}(e_4)(e_3) \\ \text{SHOOT}(e_3) \\ \text{ACCURATE}(e_3) \\ \hline \end{array}, \text{indef.} \rangle, \\ \langle e_4, \text{CAUSE}(e_4)(e_3), \lambda_2 \rangle, \\ \langle o, \text{OHNESORG}(o), \text{prop.name} \rangle, \\ \langle w, \text{AGENT}(w)(e_3), \text{indef.} \rangle, \end{array} \right\}, \begin{array}{|c|} \hline \text{BECOME}(\text{dead}(o))(e_2) \\ \text{PATIENT}(o)(e_2) \\ \hline \end{array} \right\rangle$$

The binding results in the following representation:

$$(27) \left\langle \left\{ \begin{array}{l} \langle e_3, \begin{array}{|c|} \hline \text{CAUSE}(e_2)(e_3) \\ \text{SHOOT}(e_3) \\ \text{ACCURATE}(e_3) \\ \hline \end{array}, \text{indef.} \rangle, \\ \langle e_2, \text{CAUSE}(e_2)(e_3), \text{indef.} \rangle, \\ \langle w, \text{AGENT}(w)(e_3), \text{indef.} \rangle, \\ \langle o, \text{OHNESORG}(o), \text{prop.name} \rangle, \end{array} \right\}, \begin{array}{|c|} \hline \text{BECOME}(\text{dead}(o))(e_2) \\ \text{PATIENT}(o)(e_2) \\ \hline \end{array} \right\rangle$$

Finally, the indefinites enter the DRS, resulting in the following representation for sentence (23), which should be compared to the one for the sentence including a causative predicate in (22) on the previous page.

$$(28) \left\langle \left\{ \begin{array}{|c|} \hline o \\ \hline \text{OHNESORG}(o) \\ \hline \end{array} \right\}, \begin{array}{|c|} \hline e_2 \ e_3 \ w \ n \ t_{(loc)} \ t'_{(ref)} \\ \hline t' < n \\ t = t' \\ e_3 \subseteq t \\ \text{CAUSE}(e_2)(e_3) \\ \text{BECOME}(\text{dead}(o))(e_2) \\ \text{SHOOT}(e_3) \\ \text{ACCURATE}(e_3) \\ \text{PATIENT}(o)(e_2) \\ \text{AGENT}(w)(e_3) \\ \hline \end{array} \right\rangle$$

The two derivations discussed here lead to the same result for the semantic composition for *töten* and *sterben* in combination with *durch*. In the case of the inchoative predicate *sterben*, the *durch* adverbial alternates the properties of the predicate as discussed in section 2. The event nominal *Schuss* introduces an

agent of its own, and *durch* contributes the causal relation. This is all added in a compositional fashion to the semantics of *sterben*, without assuming a separate *durch* to avoid introducing an additional CAUSE in combinations of *durch*-phrases with causative predicates, where the *durch* phrase simply specifies the causing event already present.

The analysis presented in this section has shown that a unified treatment of *durch* in combination with causatives and inchoatives is possible, i.e. the variant problem identified in section 2 can be dealt with within this DRT-framework. The solution importantly assumes unification as a mode of composition to allow *durch* to introduce a CAUSE element of its own in cases where it is not provided by the context. In the next section, the pragmatic nature of the above analysis will be elaborated upon, based on the fact that the above formalism was developed to handle presuppositional phenomena.

5 The semantics of *durch*: presupposition verification and accommodation?

In the above analysis, the semantics of *durch* was claimed to be characterised by an empty CONTENT part. *Durch* was also said to *involve* a causal relation. In this section, an attempt is made at specifying how the notion of *involvement* may be understood. Given the fact that the formalism applied here was introduced by van der Sandt (1992) and further developed by Kamp (2001) to handle presuppositional phenomena, two obvious questions are: Could the causal relation in *durch* be described as a presupposition? And what would the implications for presupposition theory be? Only a partial answer to the latter question will be given here.

Turning first to the question whether there are any parallels between the behaviour of *durch* and presuppositional phenomena in general, it is argued here that the treatment of *durch* presented above does indeed amount to analysing the implicit CAUSE element of *durch* as an *intrasentential* presupposition. A *durch*-phrase can be said to *assert* the event included therein and *presuppose* that this event is a cause of some other event. The common basis for generally assumed mechanisms of presuppositional behaviour and the compositional unification-based analysis of *durch*, is as follows: When combined with causatives, *durch* seems to lack a meaning of its own. This is due to the unification of the CAUSE of *durch* with the CAUSE of the predicate, which is parallel to presupposition verification (also referred to as *resolution* in the literature on presuppositions). In combination with inchoatives, however, *durch* does seem to make a greater contribution, where a CAUSE predicate is introduced by the causal preposition itself. Here, a parallel to context accommodation can be observed. And finally, with statives, the contribution of the *durch*-phrase to the complex semantic formula seems to be even greater, leading to a reinterpretation of the state as being a resultant state.

Importantly, a pragmatic account of the combinatorial potential of *durch*

can capture some further properties of the preposition which have previously been ignored or not correctly identified. Two additional pragmatic mechanisms involved are *bridging* and *acceptability*.

In (8), repeated here for convenience as (29), bridging (in the wider sense of Bittner (2001), standardly described as *coercion* in the semantic literature on aspect) can be argued to take place, where the CAUSE associated with the preposition forces a reinterpretation of the state described in the predicate *hoch* ('high') as being a caused resultant state:

- (29) Der durch diese Haltung hohe Luftwiderstand kann auf längeren Strecken ganz schön schlauchen.
 'The high air resistance due to this posture may put you through the mill over longer distances.'

The argument for the relevance of acceptability in the analysis of *durch* stems from the contrasting behaviour of *durch*-phrases in combination with manner-neutral and *manner-specific* predicates, like e.g. causatives where the causing event is specified. In (30), it can be seen that claims made in the literature that *durch* generally cannot be combined with manner-specific causatives (Härtl 2001) are not correct. (30a) is not really ungrammatical, but sounds very awkward, whereas (30b) is fine:

- (30) a. ??*Er wurde durch einen Schuss erschossen.*
 He was through a shot shot dead
 'He was shot dead with a shot'
 b. *Er wurde durch einen Genickschuss erschossen.*
 He was through a shot-to-the-neck shot dead
 'He was shot dead with a shot to the neck.'

The variation in well-formedness of such combinations should not be explained by reference to the semantics of *durch*. A more general account of the distribution in (30) is achieved by assuming that composition is restrained by a general pragmatic mechanism of acceptability as described by van der Sandt (1992, p. 367 ff.). The verb *erschießen* ('shoot dead') is a manner-specific causative predicate, where the causing event is specified as being a shooting event. Modifying a predicate such as *erschießen* ('shoot dead') by an adverbial like *durch einen Schuss* ('with a shot') as in (30a) is uninformative and thus unacceptable. The adverbial contains no information which is not included in the predicate. However, a specification such as *durch einen Genickschuss* ('with a shot to the neck') as in (30b) renders the adverbial more specific than the shooting event described in the predicate, adding to the content. A shot to the neck describes not only a shooting event, but also specifies the target of the shot. Thus, the distribution of *durch*-phrases in combination with manner-specific causatives does not have to be accounted for by reference to the semantics of *durch* itself, but can be seen as fully determined by acceptability restrictions.

The reference to pragmatic mechanisms when explaining the compositional behaviour of *durch* has additional benefits as compared to an analysis based

on unification alone. This is the case in examples involving indirect causation, where it is plausible to assume that two CAUSE elements occur:

- (31) *Der Kommandant ließ die Gefangenen durch eine Sprengung töten.*
the commander let the prisoners through an explosion kill
'The commander had the prisoners killed by means of an explosion.'

In (31), two causative predicates are used: *lassen* ('let'), which can be compared to the causative uses of *have* in English, and *töten* ('kill'). Two interpretational variants are available for (31). They both have in common that the commander is the agent of some event, which causes someone else to kill the prisoners. In the first variant, which is the most plausible one, it is additionally assumed that the explosion was the event that killed the prisoners. As in the above cases, the CAUSE-presupposition of the *durch*-phrase would be verified by the CAUSE of *töten*. The other, more marginal variant of (31), is one where the explosion is not part of the killing event, but rather modifies the causing event of which the commander is the agent, expressed in the *lassen* predicate, i.e. the commander somehow uses the explosion to make someone else kill the prisoners, in whatever way. In this case, the CAUSE-presupposition of *durch* will be verified by the CAUSE of *lassen*.

One of the problems a case like (31) reveals for the application of an unrestrained form of unification, is as follows: It is in principle preferable if unification is allowed to occur whenever it can, limited only by general constraints on unification, such as e.g. a demand on non-conflicting features (Carpenter 1992, p. 45 ff.). Thus, in the formalisation described above, as in most unificational frameworks, the two CAUSE predicates and the CAUSE of *durch* would be unified unless some (ad hoc) principles were defined to avoid unification. But this would of course run against the actual interpretation of (31) with two CAUSE predicates in a relation of indirect causation.¹²

It has been argued here that the kind of unification which is a plausible basis for the analysis of *durch* can be seen as presupposition justification (Kamp 2001), i.e. presupposition accommodation or verification. This view also allows a restriction of the processes which determine unification in a non-ad hoc way (though admittedly still not very clearly defined). It is argued by van der Sandt (1992) that verification does not always have to occur even if it can. It is certainly the preferred operation over accommodation, but accommodation might under certain conditions occur when verification is possible. What these conditions are, is not an easy matter to settle, but in the case of (31), it might be argued for a more general pragmatic principle in the style of bidirectional optimality-theory (Blutner 2000, Blutner and Solstad 2001): there is a simpler expression without *lassen* which is available for direct causation (namely one with only *töten* in combination with *durch*), and that unifying the two CAUSES of the predicates *töten* and *lassen* and verifying the presupposed CAUSE of *durch* with these would imply a lack of belief in the informativity of sentence (31) on

¹²Alternatively, applying default unification (Bouma 2006) might be seen as a way of avoiding this problem.

the hearer's side. An alternative motivation, from a semantic point of view, referring to thematic roles, can also be imagined: unification may be blocked in the case of (31) due to the fact that there is an additional implicit agent present: some inferiors execute the orders of the commander. The two agents cannot be the agents of one and the same event (Krifka 1992, p. 44). Thus, the events themselves have to be separable to allow the existence of these two agents, which blocks them from being unified. The latter motivation could also be appealed to in a purely unification-based approach, but it would not be a very general principle for restraining unification.

It should be emphasised that in the above examples, all pragmatic mechanisms assumed to account for the compositional behaviour of *durch* apply purely sentence-internally. What is more, the presupposition verification argued for here refers to a word-internal level in several lexical items, involving a decomposition of the semantics of lexical items by means of the predicates CAUSE and BECOME.¹³ Thus, the above approach can be said to truly belong to the realm of lexical pragmatics (Blutner 2004), not only involving pragmatic aspects of some lexical items like e.g. discourse particles, but even viewing lexical composition itself as potentially determined by pragmatics.

It might be questioned whether the nature of the alternating CAUSE contribution of *durch* is really a kind of presupposition. Due to reasons of space, this question cannot be discussed anywhere close to satisfaction in this paper. It is by no means straightforward to corroborate this view, since many of the tests normally applied as diagnostics for presuppositions are not applicable in the case of *durch*. The pragmatic mechanisms which are argued to be relevant here, apply at the sentence-internal level referring to elements of a decomposition of lexical items, whereas most presuppositional phenomena which have been treated in the literature belong to the intersentential level. These can only be evaluated after the top-most CP-level has been reached. But the verification of the CAUSE-presupposition of *durch* can be argued to rather happen at VP-level, before the topmost eventuality enters the DRS universe. Thus, traditional tests involving e.g. embeddedness do not make much sense in the case of sentence-internal pragmatics.¹⁴

Also of relevance to this point, since the presupposition justification of *durch* applies at a sentence, or even word-internal level, effects involving global, local or intermediate accommodation (e.g. Beaver and Zeevat to appear) are not expected either (but see the two possible modifications in example (31) above).

One test which does seem to be more or less straightforwardly applicable, though, is the negation test, which involves a non-entailing context in which a presupposition should still be true:

¹³Of course, it has been observed by many that morphological parts of words trigger presuppositions such as the prefix *re-* in *reenter*, which presupposes an earlier event of entering the space in question, cf. e.g. Fabricius-Hansen (2001). But such morphemes refer to semantic entities introduced in an earlier extra-sentential context.

¹⁴See Beaver (2001, p 18-20) and Geurts (1999, p. 6-10) for some short general comments on the problem of testing for presuppositions and delimiting them from other semantic or pragmatic phenomena.

- (32) *Er starb nicht durch einen gezielten Schuss.*
 He died not through an accurate shot
 'He did not die through an accurate shot.'

It does not make sense to consider the truth of CAUSE alone, but it can be observed that the CAUSE of *durch* does seem to survive negation. Recall that the *durch*-phrase presupposes that there is a causing event for some other event. In (32), the *durch*-phrase presupposes that the person in question dies because of some event. The negation survival manifests itself in the fact that the most obvious interpretation of (32) is one where death actually occurs, but the cause of death is not an accurate shot, i.e. the negation has narrow scope over the *durch*-adverbial.

It is possible to get a sentential negation reading of *nicht* ('not') in (32), but this is a more unlikely reading. The reason for this could be that it does not make sense to add a causal adverbial like *durch einen gezielten Schuss* if one wants to express that a person did not die (cf. Solstad forthcoming).

Since presuppositions in general are assumed to be verified also intersententially, it might be an additional argument for analysing the CAUSE part of the semantics of *durch* as being a presupposition if it could also be verified sentence-externally. There is at least one type of occurrence where a claim can be made that this is the case:

- (33) *Sie hat Geld verloren. Es geschah durch Unaufmerksamkeit.*
 she has money lost. it happened through lack-of-attention
 'Sie lost some money. It happened due to lack of attention.'

In the second sentence in (33) containing the *durch*-phrase, the abstract event predicate *geschehen* ('happen') is used, which asserts that some event took place. What *durch* modifies semantically, however, is the predicate *verlieren* ('lose') in the first sentence. Thus, in the case of (33), part of the presuppositional information in the store of *durch* is bound by an event variable in the preceding sentence. This indicates that a presupposition which can be argued to be sentence-internally verified, can also be sentence-externally verified.

This is however not very clear at the current point: it may be added that it is possible to see the presupposition of *durch* as purely sentence-internally verified if it is assumed that *happen* and the event anaphor *es* refer to information in the preceding sentence, such that it is available for word-internal modification in the second sentence. But then again, this conflicts with the general assumption that event variables are bound before the level of CP is reached, i.e. before any preceding context is considered, from where the event anaphor *es* would have to find an event to refer to.

Finally, it should also be noted that any presuppositions due to a definite noun phrase being the complement of *durch* such as in the phrase *durch den Schuss* ('by the shot') will have to be treated in addition to the CAUSE-presupposition. The definiteness signals that there is an established shooting event in context, which is referred to, or that such an event should be accom-

modated.

Summing up, the above arguments indicate that a presuppositional (or a bit weaker: presupposition-like) analysis of *durch* is plausible and that the consequence of this is an extension of presupposition theory to apply also to the sentence-internal level (see also Fabricius-Hansen and Sæbø 2004). In the next section, the generality of the above approach will be briefly discussed in the light of some further data.

6 Outlook

An approach as sketched in the present analysis has applications beyond the analysis of *durch*. First, unification as a mode of composition has been applied in an analysis of the semantics of *by* in English (Sæbø to appear). Second, there are causal prepositions in other languages which show a similar behaviour to *durch*. In English, *through* can also be combined with both causative and inchoative predicates. More interestingly, given the close relationship between English *through* and German *durch*, a language more remotely related to German, such as Bulgarian, also has a preposition which combines with causatives and inchoatives, *ot* ('from'):¹⁵

- (34) a. *Toj be ubit ot tri kurshuma.*
he was killed from three bullets
'He was killed with three shots.'
b. *Toj zagina ot tri kurshuma.*
he died from three bullets
'He died from three shots.'

Third, there are other types of adverbial modification where the above analysis can be applied plausibly, as illustrated in (35):¹⁶

- (35) a. *Sie ging in das Haus hinein.*
She went in the house inside
'She went into the house.'
b. *Sie ging in das Haus.*
'She went into the house.'
c. *Sie ging hinein.*
'She went inside.'

In (35a) the adverbials *in das Haus* ('into the house') and *hinein* ('inside' in addition to viewpoint information) specify a single path of movement. They are not interpreted as describing two (sub-)paths which are combined. There is a double specification of an *in* movement (i.e. *into* as opposed to *out of*), both

¹⁵Importantly, as with *durch*, objects or entities as internal argument of *ot* are sortally shifted to events. The noun *kurshuma*, meaning ('bullets'), is reinterpreted as *shots*, as indicated in the glosses and translation of (34).

¹⁶Thanks are due to Christopher Habel for calling my attention to this example.

in the preposition *in* and in the *hinein* element. In addition, directionality is specified twice: in the combination of the preposition with accusative case as well as in the *hinein* element. As can be seen from (35b)-(35c), either of the adverbials in (35a) can occur without the other. In the spirit of the analysis presented here, the *hinein* element would be assumed to carry the presupposition that there is an object into which movement takes place. In (35a) this presupposition would be sentence-internally verified, whereas it would have to be verified in a wider context or accommodated in (35c). The information on directionality and inwards movement of the two adverbials would be unified whenever they both occur.

In sum, these data suggest that the presuppositional analyses of Kamp (2001) and van der Sandt (1992) in combination with unification-based composition can be suitably applied in analysing lexical items other than e.g. particles and factive verbs, which are often analysed in terms of presuppositions.

7 Summary

In this paper, it was argued that a semantic analysis applying strict compositionality is not always a viable option. The varying compositional impact of German adverbials headed by the causal-instrumental preposition *durch* was argued to be better rendered in a unificational framework. It was further argued that pragmatic mechanisms are important in describing the combinatorial distribution of some lexical items, and that what seems to be unification may be argued to be rather sentence-internal presuppositional phenomena.

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