Reinterpretations in Adverbal Modification: A General Approach*

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Abstract
This paper is concerned with the fact that a number of adverbal modifications involve a systematic reinterpretation of at least one of the expressions connected by the operation in question. It offers an approach in which such transfers of meaning turn out to be a result of contextually controlled enrichments of an underspecified as well as a strictly compositionally structured semantic representation. The approach proposed is general for three reasons: First, it takes into account not only reinterpretations in temporal but also such in non-temporal modification. Second, it allows considering so-called secondary predications as a particular kind of adverbal modification. Third, it explains the respective reinterpretations within a uniform formal framework of meaning variation.

1. Introduction

Sometimes, modifications by temporal adverbials seem to be more than a simple composition of meaning of the original expressions. Certain occurrences of this operation give the impression that they involve also a reinterpretation of at least one of the syntactic constituents connected by adjunction. Illustrations are e.g. sentences like (1) and (2) containing durative adverbials as modifiers of verbal expressions, with which, strictly, they should not be combinable.[1]

(1) Eva hat zehn Minuten (lang) geniest.
'Eva sneezed for ten minutes.'

(2) Udo hat zwei Stunden (lang) den Roman gelesen.
'Udo read the novel for two hours.'

Sentence (1) does not characterize Eva's single but her repeated sneezing as lasting ten minutes. (2) does not describe the state of affairs that it took Udo two hours to read a novel. It conveys, rather, how long he was busy reading the novel without reading it to the end. Therefore, in both cases, the adverbial does not specify an event appertaining to the original denotatum of the expression modified. Evidently, the given modification can be realized only if the latter is used in an accordingly adapted meaning.

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[1] Traditionally, compatibility with time adverbials is considered a crucial criterion for classifying verbal expressions into states, activities, accomplishments and achievements (see Dowty 1979). According to it, durative adverbials may modify only states or activities but not accomplishments or achievements. In contrast, time-span adverbials permit only a modification of accomplishments. Not least because of the 'exceptions' to be discussed here, the justification of these determinations has often been called in question (see e.g. Smith 1991, Klein 1994).

In this paper, I will first argue that the observation described above does not reflect merely singular occurrences of the modifying combination of meanings. Particularly, I will show that the proposal developed in Moens & Steedman (1988) of an adaptation of the situational reference of verbal expressions coerced by temporal adverbials does not cover all cases where such operations influence the interpretation of the components concerned. On the one hand, there are numerous occurrences of non-temporal adverbials that, when investigating meaning transfers of this type, have to be included as well. Moreover, from the given point of view, also so-called secondary predications can be understood as a special kind of adverbal modification. On the other hand, meaning transfers can be observed not only in the modified constituents but also in the expressions used as modifiers.
Second, I will demonstrate how systematic reinterpretations considered here can be analyzed within a multi-stage model of meaning representation. Starting from the idea that in understanding an utterance the information conveyed by it has to be disclosed step by step, the model makes above all a distinction between two types of operations – operations of computation of context-independent and, thereby, underspecified meaning, and such of a subsequent contextual specification of meaning. As a consequence, one and the same expression can receive several interpretations dependently on the context of use. Unlike other, largely similar approaches it is a characteristic feature of my proposal that the variation potential of meaning can be systematically extended by the obligatory application of special semantic operators. The strategy followed by the model has several advantages. At first – in contrast with the proposals of Pustejovsky (1995) and Jackendoff (1997) – the principle of semantic compositionality is entirely maintained in its validity. In addition, the approach opens up the possibility of explaining reinterpretations in adverbal modification not simply as coerced by the immediate linguistic context but also of allowing for global factors as triggers. And finally, the phenomena considered appear to be instances of a more general kind of meaning transfer within the model chosen, namely, insofar as the operations underlying them furnish the precondition to variants of interpretation as well in other fields of conceptual structuring.
The structure of the paper is as follows: Section 2 gives a survey of relevant data of reinterpretation in the modification by temporal adverbials. In Section 3 it is tested in how far such meaning transfers can be considered a result of more or less concrete adaptational operations. Section 4 offers, as an alternative, an outline of the multi-stage model of meaning representation. In Section 5 its application in the analysis of the problem area concerned is presented by way of example. In Section 6 and 7 the approach proposed is extended to further configurations. Section 6 is to furnish an explanation for reinterpretations in modification by adverbials of manner and location, Section 7 one for depictive and resultative constructions.

2. Temporal Modifications with Reinterpretation

Let me begin with a closer consideration of sentences (1) and (2) where, in usual view, an achievement and an accomplishment, respectively, are modified by a durative adverbial. The deviation from literal meaning observed in sentence (1) is based on an iterative understanding of the verb *niesen* ('to sneeze'). While, originally, this verb denoted only a property of momentaneous eventualities, or more simply, of moments, after its reinterpretation it can denote a property of processes composed of immediately successive acts of sneezing.[2] Suppose that p and m are variables for processes and moments, respectively, AG and CONST are predicates for the relations 'agent of' and 'constituent of', respectively, and τ is a functor mapping a

[2] Cf. (as well as with most other cases dealt with in this section) the analysis in Moens & Steedman (1988). For the assumption that processes are constituted by events or moments, see e.g. Piñón (1996).

situation to its 'run time'. Then, apart from factors irrelevant here, the core of the statement of (1) can be identified by the structure given in (1a).[3]

(1) a. $\exists p$ [AG(eva, p) & $\forall m$ [CONST(m, p) $\rightarrow$ SNEZZE(m) & AG(eva, m)] & $\tau(p) \geq$ 10min]

Thus, sentence (1) indicates the duration of a sneezing process performed by Eva.
In the case of (2), in analogy with (1), an iterative interpretation of *den Roman lesen* ('read the novel') in the sense of a chain of immediately repeated events, during which one and the same novel is read, would of course be conceptually possible. But in view of the time usually necessary and, according to (2), available for reading through novels such a procedure is hardly feasible. In order to meet the conditions of the adverbial, here the possibility is returned to of illuminating the internal structure of events and of limiting oneself in reflexion only to its so-called developmental phase. In its imperfective interpretation, the V'-expression *den Roman lesen* then denotes the set of those processes of which an event of reading a novel is composed, apart from its culminating completion.[4] Using COMPL as a predicate for the relation of completion between events and processes, the information conveyed by (2) can be represented simplistically as follows:

(2) a. $\exists p$ [AG(udo, p) & TH(novel, p) & $\exists e$ [COMPL(e, p) & READ(e) & AG(udo, e) & TH(novel, e)] & $\tau(p) \geq$ 2hour]

Udo so appears as an agent in a process lasting at least two hours that is part of a reading event, the subject of which is a certain novel.
Also for a sentence like (3) where again an accomplishment occurs in combination with an durative adverbial, a process-related interpretation is possible.

(3) Anna hat fünf Minuten (lang) das Fenster geöffnet.
'Anna opened the window for five minutes.'

While an imperfective interpretation of *das Fenster öffnen* ('open the window') seems to be adequate only in particular contextual conditions, the V'-expression can be interpreted in the iterative sense without difficulty. If, however, such an understanding is not explicitly suggested by the context such a sentence will exhibit a clear preference for a third kind of interpretation, namely that where, in a derived sense, the adverbial determines the duration of the state produced by the event described. In this use (3) conveys that Anna opened the window and the resulting state of its being open lasted at least five minutes. This is represented in (3a) where s is used as a variable for states and RESULT and HD, respectively, as predicates for the relations 'resultative state of' and 'holder of', respectively.[5]

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[3] In the following, the representations of the meaning of verbal expressions are based on the neo-Davidsonian representation format as used e.g. in Krifka (1989, 1992) or Parsons (1990). (See also Dölling 1998). For the determination of phrases of measure cf. Krifka (1989, 1992) and Kamp & Reyle (1993) with some simplifications made by me for reasons of presentation.

[4] My assumption of the temporal structuring of events is based on those that can be found e.g. in Bach (1986), Moens & Steedman (1988), Parsons (1990), Kamp & Reyle (1993), Piñón (1996) and Engelberg (1998). According to Steube (1998) events can be distinguished by whether their processual phase is focussed or not.

[5] For the understanding of states and their holders see Parsons (1990), Kratzer (1994) and Dölling (1998, 1999). In terms of $^{+}$BE_OPEN a 'blocking' manner of representation is used for the complex predicate proper. For comments see the running text below.

(3) a. $\exists e$ [AG(anna, e) & OPEN(e) & TH(window, e) & $\exists s$ [RESULT(s, e) & $^{+}$BE_OPEN(s) & HD(window, s) & $\tau(s) \geq 5min$]]

This understanding of (3) involves that – unlike the cases considered so far – the adverbal modifier is reinterpreted in accordance with the conditions of *das Fenster öffnen.*[6]
In sentence (4), the adverbial *drei Wochen (lang)* ('for three weeks') does certainly not specify the duration of a process.

(4) Jutta ist drei Wochen (lang) zu spät angekommen.
'Jutta arrived too late for three weeks.'

The expression *zu spät ankommen* ('arrive too late') that, in its original meaning, falls into the class of achievements, is to be understood in the given use in habitual interpretation, rather.[7] Therefore, (4) refers to Jutta's state lasting at least three weeks, the realization of which consisted in repeated but not immediately successive situations of arriving too late.

(4) a. $\exists s$ [HD(jutta, s) & $\forall b$ [REAL(b, s) $\rightarrow$ ARRIVE_TOO_LATE(b)] & $\tau(s) \geq 3week$]

Here, b is a variable for borderline situations, or more simply, borders, as characterized e.g. by the verb *ankommen* while REAL stands for the relation of 'realization of'.[8]
Now let me turn to the analysis of cases where time-span adverbials occur as modifiers of achievements, states or activities. Since e.g. *den Gipfel erreichen* ('reach the summit') as well as *ankommen* denote a property of borders, in a sentence like (5) the adverbial *in zwei Tagen* ('within two days') cannot serve to modify this expression in its literal meaning.

(5) Ede hat in zwei Tagen den Gipfel erreicht.
'Ede reached the summit within two days.'

But sentence (5) can be understood in a way that Ede was the agent of an event finished within two days by reaching the summit and thus culminating in it. Using FINIT as a predicate denoting the relation of 'the end of', (5a) can be considered the content of (5).

(5) a. $\exists e$ [AG(ede, e) & $\exists b$ [FINIT(b, e) & REACH(b) & TH(summit, b)] & $\tau(e) \leq 2day$]

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[6] This possibility of using durative adverbials, which seems to be specific to German, is usually not mentioned in the literature orientated mostly towards English. (But see Worm 1995.) For the reinterpretation of the adverbial to be stated here, a proposal for explanation was formulated in Dölling (1998), which will here serve as a starting point. Piñón (1999) argues against the necessity of a meaning transfer in such cases. He assumes that a verb like *öffnen* ('to open') contains, in its argument structure, its own variable of state, to which the durative adverbial has immediate access in modification. For various reasons, I hold such an approach to be inacceptable. In particular, it seems to be inadequate that in most cases of using the verb the argument position in hand has to be saturated by means of a doubtful operation. As further shown in Dölling (1998), however, with adverbials of the type of *für*-PP, which can also specify the duration of a resultative state, a direct combination with the according V'-expression is possible.The presentation in Piñón (1999) is correct insofar as an actualistic and a modal interpretation of such adverbials should be distinguished. (For the ambiguity of *for*-PPs in English in contrast with German *für*-PPs cf. Dowty 1979.)

[7] Such an interpretation is suggested e.g. in Smith (1991) and de Swart (1998).

[8] For the understanding of achievements as expressions of situations forming the beginning and the end, respectively, of states, processes and events and thus limiting them, see Piñón (1997).

It is the core of this egressive understanding that *den Gipfel erreichen* changes from a predicate of borders to a predicate of events finding their completion in such a situation.
In a similar way a sentence like (6) can be treated.

(6) Sarah war in fünf Minuten wach.
'Sarah was awake within five minutes.'

(6) a. $\exists e$ [TH(sarah, e) & $\exists s$ [RESULT(s, e) & $^{+}$BE_AWAKE(s) & HD(sarah, s)]
& $\tau(e) \leq 5min$]

As follows from (6a), Sarah is characterized as the theme of an event that results in her being awake within five minutes at most. This understanding of (6) includes that the expression *wach sein* ('to be awake') denoting originally a property of states is changed to a predicate of events having an according resultative state.[9]
It is somewhat more complicated to assign to a sentence like (7) an event-related interpretation.

(7) Peter rannte in fünfundvierzig Sekunden.
'Peter ran within forty-five seconds.'

Here, it would be necessary to understand the process predicate *rennen* ('to run') – in a complementary way as it were, to the case *den Gipfel erreichen* – as an predicate that can describe an event, the developmental phase of which is formed by processes of running. Then, the content of (7) can be identified with (7a) where the predicate SUBST denotes the relation 'substratum of' between processes and events.

(7) a. $\exists e$ [AG(peter, e) & $\exists p$ [SUBST(p, e) & RUN(p) & AG(peter, p)]
& $\tau(e) \leq 45sec$]

Evidently, such an understanding can be justified only by presupposing contexts, from which an according culmination can be drawn – here by way of information of a certain running distance.
Another possibility is to assign to sentences like (7) an ingressive reading. Then, the time-span adverbial indicates a contextually determined interval, at the end of which the described process began. Interpretations of this kind where, accordingly, not the run time of an event is specified are based on the fact that such adverbials can operate also at a higher verbal projection stage and, then, permit a differentiation of internal meaning.[10] They are not only or not at all the result of a meaning transfer within a verb-adverbial complex. For this reason, ingressive interpretations which, in analogy, are also possible in cases like (5) and (6) can be ignored here.

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[9] Arguments for an understanding of copula-predicative constructions like *wach sein* ('to be awake') as predicates of states are provided in Dölling (1999) (cf. also Parsons 1990). Let me here start from the fact that an adjective like *wach,* in its basic meaning, is to be represented as λo.AWAKE(o), where o is a variable for objects. Only when combined with the copula, it is reinterpreted, by means of the procedure originally assumed by me only for DP- and PP-predicatives, as state predicate $\lambda s.\forall o$[HD(o, s) $\rightarrow$ AWAKE(o)]. The latter structure can then be abbreviated, in a simplified way, by $\lambda s.^{+}$AWAKE(s), which in turn is used in (7a) in the 'blocking' representation used for *wach sein.*

[10] For the conditions of an ingressive and egressive interpretation, respectively, see Engelberg (1994). Cf. also Kamp & Reyle (1993) and Klein (1994).

3. Reinterpretation by Sort Coercion?

Meaning transfers occurring in connection with modification by durative or time-span adverbials have already been documented more or less extensively in the literature, and various proposals have been advanced for their explanation. Basic deliberations can be found in Moens & Steedman (1988) where a systematic even if informal analysis of reinterpretations in temporal modification was made. There, time adverbials (as well as aspectual auxiliaries) were considered functions which, under particular conditions, can induce changes of meaning of the verbal expressions to be modified by them, in a way that their reference to situations of one sort is transformed into a reference to situations of another sort. Such coerced changes of reference based on an accordingly differentiated network of ontological relationships were called *type coercion* by the authors.[11] How the respective adaptations are to be accomplished in detail, however, still calls for explication.

It could be assumed that such adverbials trigger semantic operations, by which the verbal expressions are directly reinterpreted in a suitable way and thus the prerequisites to according modifications are produced. So, if a conflict arises between the sortal selection restrictions of an adverbal modifier and the semantic sort of its argument, a concrete operator is wanted that can be applied to the verbal predicate with the aim of sort coercion. For example, the reinterpretation stated in (2) could then be explained simply in the way that *den Roman lesen* is transferred, by utilizing a special adaptation operator and meeting the requirements of the adverbial, from a predicate of events to a predicate of processes and, thus, simultaneously changing its internal meaning structure.

However, such a mechanism of direct semantic adaptation leaves a number of questions unsettled. As discussed in regard of (2) the occurrence of a sort conflict between temporal adverbial and verbal expression does not at all clearly determine the form of its solution by the underlying conceptual ontology. A first problem consists in how, out of the set of conceptually possible operators and in a both systematic and economical way, those operators can be chosen that provide exactly the adequate reinterpretation concerned. It is only certain that such a choice cannot be made without resorting to resources of encyclopaedic knowledge and allowing for specific pragmatic restrictions. Then, a second and more serious problem follows from it that, with such an insertion of adaptation operators, additional parts of meaning are introduced. Obviously, under this condition, the general validity of the principle of semantic compositionality can no longer be upheld.[12] Particularly in face of the lack of a convincing alternative such a renunciation of a strictly regulated calculation method of the context-independent meaning of expressions is not acceptable.

As a possible way out, it could be offered a procedure according to which necessary reinterpretations have to be realized in two steps: In a first step, a semantic representation is constructed in terms of compositionality. Here, if a conflict of sorts results this is resolved by inserting a now largely underspecified operator. In a second step, it is tried to justify this

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[11] The concept of 'type coercion' of an argument by its functor was dealt with, from a more general view point, also in Pustejovsky (1991a, 1995). There, reinterpretations in adverbal modification, however, play only a minor role. Following the tradition of logical semantics, I prefer to use the term *sort coercion* rather than that of *type coercion*. In my opinion, it is obvious that the phenomena considered are related not to the problem of separating expressions into semantic types but to that of separating them additionally into semantic sorts. For the use of operators of type coercion in the strict sense see e.g. Partee (1992, 1995), Dölling (1992, 1997) and in the running text below.

[12] Indeed, Jackendoff (1997) – cf. also Jackendoff (1991) – sees in the required enrichment in reinterpretations an important argument against the standard hypothesis of „syntactically transparent semantic composition" (p.48). Referring to deliberations as can be found in Pustejovsky (1991a, 1995), Jackendoff pleads instead for treating the meaning of complex expressions as a function of the meanings of its parts and their syntactic combination only as a default in a wider range of options.

hypothetical adaptation of sorts by suitably specifying the operator concerned by means of encyclopedic, situational and discourse knowledge. So, it is only in this step that meaning transfer proper, if possible, is realized.[13]
Taking up this idea, then, it can be assumed that for the reinterpretations discussed here, only two underspecified adaptation operators, namely one for constructions involving durative adverbials and one for those involving time-span adverbials are required. According to the sortal requirements of adverbials, the first of them should permit to transfer predicates of events, borders or moments to predicates of processes or states; the second to transfer predicates of borders, processes or states to predicates of events. These conditions are largely met by the operators proposed in (8) and (9) where e/b/m, p/s and b/p/s are provisional variables for situations of the respective supersorts and Q, C and R respective parameters for the quantifiers $\exists$ and $\forall$, for the connectors & and $\rightarrow$, and for relations between situations of individual sorts, respectively.

(8) $\lambda P \lambda p/s.\ Qe/b/m\ [R(e/b/m, p/s)\ C\ P(e/b/m)]$

(9) $\lambda P \lambda e.\ Qb/p/s\ [R(b/p/s, e)\ C\ P(b/p/s)]$

Now, if e.g. (8) is used in the compositional construction of the semantic representation of (10), the structure given in (10') can be – including further provisionals – assumed to be the result of this derivation.

(10) Ilse hat einen Tag (lang) die Sonate gespielt.
'Ilse played the sonata for one day.'

(10') $\exists p/s\ [AG/HD(ilse, p/s)\ \&\ Qe\ [R(e, p/s)\ C\ PLAY(e)\ \&\ TH(sonata, e)]$
$\&\ \tau(p/s) \geq 1day]$

Then, conceptually possible specifications of (10') will result in (10a) to (10c).

(10) a. $\exists p\ [AG(ilse, p)\ \&\ \forall e\ [CONST(e, p) \rightarrow PLAY(e)\ \&\ TH(sonata, e)]$
$\&\ \tau(p) \geq 1day]$
b. $\exists p\ [AG(ilse, p)\ \&\ \exists e\ [COMPL(e, p)\ \&\ PLAY(e)\ \&\ TH(sonata, e)]$
$\&\ \tau(p) \geq 1day]$
c. $\exists s\ [HD(ilse, p)\ \&\ \forall e\ [REAL(e, s) \rightarrow PLAY(e)\ \&\ TH(sonata, e)]\ \&\ \tau(s) \geq 1day]$

Which of the alternatives can really provide the conceptual content of an utterance of (10), i.e. whether it refers to a process of continuously repeated playing the sonata concerned, to part of the process of an individual playing event or to a state realized by repeated but not interrupted playing the sonata has to be decided in dependence on stereotype knowledge and other contextual information.
But such a procedure, where semantic sort adaptation and context-related reinterpretation are separated, will also lead to difficulties.

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[13] In general, such a concept is advocated e.g. in Dölling (1992) and in Hobbes et al. (1993). In the field of modification by temporal adverbials this course was first followed in Worm (1995). De Swart (1998) can be considered an advancement and systematization of the latter study. Finally, similar ideas are presented in Pulman (1997).

First, its functioning has to meet the condition that the meaning transfer can proceed only in one direction, respectively.[14] A non-appliance of this condition follows alone from sentences like (3) where, beside the reinterpretation of the verbal expression only allowed for generally, at least also that of the modifying expression is possible. Therefore, the starting point of a required meaning transfer is not at all clearly determined a priori. So, it has to be decided to which of the expressions involved an adaptation operator is to be applied. However, decisions of this kind are not compatible with a strictly compositional semantic derivation.
Second, following this approach it is left out of consideration that not every meaning transfer in adverbal modification has to result from a direct conflict of sorts.[15] For example in (11) *joggen* ('to jog') fulfills the sortal selection restriction of durative adverbials insofar as this verb represents a predicate of process.

(11) Renate hat zehn Jahre (lang) gejoggt.
'Renate jogged for ten years.'

Accordingly, (11) can imply that Renate's activity of incessant jogging lasted at least ten years.

(11) a. $\exists p\,[AG(renate, p)\ \&\ JOG(p)\ \&\ \tau(p) \geq 10year]$

Unless the person in question disposes of extraordinary abilities our accessible stereotype knowledge of jogging will let us have our doubts about the justification of this process reading. It has to be followed that (11) refers to Renate's state realized by according activities of jogging, lasting ten years. Here, the adequate habitual interpretation is represented in (11b).

(11) b. $\exists s\,[HD(renate, s)\ \&\ \forall p\,[REAL(p, s) \rightarrow JOG(p)\ \&\ AG(renate, p)]\ \&\ \tau(s) \geq 10year]$

Sentence (11), however, can be understood in this sense only if the verb is subjected to an according reinterpretation based on more complicated conceptual interconnections.

4. Reinterpretation as Specification of the Inflected Semantic Form

Let me now develop an approach that, unlike previous attempts, can be called adequate from the aspect of both content and methodology. In particular, the strategy of analysis to be proposed has to meet the following, partly interrelated requirements: First, the present state of research should be met by treating, in any case, adverbal modifications strictly by the principle of semantic compositionality. Second, reinterpretations in modifying meaning combination should not simply be accounted for by occurring conflicts between the semantic sorts of the expressions involved. Third, finally, a mechanism as general as possible should be found by which any kinds of systematic meaning transfers can be performed, both of modified expressions and of modifiers.

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[14] In most of the investigations known to me, this assumption was made, but especially in Moens & Steedman (1988), Bierwisch (1989), Pustejovsky (1991a, 1991b, 1995), Jackendoff (1991, 1997), Worm (1995), Pulman (1997) and de Swart (1998). For the general possibility of different starting points and, thus, directions in reinterpretation see Nunberg (1995) and Dölling (2000).

[15] Also this erroneous assumption is shared by almost all authors concerned with the phenomeon discussed here.

In the investigation of meaning variations in different fields of conceptual structuring, I have – see Dölling (1997 - 2000) – developed a model meeting these requirements. Its basic idea is that in grasping the information conveyed with an utterance it has to be determined over several stages of representation.

The beginning of the process of conceptual understanding is formed by the level of the *semantic form SF* of expressions where their context-independent meaning is represented.[16] From this task of SF there follow its two crucial characteristics: First, SF representations are structured strictly compositionally, i.e. they are calculated exclusively in accordance with the morpho-syntactic structure of the expressions concerned. Thus, any interferences in the autonomously organized semantic structuring by references to extra-language fields of knowledge – be they of direct or indirect kind – are excluded. Second, SF representations are radically underspecified insofar as they contain different parameters, by the fixing of which the meaning of expressions can be varied accordingly. It is crucial for the approach that such SF parameters occur not only as elements of semantic entries of lexical units. Rather, in semantic composition this primary variation potential of meaning is systematically extended under strictly defined conditions by adding supplementary SF parameters. Accordingly, two subtypes of SF can be distinguished.

(12) a. The *basic semantic form* SF_B of an expression is that SF connected with a lexical expression or with a syntactically complex expression as a result of the direct combination of its parts.

b. The *inflected semantic form* SF_I of an expression results from its SF_B by introducing additional parameters by means of operations – so-called *SF inflections* – obligatorily performed on expressions of its semantic type.

As will be shown, it is the extended variation potential given by SF_I that enables meaning transfers of the type considered.[17]

With SF the basis is available to which interpretation operations of various kinds apply. Then, the meaning of an utterance is, step by step, specified more and more with resort to encyclopedic, situational and discourse knowledge and with regard to pragmatic principles and rules so that, at the end of this process, the *conceptual content CC* of the utterance is determined. In this connection, the procedure of abductive interpretation plays a major role, which 'explains' the utterance concerned, at long last, by deriving its SF by deduction from a suitable conceptual knowledge basis.[18] An intermediate result of this derivation is the so-called

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[16] Cf. e.g. Bierwisch (1988, 1989), Bierwisch & Lang (1989), Zimmermann (1992, 1999) and Maienborn (1998, 2000).

[17] Maienborn (1996, 1998, 2000) assumes, in a similar way, that, under certain conditions, new SF parameters are introduced in meaning composition independent of whether there is a semantic incompatibility or not. The possibilities of meaning transfer thus given are, however, only partial insofar as this systematic extension of interpretation potential is limited to individual types of adverbal modification. (See the respective notes in Section 6.) Also the concept of reinterpretation followed by Egg (2000) is similar to the approach proposed by me. Here, by an underspecified semantic description formalism specific sites are marked in the meaning structure of expressions, where material mediating between semantically conflicting constituents can be inserted in terms of concrete operators. It is evidently an advantage of the procedure that it permits an integrative treatment of very different kinds of semantic ambiguity, among them also ambiguities of scope. (Cf. also Pinkal 1996.) However, I can see weaknesses in that, first, the principles of a systematic marking of the respective sites remain obscure and, second, with the mere statement of such sites the material inserted is not structured at all.

[18] This mechanism conceived by Hobbes et al. (1993) and having, on the whole, still to be elaborated in the future, cannot be dealt with in more detail here. It was demonstrated particularly in Dölling (1997) what an application in the multi-stage model of meaning representation could look like. For further demonstrations see Dölling (1998) and Maienborn (1998, 2000).

parameter-fixed structure PFS of this utterance. This is generally understood as a stage of meaning representation immediately succeeding SF and differing from it by substituting the parameters in SF by concrete conceptual units. Thus, PFS representations are a first contextual specification of the meaning of expressions. They also represent the very level at which systematic meaning variations are realized.

Now, the operators used in SF inflection still have to be determined in greater detail. In a number of papers, I have advanced several proposals in search of schemata that, on the one hand, are sufficiently specific to furnish the necessary salient points for the PFS desired and, on the other, general enough to cover in fact all cases observed of meaning transfer. The SF operator ***met*** proposed in Dölling (2000) seems to be a suitable means by which all expressions of the type of one-place predicates of first order can be reinterpreted.[19] Particularly, this operator enables us to understand meaning transfers in the modification of verbal expressions as instances of an accordingly generalized notion of metonymic interpretation.

In order to simplify matters, not the respective operator itself but only its reduced version shall be used here. Let me assume the inflection parameter ***met'*** where x and y are individual variables and Q_n, C_n and R_n parameters for the quantfiers $\exists$ and $\forall$, for the connectors & and $\rightarrow$ and for relations between elements of ontological sorts, respectively.[20]

(13) ***met'***: $\lambda P \lambda x.\ Q_n y\ [R_n(y, x)\ \ C_n\ \ P(y)]$

According to condition (14) ***met'*** is to be applied to every one-place predicate occurring as SF_B of an expression α.

(14) $SF_B(\alpha)$ of type <e, t> changes to $SF_I(\alpha)$ so that it holds: $SF_I(\alpha) = \textbf{\textit{met'}}(SF_B(\alpha))$.

The following fixing conditions of SF_I of α determine in which way special parameters are substituted for the SF parameters introduced with ***met'***:

(15) $SF_I(\alpha)$ changes to $PFS(\alpha)$ so that it holds:

(i) Q_n and C_n in $SF_I(\alpha)$ are fixed by $\exists$ and & or by $\forall$ and $\rightarrow$, respectively;

(ii) R_n in $SF_I(\alpha)$ is fixed by = or by a predicate of relations between elements of two different sorts;

(iii) in the case of default Q_n, C_n and R_n are fixed by $\exists$, & and =, respectively.

Here, condition (iii) warrants that whenever there is no reason for a meaning transfer of α the contribution to interpretation made by ***met'*** in PFS is finally empty.

5. Demonstration of a Reinterpretation

Let me illustrate the application of inflection operator ***met'*** and the possibilities of its specification by sentence (3), repeated as (16) below.

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[19] The term ***met*** is to indicate that the respective operator provides the necessary prerequisites for explaining, within a uniform formal framework, particularly metonymy and metaphor as basic kinds of meaning transfer.

[20] Cf. also Dölling (1998, 1999). As will be shown, this hypothetically assumed operator has to be somewhat extended in order to cover also other cases of reinterpretation in adverbal modification.

(16) Anna hat fünf Minuten (lang) das Fenster geöffnet.
'Anna opened the window for five minutes.'

In (17a) the segment of SF derivation relevant to our problems is given for *fünf Minuten (lang) das Fenster öffnen* ('open the window for five minutes').

(17) a. *das Fenster öffnen*; SF_B: $\lambda x.\ OPEN(x)\ \&\ TH(window, x)$

| ***met'***: $\lambda P \lambda x.\ Q_1 y\ [R_1(y, x)\ C_1\ P(y)]$

das Fenster öffnen; SF_I: $\lambda x.\ Q_1 y\ [R_1(y, x)\ C_1\ OPEN(y)\ \&\ TH(window, y)]$

| *fünf Minuten (lang)*; SF_B: $\lambda x.\ \tau(x) \geq 5min$

| | ***met'***: $\lambda P \lambda x.\ Q_2 y\ [R_2(y, x)\ C_2\ P(y)]$

| *fünf Minuten (lang)*; SF_I: $\lambda x.\ Q_2 y\ [R_2(y, x)\ C_2\ \tau(y) \geq 5min]$

| | ***MOD***: $\lambda Q \lambda P \lambda x.\ P(x)\ \&\ Q(x)$

| *fünf Minuten (lang)*; SF: $\lambda P \lambda x.\ P(x)\ \&\ Q_2 y\ [R_2(y, x)\ C_2\ \tau(y) \geq 5min]$

fünf Minuten (lang) das Fenster öffnen;
SF_B: $\lambda x.\ Q_1 y\ [R_1(y, x)\ C_1\ OPEN(y)\ \&\ TH(window, y)]$
$\&\ Q_2 y\ [R_2(y, x)\ C_2\ \tau(y) \geq 5min]$

| ***met'***: $\lambda P \lambda x.\ Q_3 y\ [R_3(y, x)\ C_3\ P(y)]$

fünf Minuten (lang) das Fenster öffnen;
SF_I: $\lambda x.\ Q_3 y\ [R_3(y, x)\ C_3\ Q_1 z\ [R_1(z, y)\ C_1\ OPEN(z)\ \&\ TH(window, z)]$
$\&\ Q_2 z\ [R_2(z, y)\ C_2\ \tau(z) \geq 5min]]$

The following remarks about (17a) are appropriate: First, the derivation makes it clear that a representation format for SF is preferred where no sorted individual variables and, thus, no variables for situation sorts are used.[21] Instead, differentiations of sorts are made by using ontological restrictions in terms of axioms for the constants concerned. Second, the three occurrences of ***met'*** indicate that, in the SF derivation, exactly as many predicates appear in the role of an SF_B and therefore, in agreement with (14), require an according number of operator applications. The last application of ***met'*** is given only for the sake of completeness because the SF parameters introduced with it are possibly relevant for the reinterpretations of the results of modification but not for those of their components. Third, finally, a special operator for type coercion is used in terms of ***MOD***, by which expressions of the predicate

[21] The reason for this omission is that, on the one hand, the network of ontological sorts is anyway much too differentiated to be actually allowed for in an adequate number of variables. On the other hand, the very presence of sorted variables in SF would impair the use of general operators like ***met'***.

type can be transferred to such of the type of modifier. In this sense, the application of the ***MOD*** operator represents a condition for modifying combination of meanings.[22]
Starting from the result of (17a) a SF can be assumed for sentence (16) as – simplified in several respects – represented in (16a).

(16) a. SF: $\exists x\,[\theta(\text{anna}, x)\ \&\ Q_3 y\,[R_3(y, x)\ C_3\ Q_1 z\,[R_1(z, y)\ C_1\ \text{OPEN}(z)\ \&\ \text{TH}(\text{window}, z)]\ \&\ Q_2 z\,[R_2(z, y)\ C_2\ \tau(z) \geq 5\text{min}]]]$

Here, θ is an additional SF parameter which has to be fixed by predicates of participation relations like AG, HD or TH. It is part of a structure that can be considered the SF contribution of the functional category AGR_S .

(18) AGR_S; $\lambda P \lambda y \lambda x.\ \theta(y, x)\ \&\ P(x)$

Thus, AGR_S fulfills the semantic function of extending the SF of the respective V'-expression by an argument place for grammatical subjects.[23]
The compositionally calculated SF of (16) is now to be interpreted against the background of contextual knowledge (in the broadest sense) where, as a first step, the parameters occurring in it have to be fixed. Evidently, the knowledge required is highly diverse. At first, it includes axioms like (19a), (19b) and (20), laying down the conditions of use for more special conceptual units and configurations.

(19) a. $\Box\forall x\,[\text{OPEN}(x) \rightarrow \exists y\,\text{AG}(y, x)\ \&\ \exists z\,\text{TH}(z, x)]$
b. $\Box\forall x\,[\text{OPEN}(x) \rightarrow \exists y\,[\text{RESULT}(y, x)\ \&\ {}^{+}\text{BE\_OPEN}(y)]$

(20) $\Box\forall x\,[\exists y\,[\tau(x) \geq y] \rightarrow \text{EVENT}(x) \vee \text{STATE}(x)]$

Thus, (19a) characterizes every opening as a process involving an agent and a theme as participants; (19b) lays down that every opening implies a resultative state of being open. The axiom formulated in (20), however, can be considered that condition which restricts the use of durative adverbials. Moreover, above all axioms of conceptual ontology are required as well, characterizing the basic properties and relations of different sorts of situations. Such general determinations are made e.g. by using (21a) to (21d) or (22a) and (22b).[24]

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[22] Cf. for example Partee (1992), Zimmermann (1992, 1999), Wunderlich (1997), Dölling (1998). It could be that in modifications, instead of the Boolean conjunction, actually a non-commutative restriction operation is used. For the properties of the logical operator hardly studied so far see Bierwisch (1989) or Zimmermann (1992).

[23] Here, I follow an idea of Kratzer (1994) where the category of *voice* was used as such a provider of argument places. See also Dölling (1999).

[24] The axioms in (21b) and (21d) allow for the fact that, in contrast to a widespread view, not all events are changes of states. In Egg (1994, 1995) it was proposed to distinguish between 'changes' and so-called *inter-gressives* as denoted e.g. by predicates like *ein Lied singen* ('sing a song') or *einhundert Meter schwimmen* ('swim a hundred meters'). Piñón (1999) pleads for explicitly characterizing expressions of change by including a component of resultative state in their semantic representation and, accordingly, supplementing their argument structure by a variable of state. In this way, simultaneously the reinterpretation required by sentences like (3) and (16), respectively, is to be avoided. In Footnote 6 I have expressed my doubts about this proposal. Starting from basic deliberations, I follow the principle of looking upon semantic representations as guideposts as simple as possible, rather, for necessary differentiations by using detailed conceptual axioms.

(21) a. $\Box\forall x\forall y$ [RESULT(x, y) $\rightarrow$ STATE(x) & CHANGE(y)]
b. $\Box\forall x\forall y$ [CHANGE(x) $\rightarrow \exists y$ [STATE(y) & RESULT(y, x)]]
c. $\Box\forall x\forall y\forall z$ [RESULT(x, y) & (TH(z, y) $\vee$ AG(z, y) & $\neg\exists z$ TH(z, y)) $\rightarrow$ HD(z, x)]
d. $\Box\forall x$ [CHANGE(x) $\rightarrow$ EVENT(x)]

(22) a. $\Box\forall x\forall y$ [CONST(x, y) $\rightarrow$ PROCESS(x) & EVENT(y)]
b. $\Box\forall x\forall y$ [EVENT(x) $\rightarrow \exists y$ [PROCESS(y) & CONST(y, x)]]

Numerous further axioms would have to be added as part of a conceptual knowledge basis if the interpretation in question were to be described in greater detail.[25]
Presupposing a sufficient number of determinations of the kind outlined the following conceptually possible specifications of SF_I of *fünf Minuten (lang) das Fenster öffnen* can be distinguished:

(17) b. PFS_1:$\lambda x.\ \exists y$ [=(y, x) & $\exists z$ [=(z, y) & OPEN(z) & TH(window, z)]
& $\exists z$ [RESULT(z, y) & $\tau(z) \geq 5min$]]
= $\lambda x.$ OPEN(x) & TH(window, x) & $\exists y$ [RESULT(y, x) & $\tau(y) \geq 5min$]
c. PFS_2:$\lambda x.\ \exists y$ [=(y, x) & $\forall z$ [CONST(z, y) $\rightarrow$ OPEN(z) & TH(window, z)]
& $\exists z$ [=(z, y) & $\tau(z) \geq 5min$]]
= $\lambda x.\ \forall y$ [CONST(y, x) $\rightarrow$ OPEN(y) & TH(window, y)] & $\tau(x) \geq 5min$
d. PFS_3:$\lambda x.\ \exists y$ [=(y, x) & $\exists z$ [COMPL(z, y) & OPEN(z) & TH(window, y)]
& $\exists z$ [=(z, y) & $\tau(z) \geq 5min$]]
= $\lambda x.\ \exists y$ [COMPL(y, x) & OPEN(y) & TH(window, y)] & $\tau(x) \geq 5min$
e. PFS_4:$\lambda x.\ \exists y$ [=(y, x) & $\forall z$ [REAL(z, y) $\rightarrow$ OPEN(z) & TH(window, y)]
& $\exists z$ [=(z, y) & $\tau(z) \geq 5min$]]
= $\lambda x.\ \forall y$ [REAL(y, x) $\rightarrow$ OPEN(y) & TH(window, y)] & $\tau(x) \geq 5min$

Each of these PFSs involves a meaning transfer in one of the two components of the verb-adverbial construction: In PFS_1 *fünf Minuten (lang)* is reinterpreted as a predicate of resultative states, in PFS_2 to PFS_4, *das Fenster öffnen*, accordingly, as a predicate of processes – either in terms of iterations or of developmental phases of events – and as a predicate of habitual states.
Of course, the four possibilities of specification are, due to the knowledge of typical events like opening the window and of the situations connected with them, respectively, to be assessed differently with respect to their probability. So, an interpretation of (16) by using (17e) can be ruled out under normal conditions. Interpretations using (17c) and (17d) seem to be more probable even if marginal only. As mentioned above, under usual conditions evidently that interpretation should be preferred where (17b) is derived as PFS of *fünf Minuten (lang) das Fenster öffnen*.
The PFS to be thus assumed for (16) is given in (16b).

[25] It will be a crucial task of future conceptual analysis to research, in greater detail, the various fields of such knowledge and their interaction in interpretation.

(16) b. PFS: $\exists x$ [AG(anna, x) & OPEN(x) & TH(window, x) & $\exists y$ [RESULT(y, x) & $\tau(y) \geq 5min$]]

Beside the parameters introduced into the PFS of (16) by *fünf Minuten (lang) das Fenster öffnen*, θ is fixed as AG due to (19a). After further steps of specification returning, among others, to axioms like (19b) and (21c), the process of interpretation is completed with the conceptual content CC of (16). In simplified form, this can be identified with the structure in (16c).

(16) c. CC: $\exists x$ [AG(anna, x) & OPEN(x) & TH(window, x) & $\exists y$ [RESULT(y, x) & $^{+}$BE_OPEN(y) & HD(window, y) & $\tau(y) \geq 5min$]]

Unlike (16b) the meaning of (16) is determined more exactly by the fact that, now, on the one hand, the resultative state is demonstrated to be that of being open and, on the other hand, its holder to be that object that is also the theme of the respective event (cf. (3a)).

6. Further Adverbal Modifications with Reinterpretation

Reinterpretations of the kind considered do not only hold – as almost generally assumed in literature – for the modification by temporal adverbials. At first it has to be stated that also the use of adverbials of manner may involve a change in meaning of the verbal expression modified. For example, in analogy with one of the interpretations of (5), (23) can be understood as characterization of an event, the agent of which was Claudia and which found its completion with Claudia leaving the flat.

(23) Claudia hat schnell die Wohnung verlassen.
'Claudia quickly left the flat.'

The structure in (23a) would have to be assumed to be the PFS of (23), using again, for sake of easier understanding, sorted variables as a means of representation.[26]

(23) a. PFS: $\exists c$ [AG(claudia, c) & $\exists b$ [FINIT(b, c) & LEAVE(b) & TH(flat, b)] & QUICK(c)]

It is part of this interpretation of (23) that, as a result of specifying its SF_I, the V'-expression *die Wohnung verlassen* ('leave the flat') denotes not a property of borders but – as noted in (24b) – one of changes.

(24) a. SF_I: $\lambda x.\ Q_k y$ [R_k(y, x) C_k LEAVE(y) & TH(flat, y)]
b. PFS: $\lambda e.\ \exists b$ [FINIT(b, c) & LEAVE(b) & TH(flat, b)]

It is only under such a precondition that *schnell* ('quickly') in (24) can be reasonably used as an adverbial of manner.
A meaning transfer of the modified expression can be observed also in sentences where an instrumental PP as in (25) occurs as adverbal modifier.

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[26] In order to be more precise, c, c' etc. will be used below as variables for changes (See Footnote 24.)

(25) Stefan war mit dem Auto in der Stadt.
'Stefan was in the town by car.'

In parallel with one of the interpretations of (6), here a statement is made about a change resulting in a state of being in the town. The conceptual content conveyed by (25) is formulated in (25a) where INSTR denotes the relation 'instrument of'.

(25) a. CC: $\exists$c [AG (stefan, c) & $\exists$s [RESULT(s, c) & $^{+}$BE_IN_THE_CITY(s)
& HD(stefan, s)] & INSTR(car, c)]

Thus, in order to characterize Stefan's state indirectly in greater detail, namely that the vehicle used for its establishment is given, the copula-predicative construction *in der Stadt sein* ('to be in the city') has to be changed accordingly from a predicate of state to one of change. Then the statement that Stefan was the holder of the state induced by himself is, again, the result of an additional step of specification based on axiom (21c).
An other example is (26) where an originally change- or process-related PP is reinterpreted so that it can be combined with an expression denoting a set of states as an adverbial of manner.

(26) Peter war mit Begeisterung Angler.
'Peter was an angler with enthusiasm.'

Accordingly, Peter was in a habitual state of being an angler so that he performed the events or processes realizing the state with enthusiasm. Using e/p as provisional variable for events and processes, (26) then has the following conceptual content:

(26) a. CC: $\exists$s [HD(peter, s) & $^{+}$BE_AN_ANGLER(s) & $\forall$e/p [REAL(e/p, s)
$\rightarrow$ WITH_ENTHUSIASM(e/p) & AG(peter, e/p)]]

Based on a respective fixation of the SF parameters occurring in (27a), the PP *mit Begeisterung* ('with enthusiasm') contributes the PFS given in (27b) to the operation of modification.

(27) a. SF_I: λx. Q_ky [R_k(y, x) C_k WITH_ENTHUSIASM(y)]
b. PFS: λs. $\forall$e/p [REAL(e/p, s) $\rightarrow$ WITH_ENTHUSIASM(e/p)]

That reinterpretations of the expressions used as modifiers, however, are not at all an exception will be shown later. Most of the examples discussed below are cases where the meaning of the modifying constituents is subjected to different kinds of transfer.
In Eckardt (1998) the indication can be found that sentences like (28) and (29) permit not only one interpretation specifying the described event by the adverbial of manner as unobtrusive and elegant, respectively.

(28) Anna hat Max unauffällig frisiert.
'Anna dressed Max's hair unobtrusively.'

(29) Maria hat Hans elegant gekleidet.
'Maria clothed Hans elegantly.'

Such adverbials can as well specify a result achieved by the action concerned. It seems to be obvious to interpret them, in analogy with the temporal adverbial in (3), thus making a statement about states.[27] The second interpretation (28) would then imply that Anna dressed Max's hair and that the resulting state of Max was unobtrusive.
As also an analysis of sentences (30) and (31) makes it clear, this assumption, however, cannot be held up.

(30) Der Student hat den Brief korrekt übersetzt.
'The student translated the letter correctly.'

(31) Die Bibliothekarin hat die Bücher ordentlich gestapelt.
'The librarian piled up the books properly.'

Evidently, in the result-related interpretation, (30) does not imply that the letter was in a correct state as a result of its translation by the student concerned. It shall be expressed, rather, that the translation of the letter resulting from this event, i.e. an object produced in this way, was correct.[28] Supposing that OBJ_RESULT stands for the relation 'object result of' and o is a variable for objects, this interpretation therefore permits to assume the PFS given in (30a).

(30) a. PFS: $\exists$c [AG(student, c) & TH(letter, c) & TRANSLATE(c)
& $\exists$o [OBJ_RESULT(o, c) & CORRECT(o)]]

In quite a similar way a property of Max's hair-do, of Hans's clothing and of the pile of books is stated, accordingly, by the adverbials *unauffällig* ('unobtrusively'), *elegant* ('elegantly') and *ordentlich* ('properly') in (28), (29) and (31), respectively.[29] But for these object predicates as modifiers to have any site of application in the meaning structure of the sentences in question, they have to become predicates of changes at the level of PFS.
Suppose that, with (32a), the SF_I of the adverb occurring in (28) is available, the predicate UNOBTRUSIVE being, in its applicability to objects or situations, unspecified at first.

(32) a. SF_I: $\lambda x.\ Q_k y\ [R_k(y, x)\ C_k$ UNOBTRUSIVE(y)]

Then, by specification, two PFSs can be obtained for *unauffällig*, on which the two possible interpretations of (28) can be based.

(32) b. PFS_1:λc. $\exists$c' [=(c', c) & UNOBTRUSIVE(c)]
= λc. UNOBTRUSIVE(c)
c. PFS_2:λc. $\exists$o [OBJ_RESULT(o, c) & UNOBTRUSIVE(o)]

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[27] The deliberations in Dölling (1998) are based on this view. A corresponding proposal for formalization is made as early as in Parsons (1990) for similar examples.

[28] For the possibility of assuming, beside its basic meaning as an event predicate, for a nominalization like *Übersetzung* ('translation') also a derived meaning in the sense of a predicate for objects being the result of a respective event, cf. Bierwisch (1988).

[29] Since adverbs do not have any special morphological marking in German it may be asked whether it is here really a matter of adverbial uses of the adjectives concerned. With reference to parallel English sentences this question can be answered in the affirmative. In Parsons (1990), however, the use of the ending *-ly* to be found there is assessed as „a mere case of compensating hypercorrectness" and, therefore, as unjustified in the strict sense.

So, while in (32b) the contribution of the SF flexive to the interpretation finally is reduced to zero and, therefore, only the change described by (28) can be determined in greater detail by means of the adverb, (32c) permits to insert *unauffällig* to characterize the object resulting from the event.
Unlike the cases considered above, in sentences like (28) to (31), it is referred in terms of OBJ_RESULT to another ontological relation, by which also object-related predicates can be included as adverbal modifiers. We will see below that numerous other such possibilities of reinterpretation in modifications of verbal expressions have to be expected.
Detailed investigations in Maienborn (1996, 1998, 2000) prove that not all adverbial occurrences of locative PPs may be interpreted as localizing the situation, to which the respective sentence immediately refers. (33), for example, can be understood in two ways.

(33) Die Bankräuber sind auf Fahrrädern geflüchtet.
'The bank robbers fled on bicycles.'

On the one hand, this sentence can be understood as a description, in view of our standard knowledge, of a bizarre scenario where the bank robbers in question moved along on oversized bikes. Beside this situation-localizing interpretation of (33), there is another interpretation to be preferred under usual conditions specifying by the modifier the bank robbers' location in their flight. These two interpretations accordingly imply the following PFSs:

(33) a. PFS_1: $\exists p$ [AG(robbers, p) & FLEE(p) & $\exists p'$[=(p', p) & LOC_{ON}(p', bicycles)]
= $\exists p$ [AG(robbers, p) & FLEE(p) & LOC_{ON}(p, bicycles)]
b. PFS_2: $\exists p$ [AG(robbers, p) & FLEE(p) & $\exists o$ [AG(o, p) & LOC_{ON}(o, bicycles)]]

Since it can be ruled out, for any kinds of situations, that two different objects play the role of the same participant, the identity of the localized agents can be directly inferred from PFS_2. As demonstrated in Maienborn (2000), the object-localizing interpretation moreover permits, due to additional axioms, an inference about the use of bikes as instruments of flight. Thus, the structure given in (33c) can be assumed to be the conceptual content CC_2 of (33).

(33) c. CC_2: $\exists p$ [AG(robbers, p) & FLEE(p) & LOC_{ON}(robbers, bicycles)
& INSTR(bicycles, p)]

The second interpretation of sentence (33), however, is possible only by transferring, in connection with a suitable specification of its SF, especially by substituting AG for R_n, the PP *auf Fahrrädern* ('on bicycles') from a strictly object-related to a process-related predicate.[30]

[30] Unlike my approach, Maienborn (1996, 1998, 2000) assumes a special mechanism for deriving the non-standard interpretation of locative PPs. The starting point of her deliberations is the observation that such an interpretation is permitted only if the respective expression is in a syntactic position near the verb. This connection is explained by the fact that different modification operations are used in dependence on whether the locative modifier is applied to a constituent of the V'- or of the V-category. While, in cases of the former kind, the modifying meaning combination follows the 'usual' pattern, for cases of V-modification a special operation is presupposed, producing according possibilities of specification. It is an asset of Maienborn's conception that thus – unlike my procedure here – syntactic restrictions of reinterpreting adverbal modifiers are allowed for. But this proposal has not only the drawback that an extension to occurrences where the meaning of the modified expression is transferred appears hardly to be possible. As will be shown below, it is problematic also insofar as, along with it, other possibilities of meaning transfer in V'-modifiers are ruled out.

A sentence implying at least three different possibilities of reference of the locative PP used as modifier is represented by (34).[31]

(34) Der Koch hat das Hähnchen in einer Marihuana-Tunke zubereitet.
'The cook prepared the chicken in a Marihuana sauce.'

First, again an adverbial of localizing the event, to which (34) refers, can be seen in the PP. Then the PFS concerned permits, in dependence on the world knowledge involved, alternative inferences to whether only the chicken or – under quite adventurous circumstances – also the cook is localized at the given place as objects participating in the process. Second, the modifying expression *in einer Marihuana-Tunke* ('in a Marihuana sauce') can be considered as related exclusively to the chicken. Thus, the object of preparation but not the situation itself is arranged in space. Third, there is also the possibility to understand the PP in the sense of a specification of the place where the cook was during the procedure of preparation. It is crucial for the two object-localizing interpretations of the modifier that it is evidently a matter of meaning combination usually classified under the term of *secondary predication*.
Before turning my attention to this field of phenomena, sentences shall be briefly discussed, in which directional PPs occur as adverbal modifiers. Let me consider the following example:

(35) Fred ist in das Haus geflüchtet.
'Fred fled into the house.'

Sentence (35) refers to a process performed by Fred and resulting in his being in the house. By intuition, the expression *in das Haus* ('into the house') has the task to provide the process of fleeing with a resultative state and thus to 'transfer' it to a change.[32] Accordingly, the PFS given in (36) can be assumed to be a representation of the literal meaning of the PP. While the second represents its locative part of meaning, i.e. 'being in the house', the first conjunct stands for its resultative part.[33]

(36) PFS: $\lambda c.\ \exists s\ [\mathrm{RESULT}(s, c)\ \&\ \forall o[\mathrm{HD}(o, s) \rightarrow \mathrm{LOC_{IN}}(o, \mathrm{house})]]$

As can be seen from (36), the modifying combination of the directional PP with *flüchten* ('to flee') requires that the verb – in parallel e.g. with *rennen* in sentence (7) – becomes an event predicate in the context of specification of its $\mathrm{SF_I}$. Thus, its PFS can be identified with the structure given in (37).

(37) PFS: $\lambda c.\ \exists p\ [p\ \mathrm{SUBST}\ c\ \&\ \mathrm{FLEE}(p)]$

When additionally fixing θ by AG, the following PFS results for sentence (35):

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[31] This example as well has been drawn from Maienborn (1998). However, I deviate in a number of points from the understanding proposed there.

[32] A basically similar understanding can be found in Pustejovsky (1991b) where, however, in my view a rather obscure procedure of reinterpretation was followed.

[33] The formulation of (36) can be reconstructed as follows: The part corresponding to the locative expression *in dem Haus* ('in the house') is first to be represented as $\lambda o.\ \mathrm{LOC_{IN}}$ (o, house) and thus as a predicate of objects. Its reinterpretation as predicate $\lambda s.\ \forall o[\mathrm{HD}(o, s) \rightarrow \mathrm{LOC_{IN}}(o, \mathrm{house})]$ can be made, according to Dölling (1999), by suitably fixing the parameters occurring in the $\mathrm{SF_I}$ of *in dem Haus*. Then, by applying the modifier $\lambda P \lambda c.\ \exists s\ [\mathrm{RESULT}(s, c)\ \&\ P(s)]$ to the state predicate, the resultative part of the PP is introduced. (See also Footnote 10.)

(35) a. PFS: $\exists$c [AG(fred, c) & $\exists$p [p SUBST c & FLEE(p)] & $\exists$s [RESULT(s, c) & $\forall$o[HD(o, s) $\rightarrow$ LOC_{IN}(o, house)]]]

Further parts of the conceptual content of (35), among them particularly statements on that Fred is both agent of the flight process and holder of being in the house, can be inferred, accordingly, from the axioms for FLEE, SUBST and RESULT.

7. Secondary Predications as Adverbal Modifications

In current view, the semantic difference between a so-called secondary predicate and an adverbial is based on the condition that, in contrast to the latter, the former is related not directly to a verbal expression but to a DP in the sentence.[34] The following two subtypes of secondary predicates are distinguished: *Depictive predicates* stand for an additional property pertaining to one of the participants during the situation denoted by the verb; *resultative predicates*, however, for a state resulting from the event covered by the verb. Examples of sentences containing secondary predications are (38) to (40).

(38) Der Koch hat das Hähnchen roh zubereitet.
'The cook prepared the chicken raw.'

(39) Der Koch hat das Hähnchen missmutig zubereitet.
'The cook prepared the chicken ill-humored.'

(40) Der Koch hat das Hähnchen knusprig zubereitet.
'The cook prepared the chicken crisp.'

While, under standard conditions, *roh* ('raw') in (38) is used as a depictive predicate related to the grammatical object and *missmutig* ('ill-humored') in (39) as one related to the grammatical subject, *knusprig* ('crisp') in (40) is used as a resultative predicate related to the grammatical object.
The remaining part of the paper is to outline how secondary predications can be treated within the model of multi-stage meaning representation. Starting with an analysis of depictives, let me first consider sentence (38) that can be paraphrased in approximation by (38').

(38') Während der Koch das Hähnchen zubereitet hat, war es roh.
'While the cook prepared the chicken, it was raw.'

It is crucial for the understanding of (38) that the characterization of the chicken as being raw, a state is referred to that, the duration of which does not only contain the temporal interval required for preparing the chicken but which, more strictly, is to be considered an accompanying circumstance of this process. Using CIRC as a predicate denoting the relation 'accompanying circumstance of', the structure given in (38a) can be assumed to be the conceptual content of (38).

(38) a. CC: $\exists$c [AG(cook, c) & PREPARE(c) & TH(chicken, c) & $\exists$s [CIRC(s, c) & HD(chicken, s) & $\forall$o [HD(o, s) $\rightarrow$ RAW(o)]]]

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[34] See, among others, the proposals in Steube (1994), Koch & Rosengren (1995), Maienborn (1996), Wunderlich (1997) and Kaufmann & Wunderlich (1998). That adjectives functioning as heads of secondary predicates are not used as adverbs can be directly proved by respective occurrences in English.

The axioms (41) and (42) hold, among others, for CIRC, v being a variable for any situations.

(41) $\Box\forall s\forall v\,[\mathrm{CIRC}(s, v) \rightarrow \tau(s) \supseteq \tau(v)]$

(42) $\Box\forall s\forall v\forall o\,[\mathrm{CIRC}(s, v) \;\&\; (\mathrm{AG}(o, v) \vee \mathrm{TH}(o, v) \vee \mathrm{HD}(o, v)) \rightarrow \mathrm{HD}(o, s)]$

Now, how can CC of (38) be derived?
In what follows, I assume that depictive predications can be considered adverbal modifications, in which the expression used as a modifier is regularly reinterpreted.[35] Concretely related to (38) this implies that the AP *roh* is combined with the verb *zubereiten* ('to prepare') in a modifying way and thus transferred, in the connection of parameter fixing for the SF of (38), from a predicate of objects to a predicate of changes. Supposing (43a) as PFS of the adjective in its literal meaning, in (43b) that structure can be seen which is available as PFS of *roh* as a result of meaning transfer.[36]

(43) a. PFS: $\lambda o.\ \mathrm{RAW}(o)$
b. PFS: $\lambda c.\ \exists s\,[\mathrm{CIRC}(s, c) \;\&\; \forall o\,[\mathrm{HD}(o, s) \rightarrow \mathrm{RAW}(o)]]$

It is evident that, as a basis of the transfer being more complex, an inflected SF obtained by means of the ***met'***-operator used so far, would not suffice. Therefore, a revision of the assumptions made by (13) is inevitable.
In approximation to the general scheme of SF inflection developed in Dölling (2000), the complex character of which is accounted for by the occurrence of metonymy chains, the operator ***met''*** given in (44) shall therefore be used below.

(44) ***met''***: $\lambda P\lambda x.\ \exists y\,[{R^2}_n(y, x) \;\&\; Q_n z\,[{R^1}_n(z, y)\ C_n\ P(z)]]$

While the application condition of the inflection operator agrees with that assumed in (14), the conditions of parameter fixing for ***met''*** in (15) have to be modified in a way that now in transition to PFS two parameters ${R^1}_n$ and ${R^2}_n$ can be fixed accordingly by = or by a predicate for relations between elements of two different ontological sorts. Such an use of the operator in the cases considered earlier does not lead to any problems since the contribution of the components newly introduced will prove empty at the PFS stage there.
As can be seen from (43c), the $\mathrm{SF_I}$ of *roh* derived with ***met''*** contains all parameters required for the interpretation.

(43) c. $\mathrm{SF_I}$: $\lambda x.\ \exists y\,[{R^2}_k(y, x) \;\&\; Q_k z\,[{R^1}_k(z, y)\ C_k\ \mathrm{RAW}(z)]]$

In analogy, this holds for the SF of the entire sentence (38) that – again highly simplified – can be given with (38b).

(38) b. SF: $\exists x\,[\theta(\mathrm{cook}, x) \;\&\; \mathrm{PREPARE}(x) \;\&\; \mathrm{TH}(\mathrm{chicken}, x) \;\&\; \exists y\,[{R^2}_k(y, x)$
$\&\; Q_k z\,[{R^1}_k(z, y)\ C_k\ \mathrm{RAW}(z)]]]$

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[35] Here, I follow the basic understanding of depictives as stated in Zimmermann (1992, Footnote 16) and Steube (1994). For the use of past-participle constructions as depictive predicates, not allowed for here, see Zimmermann (1999).

[36] It should be recalled that the second conjunct is to be understood as a representation of that part of meaning which can be abbreviated, in a simplifying way, also with ${}^{+}\mathrm{RAW}(s)$.

After fixing all SF parameters occurring, the following structure results:

(38) c. PFS: ∃c [AG(cook, c) & PREPARE(c) & TH(chicken, c) & ∃s [CIRC(s, c) & ∀o [HD(o, s) → RAW(o)]]]

Finally, the conceptual content represented in (38a) is obtained by that, among other things, based on axiom (42), the respective chicken will be inferred as the holder of the state accompanying the preparation.
The type of depictive exemplified by (39) is different from the one considered above only by the fact that now the object denoted by the grammatical subject, but not by the grammatical object is the holder of the state in question. Thus, (39a) can be assumed to be the conceptual content of (39).

(39) a. CC: ∃c [AG(cook, c) & PREPARE(c) & TH(chicken, c) & ∃s [CIRC(s, c) & HD(cook, s) & ∀o [HD(o, s) → ILL-HUMORED(o)]]]

It is a consequence of this difference limited to CC that a sentence like (45) has only one PFS, although it permits two interpretations of the depictive predicate *traurig* ('sad') – one interpretation related to the subject DP and one to the object DP.

(45) Hans hat Maria traurig verlassen.
'Hans left Mary sad.'

(45) a. PFS: ∃b [AG(hans, b) & LEAVE(b) & TH(maria, b) & ∃s [CIRC(s, b) & ∀o [HD(o, s) → SAD(o)]]]

Accordingly, the conceptual contents given in (45b) and (45c) can be derived by extension of (45a).

(45) b. CC_1: ∃b [AG(hans, b) & LEAVE(b) & TH(maria, b) & ∃s [CIRC(s, b) & HD(hans, s) & ∀o [HD(o, s) → SAD(o)]]]
c. CC_2: ∃b [AG(hans, b) & LEAVE(b) & TH(maria, b) & ∃s [CIRC(s, b) & HD(maria, s) & ∀o [HD(o, s) → SAD(o)]]]

In analogy, this holds also for the second and third interpretation of sentence (34) discussed in Section 6. The locative PP *in einer Marihuana-Tunke* used here as a depictive predicate related in different ways, in both cases has the following PFS:

(46) a. PFS: λc. ∃s [CIRC(s, c) & ∀o [HD(o, s) → LOC_{IN}(o, marihuana_sauce)]]

As can be seen from (46a), the PP characterizes an accompanying state such that its holder is localized in a Marihuana sauce.[37] Then, the two possible CCs indicate that, in parallel with

[37] It may be assumed that, in contrast with, locative PPs are understood in the sense of a direct object localization only if, thus, a further specification is enabled as e.g. in the second interpretation of sentence (33). There, by inferring from the object-localizing interpretation of the PP *auf Fahrrädern* to the instrument of the situation described, an additional participant is identified (cf. (33c)).

(45b) and (45c), respectively, on the one hand the chicken and on the other the cook are the holders of the respective state.

(46) b. CC_1: λc. ∃s [CIRC(s, c) & HD(chicken, s)
& ∀o [HD(o, s) → LOC_{IN}(o, marihuana_sauce)]]
c. CC_2: λc. ∃s [CIRC(s, c) & HD(cook, s) &
∀o [HD(o, s) → LOC_{IN}(o, marihuana_sauce)]]

Turning now my attention to resultatives I do not see any reason why to treat this type of secondary predication in a different way, principally. In such cases as well, it is evidently a matter of adverbal modifications which, however – as we will show – are not always connected with reinterpretations of that expression used as a resultative predicate. For example, sentence (40) is different from (38) and (39) only insofar as the AP *knusprig* does not specify a state accompanying but resulting from the preparation of the chicken.[38] The three stages of the meaning representation of (40) relevant to our purposes are given, accordingly, in (40a) to (40c).

(40) a. SF: ∃x [θ(cook, x) & PREPARE(x) & TH(chicken, x)
& ∃y [R^2_k(y, x) & Q_kz [R^1_k(z, y) C_k CRISP(z)]]]
b. PFS: ∃c [AG(cook, c) & PREPARE(c) & TH(chicken, c)
& ∃s [RESULT(s, c) & ∀o [HD(o, s) → CRISP(o)]]]
c. CC: ∃c [AG(cook, c) & PREPARE(c) & TH(chicken, c)
& ∃s [RESULT(s, c) & HD(chicken, s) & ∀o [HD(o, s) → CRISP(o)]]]

The statement contained in CC, with which the theme of change is determined also as holder of its resultative state, follows again from axiom (21c).
A case of resultative predication where not only the modifying AP but also the modified verb is reinterpreted can be found in (47).

(47) Gerda hat den Tisch sauber gewischt.
'Gerda wiped the table clean.'

Here, *sauber* ('clean') – in analogy with *knusprig* in (40) – is transformed into a predicate of changes by fixing the parameters occurring in its SF_I.

(48) PFS: λc. ∃s [RESULT(s, c) & ∀o[HD(o, s) → CLEAN(o)]]

But since *wischen* ('to wipe') is one of those process verbs the connection of which with a quantized object DP does not necessarily result in an accomplishment,[39] the verb – in analogy with *flüchten* in (35) – has to be transferred in its meaning to a predicate of change. More specifically, by fixing the parameters in the SF_I of *wischen* we get the following PFS:

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[38] At this place, it should be referred to the difference from modifications by adverbials of manner as discussed by means of the sentences (28) to (31). There, properties of objects resulting from the events but not such of resultative states are specified.

[39] The characteristics of such verbs are, among others, explicated in Engelberg (1994, 1997, 1998). For the concept of quantized nominal predicates cf. Krifka (1989, 1992).

(49) PFS: $\lambda c.\ \exists c'[=(c', c)\ \&\ \exists p\ [p\ \text{SUBST}\ c'\ \&\ \text{WIPE}(p)]]$
= $\lambda c.\ \exists p\ [p\ \text{SUBST}\ c\ \&\ \text{WIPE}(p)]$

Finally, the structure fomulated in (47a) results as the conceptual content of (47).

(47) a. CC: $\exists c\ [\text{AG}(\text{gerda}, c)\ \&\ \text{TH}(\text{table}, c)\ \&\ \exists p\ [p\ \text{SUBST}\ c\ \&\ \text{WIPE}(p)$
$\&\ \text{AG}(\text{gerda}, p)\ \&\ \text{TH}(\text{table}, p)]\ \&\ \exists s\ [\text{RESULT}(s, c)$
$\&\ \text{HD}(\text{table}, s)\ \&\ \forall o[\text{HD}(o, s) \rightarrow \text{CLEAN}(o)]]]$

As can be seen from sentence (50), resultative constructions, however, have not always to be connected with a meaning transfer in the modifying expression.

(50) Alice schrumpfte zu einer Zwergin.
'Alice shrank to a dwarf.'

Suppose that the PFS in (51) represents the literal meaning of the resultative PP *zu einer Zwergin* ('to a dwarf') in one of its possible specializations. Then, in the modification in (50) only the literal meaning of the verb *schrumpfen* ('to shrink') is changed to the PFS given in (52).

(51) PFS: $\lambda c.\ \exists s\ [\text{RESULT}(s, c)\ \&\ \forall o[\text{HD}(o, s) \rightarrow \text{DWARF}(o)]]$

(52) PFS: $\lambda c.\ \exists p\ [p\ \text{SUBST}\ c\ \&\ \text{SHRINK}(p)]$

For this reason, the relationships of resultatives with adverbial modifications by directional PPs as in (35) call for clarification.
The close relationship between the two kinds of secondary predication can be directly shown also by means of sentences, in which one and the same expression plays different roles of a modifier. For example, the PP *in Scheiben* ('into/in slices') is used in (53) as a resultative, in (54) as a depictive predicate.

(53) Maria hat das Brot in Scheiben geschnitten.
'Maria cut the bread into slices.'

(54) Maria hat das Brot in Scheiben gegessen.
'Maria ate the bread in slices.'

Using MOD_{IN} to characterize the modal understanding of the preposition *in,* the following conceptual contents can be assumed for (53) and (54):

(53) a. CC: $\exists c\ [\text{AG}(\text{maria}, c)\ \&\ \text{TH}(\text{bread}, c)\ \&\ \text{CUT}(c)\ \&\ \exists s\ [\text{RESULT}(s, c)$
$\&\ \text{HD}(\text{bread}, s)\ \&\ \forall o[\text{HD}(o, s) \rightarrow \text{MOD}_{\text{IN}}(o, \text{slices})]]]$

(54) a. CC: $\exists c\ [\text{AG}(\text{maria}, c)\ \&\ \text{TH}(\text{bread}, c)\ \&\ \text{EAT}(c)\ \&\ \exists s\ [\text{CIRC}(s, c)$
$\&\ \text{HD}(\text{bread}, s)\ \&\ \forall o[\text{HD}(o, s) \rightarrow \text{MOD}_{\text{IN}}(o, \text{slices})]]]$

To which transfer, here, the meaning of the PP is subjected in the connection of parameter fixing, again follows from the background of the standard knowledge about situations of the type of cutting bread and that of eating bread, respectively.
Finally, cases shall be briefly discussed which could appear to be problematic for the general approach proposed here. Unlike the ('weak') resultatives analyzed so far, so-called 'strong' resultatives give the impression that their understanding as adverbal modifications is ruled out.[40] This assumption is based on the circumstance that, in their cases, the resultative predicates – as exemplified in (55) – do not relate to a DP subcategorized by the verb.

(55) Der Gast hat das Glas leer getrunken.
'*The guest drank the glass empty.'

By intuition, the sentence implies that the guest concerned drank something, which was the content of the glass in question and that, as a result, this glass was empty. Therefore, the structure given in (55a) can be assumed to be the CC of (55), CONT standing for the relation 'content of'.

(55) a. CC: $\exists c$ [AG(guest, c) & $\exists o$ [CONT(o, glass) & TH(o, c)] & DRINK(c)
& $\exists s$ [RESULT(s, c) & HD(glass, s)
& $\forall o$[HD(o, s) $\rightarrow$ EMPTY(o)]]]

Although, when inferring the conceptual content, we have to return to more complex interconnections I suppose that also resultatives of this kind can be explained in the context proposed above. Justifying this assumption, however, has to be left to future inquiry.

8. Concluding remarks

The subject of my discussion were several forms of reinterpretation as can be observed in connection with adverbal modifications. Essentially, I did not only consider shiftings of meaning in modification by temporal and non-temporal adverbials. Instead, it was also demonstrated that by allowing reinterpretation so-called secondary predications can be understood as a special kind of adverbal modification. As a suitable means for analysis, a multistage model of meaning representation was presented, in which flexible interpretations proved to be a result of contextually controlled enrichments of an underspecified as well as a strictly compositionally structured semantic form. Here, the presupposition of obligatory inflection operations was crucial, by which the lexically given potential of meaning variation was systematically extended by introducing additional parameters. My paper concentrated particularly on the formal possibilities offered by such representation instruments for realizing according meaning transfers in adverbal modification. In contrast to, the syntactic conditions of compositional-semantic derivation, but especially also the concrete steps of interpretation in deriving the conceptual content were only be briefly touched. It remains the task of further investigations to formulate sufficient grammatical, pragmatic and conceptual restrictions of cases of meaning variation considered. Although, admittedly, the approach proposed has partly programmatic features, its fertility as a general device for explaining systematic reinterpretations in adverbal modification should have become clear.

[40] For the distinction of these two kinds of resultative predication see Kaufmann & Wunderlich (1998).

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