Eventive versus stative causation: the case of German causal *von*-modifiers

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Abstract Causation is generally conceived of as a relation that holds between events. Apart from a few cursory remarks, the case of stative causation has been widely neglected. The paper aims at contributing to a more balanced perspective by arguing for a stative variant of causation, on a par with eventive causation. The stative variant is analyzed in terms of Moltmann's ontological notion of tropes. German causal *von*-modifiers ('from') are taken as a linguistic window into our understanding of causation. The study of *von* is particularly suited to this endeavor, because *von*-modifiers are confined to expressing the core notion of "direct causation" (Wolff in Cognition 88(1):1–48, 2003). The paper develops a compositional semantics of causal *von*-modifiers that derives their eventive and stative readings from a single lexical entry and allows for coercive adaptions to account for the observed range of interpretive adjustments. Characteristic features of the interpretation such as the inferential behavior of causal *von*-modifiers and the holistic effect of the stative reading are traced back to independently motivated conceptual assumptions concerning the spatiotemporal grounding of direct causation. The formal analysis is couched in terms of Asher's (Lexical meaning in context. A web of words. Cambridge University Press, Cambridge, 2011) type composition logic.

Keywords Causation · Events · Tropes · Eventive/stative ambiguity · Modification · Lexical semantics

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1 Introduction

Among the categories that build the core concepts of human cognition, causation takes a prominent place. Reasoning about causes and their effects builds an important part of human thinking. In line with that, all natural languages have developed rich means for expressing causal relations, e.g., Comrie (1981). Linguistic theories generally converge on the assumption that causation is a relation that holds between events. This is typically represented by a primitive relation 'cause (e_1, e_2)', which is meant to express that the occurrence of a causing event e_1 causes a resulting event e_2 to occur; see, e.g., Copley and Wolff (2014). Taking events as causal relata is the standard case in the linguistic literature on causation.[1] During the last decades, a multitude of expressions relating to causation have been studied and analyzed successfully under this event-based perspective. Very rarely, and mostly only in passing, exceptions from this standard case are mentioned, which do not fit into the event-based picture of causation but rather suggest that, besides events, also certain stative objects may enter into causal relations. For instance, Dowty (1979: 103) cites sentence (1), which he credits to Fillmore (1971), as an instance of a stative causal relation.

(1) Mary's living nearby causes John to prefer this neighborhood.

Moreover, Hobbs (2005: 207) remarks that our notion of causation, although typically confined to events, should probably be extended to also include "states" because, as he notes, a "state like slipperiness can be both a cause and an effect", as indicated by the sentences in (2); see also Solstad (2006: 97).[2]

(2) a. The slipperiness of the floor caused John to fall.
     b. Someone spilling vegetable oil on the floor caused the floor to be slippery.

Yet, beyond some rather cursory remarks, the case of stative causation has not received particular attention within linguistic research. In the present paper, we intend to fill this gap. We will use German causal *von*-modifiers ('from') as a means of gaining deeper insights into the linguistic expression of eventive and stative causation, and make a proposal that highlights in particular what they have in

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[1] Note that Lewis' (1973) highly influential counterfactual theory of causation, though recurring to propositions as causal relata, basically takes on an event-based perspective on causation. Lewis makes use of a predicate **O** 'occur', that turns an event into a proposition **O**(e). Dowty's (1979) refinement and further development of Lewis' theory takes 'cause' to be a "bi-sentential connector" that typically takes the form [ϕ cause [become ψ]]; see Dowty (1979: 91, 103). Yet, Dowty continues to speak informally about events as causal relata; see Dowty (1979: 103). Eckardt (2000) develops an eventive reformulation of Dowty's definition of 'cause'. See, e.g., Parsons (1990), Vecchiato (2011), Thomason (2014) for criticisms on a propositional account of causation.

[2] Upon closer inspection the stative cases brought forward by Hobbs (2005) are not so clear as they might first appear. At least for (2b) one can argue that spilling vegetable oil on the floor did not cause the state of the floor being slippery in the first place but rather an event of the floor becoming slippery. Under this assumption, which we will develop further in Sect. 5, (2b) could still be analyzed in terms of event causation, provided that appropriate measures of coercion (e.g. Asher 2011) turn the overtly expressed state into a result state of a hidden eventive 'become'-operator.

common, and how they differ. Causal *von*-modifiers of adjectival copula sentences support an eventive as well as a stative causal reading. This is illustrated by the sentences in (3).

(3) a. Paul ist müde von der Reise.   eventive reading
       Paul is tired from the trip
    b. Der Platz ist weiß von den Hagelkörnern.   stative reading
       The square is white from the hailstones

In (3a), the *von*-phrase expresses an eventive causal relation between a trip and an event that results in Paul being tired. In (3b), by contrast, the causal relation does not hold among events but is of some stative nature. Informally speaking, the cause for the square being white is provided by some property related to the hailstones, viz. their whiteness. Furthermore, the hailstones are understood as being holistically located on the square. The attested examples in (4) are ambiguous, they have an eventive as well as a stative reading.

(4) a. Sein Gesicht war weiß von einer Salbe… Rhein-Zeitung, 02.08.2007
       His   face   was white from a   cream
    b. Binnen einer Sekunde war mein rechtes Bein schwarz von […]
       Within one second was my   right leg black   from […]
       Wespen, die   sehr aggressiv waren.
       wasps   which very aggressive were
                                    Niederösterreichische Nachrichten, 24.08.2009

According to the stative reading for sentence (4a), the whiteness of the face is due to the whiteness of the cream (which covers the face). The eventive reading for (4a) says that the use of, e.g., a bleaching cream caused the face to turn white. Similarly, (4b) may be understood as indicating that the speaker's leg was black because it was covered by wasps (stative reading), or that wasp stings caused some allergic reaction that turned the leg black (eventive reading). As these examples indicate, the interpretation of causal *von* may involve certain coercive adaptions as, for instance, the inference of suitable events (e.g., wasp stings) from a given object referent (e.g., wasps).

The short text in (5) shows that *von*'s eventive and stative readings are an instance of true ambiguity (rather than merely reflecting a semantic indeterminacy of causal *von*). That this is indeed the case can be seen from the fact that the two readings involve different truth conditions. In (5), the expression *weiß von der Salbe* ('white from the cream') is true under the stative reading but false under the eventive reading for one and the same state of affairs; see Zwicky and Sadock (1975) and Kennedy (2011) for further discussion of this ambiguity test.

(5) Otto möchte unbedingt eine weiße Hautfarbe haben. In der Nacht trägt er eine
weiße Bleichsalbe auf sein Gesicht auf. Am nächsten Morgen ist sein Gesicht
immer noch weiß von der Salbe, weil die sich nur schwer entfernen lässt, aber
sein Gesicht ist keineswegs weiß von der Salbe, denn sie nützt offenbar nichts.

'Otto desperately wants white skin. At night, he puts white bleaching cream
on his face. In the morning, his face is still white from the cream, as it is
hard to remove, but his face is still not white from the cream, which
obviously is useless.'

Furthermore, a conjunctive sentence as in (6) only has two readings, not four.
Sentence (6) is only true if either Otto's and Anna's face are both white because
they are covered with a cream (stative reading), or because they both turned white
due to the effect of a cream (eventive reading). The sentence does not support a
mixture of eventive and stative readings; see Lakoff (1970) and Pinkal (1991) for
this ambiguity test.

(6) Ottos   Gesicht   war   weiß   von   einer   Salbe   und   Annas   Gesicht   auch.
    Otto's face   was   white from a   cream   and   Anna's face   too

In the present paper, we will argue that the ambiguity of causal *von*-modifiers
observed in (4)–(6) can be accounted for parsimoniously if we develop an adequate
notion of stative causation on a par with eventive causation. The study of *von* is
particularly suited to this endeavor, because—as we will see—causal *von*-modifiers
are confined to expressing an immediate, direct causal relationship between a cause
and its effect; see the notion of "direct causation" in Wolff (2003). Other causal
prepositions such as German *durch* ('through') or *wegen* ('because-of') establish
more indirect causal chains and are more liberal as to the ontological type of their
arguments (accepting also, e.g., facts and propositions, see Solstad 2010). Causal
von, by contrast, is confined to the case of direct causation.[3] This makes *von* an ideal
linguistic window into our core conceptualization of causation.[4]

The structure of the article is as follows. In Sect. 2, we present four core
observations concerning the interpretation of causal *von*-modifiers in adjectival
copula sentences that are to be explained. Section 3 is devoted to the ontology of
the causal relata that are selected by *von* and discusses the notion of direct
causation. Section 4 presents a discussion of the syntax of *von*-modifiers, which

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[3] As has been repeatedly discussed in the literature on lexical versus periphrastic causatives, the verb *to cause* itself also expresses a rather loose notion of causation, which is generally interpreted in terms of mediated causal chains; e.g. McCawley (1978) and Wolff (2003). Therefore, *cause*-sentences such as (1) and (2) are not particularly well suited to reveal our core understanding of causation as manifested in direct causation.

[4] From these introductory remarks it should be clear that the present study is not primarily concerned with causation as a philosophical concept, and even less with an understanding of the real world conditions on causes and effects. Rather, we are interested in our everyday conceptualization of causation as reflected by language; see Bach's (1986a) term "natural language metaphysics". See Copley and Wolff (2014) for an overview of theories of causation both in philosophy and linguistics. We will come back to this point in Sect. 3.

shows that the two readings correspond to different syntactic base adjunction sites. Based on this syntactic difference, Sect. 5 develops a compositional semantics for causal *von*-modifiers that derives their eventive and stative readings from a single lexical entry and makes use of coercive mechanisms in order to account for the observed range of interpretive adjustments. The formal analysis is couched in terms of Asher's (2011) Type Composition Logic. In Sect. 6, pragmatic specifications for coerced meaning representations are provided. Section 7 presents our conclusions.

2 Core observations about German causal *von*-modifiers

2.1 Preliminary remarks

Let us start our discussion of causal *von* with a remark of caution. The interpretations of German *von* and English *from* do not match exactly although they overlap significantly. In (7a) and (7b), for instance, *von* corresponds to *from*. However, whereas stative causal relations are expressed uniformly with *von* in German, English uses both *from* and *with*; see (7b–d).[5] Furthermore, German *von* is also used for the expression of agents as in (7e).

(7) a. Paul ist müde von der Reise.   Paul is tired from the trip.
    b. Das Gesicht war schwarz von   The face was black from the dust.
       dem Staub.
    c. Der Boden war schwarz von/*mit   The floor was black
       Ameisen.   *from/with ants.[a]
    d. Die Luft war schwer von/*mit   The air was thick *from/
       Blütenduft.   with blossom-scent.
    e. Dieses Bild wurde von Paul gemalt.   This picture was painted by Paul.

[a] The English example (7c) is taken from Rapoport (2014), who proposes a uniform interpretation of *with* in terms of "central coincidence"; see below.

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[5] Besides *von*, German may use also *vor* (literally: 'before') to express stative causal relations as in (i) and (ii).

(i) Der Boden ist schwarz vor Ameisen.
     The floor is black   with ants
(ii) Maria ist starr vor Angst.
     Maria is stiff   with fear

We will not discuss the subtle differences in meaning and distribution between stative *von* and *vor* here any further, but see Laptieva (2014) for a corpus study on causal *vor*, which is based on the approach towards stative causation developed here.

In the following, we will generally omit additional colloquial English translations of the German data if they would differ from the word-by-word glosses only in word order and/or in interpretive nuances concerning *von* versus *from/with*. In case of additional English translations, the abbreviation PRT is used for (verbal or discourse) particles.

Note furthermore that *von* appears to impose stronger restrictions than *from* on the kind of causal relation it may express. The English sentences in (8) were judged as well-formed by native speakers of English, but their respective German translations with *von* are ruled out as ungrammatical. In order to refer to such constellations in German, one would have to resort to the more liberal causal preposition *wegen* ('because-of'); see (9).

(8) a. The light was pink from my rose-colored glasses.
     b. The square was blue from the nearby skyscraper.
     c. The living room was cold from the hole in the basement door.
     d. Paul was poor from bad investments.

(9) a. * Das Licht war rosa von meiner rosé-getönten Brille.   ✔ wegen
     b. * Der Platz war blau von dem nahen Wolkenkratzer.   ✔ wegen
     c. * Das Wohnzimmer war kalt von dem Loch in der Kellertür.   ✔ wegen
     d. * Paul war arm von schlechten Geldanlagen.   ✔ wegen

Thus, there is a subtle but significant difference between the causal relations expressed by German *von* and English *from*. This should be kept in mind throughout the paper. We will discuss the particular restrictions on causation imposed by *von* in Sect. 3, and the German data will be complemented by some remarks on Russian in Sect. 2.5.

   A second preliminary remark concerns the case of *von*-arguments. Some adjectives and adjectivized participles take *von*-PPs as arguments; see the examples in (10).

(10) a. Die Schüssel ist voll von / mit   Kirschen.
          The bowl   is   full of / with cherries
      b. Unsere Früchte sind frei von Pestiziden.
          Our   fruits are free of pesticides
      c. Paul ist beeindruckt / enttäuscht   von Marias   Vortrag.
          Paul is impressed / disappointed   by Maria's   talk

Adjectives such as *voll* ('full') or *frei* ('free') are inherently relational and select for an internal argument. Similarly, adjectivized participles such as *beeindruckt* ('impressed') or *enttäuscht* ('disappointed') inherit a stimulus argument from their verbal base. Adjectival *von*-arguments fall outside the scope of the present paper. Here, we are only interested in *von*-PPs that do not fill an argument slot but act as modifiers.

   In the following, we will present four core observations concerning the interpretation of causal *von*-modifiers that our semantic analysis strives to account for.

2.2 Inference patterns

Eventive and stative readings of causal *von*-modifiers differ with respect to two inferential patterns. First, only stative *von* supports the inference that *von*'s internal NP-referent is located on the subject referent at the predication time; see (11).

(11) a. Der   Platz   ist weiß von den Hagelkörnern.   →   The hailstones are
        The   square is   white from the   hailstones   on the square.
     b. Die Bank ist dreckig von   den Schuhen.↛   The shoes are on the bench.
        The bench is   dirty   from the shoes

For (11a) to be true, the hailstones must be located on the square at the predication time. This is not the case for (11b). The shoes may still be on the bench, but they don't need to be; their location is irrelevant for the truth conditions of (11b).
    Secondly, only stative *von* implies that the main predicate also holds (*cum grano salis*) for *von*'s internal NP-referent at the predication time. This can easily be observed in a case like (12a) with the newly invented fantasy noun *Mimbeln* ('mimbles'). There is no world knowledge available about mimbles, so we have no expectations about their color. Nevertheless, from (12a) we conclude that the mimbles are white at the predication time. No such inference is valid in the case of eventive causal *von*-modifiers; see (12b).

(12) a. Der Platz ist weiß   von   den Mimbeln.   →   The mimbles are white.
        The square is white   from   the mimbles
     b. Die Bank is dreckig von   den Schuhen.   ↛   The shoes are dirty.
        The bench is   dirty   from   the shoes

That is, stative *von* supports, roughly speaking, some kind of "property transfer" from *von*'s internal NP-referent to the subject referent. In (12a), the square's whiteness is inherited from the whiteness of the mimbles. There is a certain margin of freedom in inferring the relevant property, though. Compare (12a) with (13a). Here, the square's blackness is not necessarily caused by the mimbles being literally black but it suffices that they, as a whole, make a dark appearance; this is also the case for the stative reading of sentence (4b) above.

(13) a. Der Platz   ist schwarz von   den Mimbeln. → The mimbles are dark.
        The square is   black   from the mimbles
     b. Ihr Gesicht war bleich   von   Mehlstaub. → The flour-dust is bright/white.
        Her face   was pale   from flour-dust

Furthermore, in (13b) the adjective *bleich* ('pale') carries a selectional restriction for human beings. This restriction is not met by flour dust. The property for which the inference pattern holds is that of having a bright, almost white color in this case. So, contrary to the first inference pattern, which is strictly logically valid, this second inference pattern requires some pragmatic fine tuning when applied. This should be taken into account when providing an explanation for the observed inferences.

The two inference patterns illustrated in (11)–(13) may serve as diagnostics for differentiating eventive and stative readings of causal *von*. Herdtfelder and Maienborn (2015) present the results of a corpus study on causal *von*-modifiers in adjectival copula sentences. Our corpus comprises 358 sentences (extracted from the Deutsches Referenzkorpus (DeReKo) and the web corpus SdeWaC). Based on the two diagnostics mentioned above, 249 sentences (69.6%) were classified as eventive in the given context, and 109 sentences (30.4%) as stative. Furthermore, the corpus study revealed that stative causal *von* is rather limited in its distribution and tolerates only adjectives that express basic optic, haptic, or olfactoric properties (e.g., 'white', 'dark', 'wet', 'sticky'). Eventive causal *von* combines with a broader range of adjectives, among which adjectives expressing body-related properties predominate (e.g., 'tired', 'sick', 'hoarse').

Finally, we should add that there is a strong preference for copula sentences with stative *von*-modifiers to express temporary properties. Thus, a sentence like (14) sounds odd, if we understand the beach as being inherently white due to the (white) sand.

(14) Der   Strand war   weiß   von   dem Sand.
      The   beach   was   white   from   the   sand

Note, however, that this restriction is not of a semantic nature but is rather due to pragmatics. (15) provides two examples from our corpus which illustrate that a stative *von*-modifier may also combine with a copula sentence that expresses a permanent/inherent property.

(15) a. Fogo ist   schwarz von   Lava aber auch grün   von
          Fogo is   black   from   lava but   also green from
          Pflanzen, die   sich bis   in   die   Höhe des   Pico
          plants   which   REFL till into the   height of.the Pico
          de Fogo   2839   Meter in   den   Stein klammern.
          de Fogo   2839   metres into the   rock   cramp
                                              Nürnberger Nachrichten, 20.05.2006
      b. Dunkel vom   Lavagestein sind die   wenigen Sandstrände,
          Dark   from.the lava flows are the   few   sand beaches,
          und   bis auf   ein   paar Ausnahmen ist die Küste
          and   apart from a   few   exceptions is   the coast
          schroff und   wild.
          cliffy   and   wild
          www.hr-online.de/website/rubriken/ratgeber/index.jsp?rubrik=5590&key=
          standard_document_3257800

Sentence (15a), for instance, does not force us to assume that the island Fogo was of some different color before a volcanic eruption covered it with black lava. Fogo might well be a volcanic island that only emerged due to a volcanic eruption and is inherently black from lava. Similarly, there is no reason to assume that those parts of Fogo that are green from plants are only temporarily green. Therefore, we assume that the temporariness effect that we observed for (14) should receive a pragmatic explanation; see, e.g., Maienborn (2004) for an optimality theoretic approach.

2.3 Holistic effect

As already mentioned in the introduction, a prominent feature of *von*'s stative reading is the holistic interpretation of its internal NP-referent. In the sentences in (16), the internal NP-referent is interpreted as being located all over (relevant parts of) the subject referent.

(16) a. Der Boden war schwarz von Ameisen.
        The floor   was black   from ants
     b. Die Luft ist schwer von Blütenduft.
        The air   is thick   from blossom-scent

Rapoport (2014) has argued for the parallel case of *with* (e.g., *The floor was black with ants.*) that the observed holistic effect is due to the particular semantics of the preposition *with* (rather than being construction-specific). In the same spirit, we will argue in Sect. 3 that the holistic effect can be derived from the semantics of *von*. More specifically, we will propose that it follows from the conditions on spatiotemporal contiguity imposed on stative causation.

2.4 Direct causation

Causal *von*-PPs express non-agentive causal relations. The cause is neither in control of the event (i.e. an agent) nor under external control (i.e. an instrument); e.g., DeLancey (1984). The causal preposition *von* differs from its fellow *wegen* ('because-of') in this respect; see the illustrations in (17)–(18).

(17) a. * Maria ist müde/traurig von Peter.
           Maria is tired/sad   from Peter
     b.   Maria ist müde/traurig wegen   Peter.
          Maria is tired/sad   because-of Peter

The *wegen*-sentence (17b) may refer to a situation in which some action performed by Peter (possibly intentionally) is the cause for Maria's tiredness or sadness. This interpretation is not available for *von*; see (17a).[6] As (18) shows, the same holds true

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[6] Copley and Wolff (2014) make a similar observation for English *from* versus *because of*. They note that whereas causal *from* is restricted to inanimate, non-volitional causers (Copley and Wolff 2014: 36), *because of* "is apparently not sensitive to how far away in the causal chain an agent is, or if there are any intermediate agents or causers in the chain" (Copley and Wolff 2014: 59).

for instruments. For a situation in which Maria got tired, e.g., because of digging up
the garden with a broken spade, only *wegen* can be used.[7]

(18) a. * Maria ist müde von   dem kaputten Spaten.
          Maria is   tired from the   broken   spade
      b.   Maria ist müde wegen   des kaputten Spatens.
          Maria is   tired because-of the broken   spade.

As these and our previous examples indicate, causal *von*'s internal argument takes
on the thematic role of a non-volitional cause; see the notion of a "causer", e.g., in
Rappaport Hovav and Levin (2000), Alexiadou and Schäfer (2006), Rothmayr
(2009) and Schäfer (2012).

   Moreover, causal *von* is restricted to expressing a narrow notion of "direct
causation." The distinction between direct versus indirect causation is a widely
discussed opposition within the literature on causation; see e.g., Shibatani (1976),
Talmy (1976), Dowty (1979: 98f), Wolff (2003), Vecchiato (2011) and Copley and
Wolff (2014). Direct causation is commonly understood as an immediate causal
relationship between a cause and an effect without intervening entities, whereas
indirect causation allows cause and effect to be related via longer causal chains.
Take (19) as an illustration.

(19) a. Paul ist müde von   der Reise.
          Paul is   tired from the trip
      b. Paul ist müde wegen   der Reise.
          Paul is   tired because-of the trip

In (19a), *von* requires an immediate, non-interrupted relationship between the trip
and Paul becoming tired: First of all, Paul must have taken part in the trip. Secondly,
von implies a temporal ordering according to which the trip must precede Paul's
tiredness, and, furthermore, no (significant) temporal gap is permitted between the
trip and the onset of Paul's tiredness. For instance, (19a) could not refer to a
situation in which Paul takes part in a trip, then in order to relax his stiff limbs mows
the lawn upon his return home, and only afterwards becomes tired. Causal *von*
differs sharply from the more liberal causal preposition *wegen* ('because-of') in this
respect. The *wegen*-sentence in (19b) only requires that the trip somehow relate to
the cause of Paul's tiredness. Paul is neither required to take part in the trip nor are
there any temporal restrictions. For instance, (19b) might well refer to a situation
where Paul is planning a future trip for his children or is suffering from nightmares
about a trip that took place long ago. Such scenarios are excluded for *von*.

   Similar conditions hold for the case of stative causal *von*. Sentence (20a) requires
spatial and temporal contiguity between the ants being on the floor and the floor
being black. The ants must be located on the floor at the time of the predication; see
the inference pattern in (11). The *wegen*-sentence (20b), by contrast, also tolerates

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[7] For a semantic account of *wegen* ('because of') in terms of a causal relation between abstract entities
such as propositions and facts see Solstad (2010).

an indirect causal relationship, where no spatiotemporal contiguity between cause and effect holds. For instance, (20b) could refer to a situation where the floor is painted black because this keeps ants away.

(20) a. Der Boden ist schwarz von den Ameisen.
        The floor is black from the ants
     b. Der Boden ist schwarz wegen der Ameisen.
        The floor is black because-of the ants

Several definitions of direct causation have been suggested, mostly in connection with a discussion of lexical versus periphrastic causatives; see, e.g., Shibatani (1976) and Vecchiato (2011).[8] In the following, we will adopt Wolff's (2003) *No-intervening-cause criterion*:

(21) No-intervening-cause criterion:
     Direct causation is present between the causer and the final causee in a causal chain (1) if there are no intermediate entities at the same level of granularity as either the initial causer or final causee, or (2) if any intermediate entities that are present can be construed as an enabling condition rather than an intervening causer.   Wolff (2003: 4f)

We have already seen an illustration of Wolff's first condition on direct causation when discussing sentence (19a): *von,* as representative for direct causation, requires that Paul's trip immediately lead to his tiredness. No intervening event of the same level of granularity such as the mowing of the lawn is tolerated. By contrast, the preposition *wegen* would be fine in such a scenario of indirect causation. This point can be further strengthened with the following examples.

(22) a. Pauls Hände sind klebrig von der Bananenschale.
        Paul's hands are sticky from the banana-skin
     b. Pauls Füße sind klebrig von der Bananenschale.
        Paul's feet are sticky from the banana-skin

Sentence (22a) requires that there have been immediate spatial contact between Paul's hands and the banana skin, which caused his hands to become sticky. Analogously, (22b) requires that there have been direct spatial contact between his feet and the banana skin. Paul probably stepped on the banana skin while

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[8] The range of causal constellations referred to by lexical causatives is more limited than that referred to by periphrastic causatives. For instance, whereas both (i) and (ii) may be used to refer to a situation where Sue opens the door by turning the knob and pushing the door, (i) is excluded in a constellation in which Sue opens a window, by which a breeze enters the room that opens the door; see Wolff (2003).

(i) Sue opened the door.
(ii) Sue caused the door to open.

Researchers have appealed to the notion of direct causation in order to characterize and explain this more narrow interpretation of lexical causatives.

barefooted. However, sentence (22b) is ruled out in a scenario in which Paul got sticky hands, e.g., from peeling a banana, and then he touched his feet, which therefore became sticky as well. In this case, touching his feet with sticky hands would count as intervening cause, which interrupts the direct causal relationship. The discussion of (22) shows that causal *von* is very strict in this respect and does not tolerate even minor relaxations of what counts as direct causation. It goes without saying that the preposition *wegen*, in contrast, would be fine in the above scenario of indirect causation. That is, causal chains that are referred to by *wegen* do not have to meet Wolff's No-intervening-cause criterion.[9] Thus, the above remarks on the interpretation of *von* versus *wegen* in (19)–(20) and (22) stress the need for assuming a narrow notion of direct causation as opposed to indirect causation.

Note that direct causation differs from indirect causation in not being transitive. Transitivity is generally considered a core property of causation; see, e.g., Lewis (1973: 563). However, it only holds for indirect causation. The following examples illustrate that the causal relation expressed by *von* is in fact non-transitive and differs from *wegen* in this respect. (23) shows the behavior of eventive causal *von*.

(23) a. Die Bank ist dreckig von den Schuhen.   'The bench is dirty from the shoes.'

  b. <u>Die Schuhe sind dreckig von der Wanderung.</u>   <u>'The shoes are dirty from the hike.'</u>

  c. ↛ Die Bank ist dreckig von der Wanderung.   'The bench is dirty from the hike.'

  d. → Die Bank ist dreckig wegen der Wanderung.   'The bench is dirty because of the hike.'

If the bench is dirty from the shoes (23a), and the shoes are dirty from the hike (23b), it does not follow that the bench is dirty from the hike (23c), but we may only conclude that the bench is dirty because of the hike (23d). (24) illustrates the same transitivity pattern for stative causal *von*.

(24) a. Der Platz ist schwarz von Flugblättern.   'The square is black from flyers.'

  b. <u>Die Flugblätter sind schwarz von Ruß.</u>   <u>'The flyers are black from soot.'</u>

  c. ↛ Der Platz ist schwarz von Ruß   'The square is black from soot.'

  d. → Der Platz ist schwarz wegen des Rußes.   'The square is black because of the soot.'

In sum, causal *von*-modifiers express a narrow notion of direct causation in the sense of Wolff (2003), which is non-transitive and imposes particular conditions on

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[9] The second condition in Wolff's definition of direct causation ensures that the use of an instrument by an agent does not count as an intervening cause, whereas a second volitional agent would count as an intervening cause. Since we already established above that causal *von* is reserved for non-agentive causation, Wolff's second condition can be neglected for our purposes.

spatiotemporal contiguity between the cause and its effect. These conditions will be spelled out in Sect. 3.

2.5 Coercion

Finally, it is worth noting that causal *von* tolerates certain coercive adaptions in case of type mismatches. To give just one example, eventive causal *von* requires an internal argument of type 'event'. This causing event might be given explicitly as, for example, the trip in (19a). Alternatively, in case of a type conflict, it might also be inferred from an object referent as in (25). The symbol '⤳' is used for pragmatic inferences based on world knowledge.

(25) a. Paul war satt von der Pizza. ⤳ from eating the pizza
          Paul was full from the pizza
      b. Paul war müde von den Tabletten. ⤳ from the release of their ingredients
          Paul was tired from the pills   (after taking them)

In (25a), the most natural cause for being full that is related to a pizza is an eating event. For (25b), an obvious reason related to the pills for Paul becoming tired is the release of the ingredients of the pills after taking them. Yet, in an appropriate context, (25b) could also be interpreted as expressing that Paul became tired by some exhausting action that he performed with the pills, for instance, checking their expiry date. That is, the interpretation of sentences such as (25) is based on event coercion: a combinatory conflict is resolved by accommodating a contextually appropriate event based on the given object referent.

  Interestingly, the question of whether event coercion may take place or not is not a mere matter of pragmatics but also relates to the lexicon. This can be seen when comparing the German data with the conditions in Russian.[10] The Russian causal preposition *от* ('from') parallels German *von* in also supporting both an eventive reading [e.g., (26a)] and a stative reading [e.g., (26b)].

(26) a. Павел был сонным   от   долгой   поездки.
          Paul   was dozy.INSTR from long.GEN   trip.GEN
      b. Площадь была белой   от   снега.
          Square   was   white.INSTR from snow.GEN

However, contrary to the German case, *от* does not tolerate event coercion; see the minimal pairs in (27)–(29).

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(27) a. Павел был грязным от катания на велосипеде.
      Paul was dirty.INSTR from driving.GEN on bike.PRP

   b. * Павел был грязным от велосипеда.
      Paul was dirty.INSTR from bike.GEN

(28) a. Павел был больным от употребления наркотиков.
      Paul was ill.INSTR from consuming.GEN drugs.GEN

   b. * Павел был больным от наркотиков.
      Paul was ill.INSTR from drugs.GEN

(29) a. Руки Павла были клейкими от готовки.
      hands Paul.GEN were sticky.INSTR from cooking.GEN

   b. * Руки Павла были клейкими от пирога.
      hands Paul.GEN were sticky.INSTR from cake.GEN

In (27a)–(29a), *от* takes an event nominal as internal argument. This yields a well-formed sentence. The combination of *от* with an object-referring NP, by contrast, is strictly ruled out; see (27b)–(29b). Although it should be very easy in each of these cases to infer a plausible causing event from the given object, this rescue strategy appears to be unavailable for Russian *от*. Thus, the comparison of the German and the Russian data indicates that the tolerance for event coercion is to be adequately accounted for within the lexical entry of causal *von*.

Let us conclude this section on empirical core observations with a remark concerning the referential properties of causal *von*'s internal NP arguments. As the reader might have noticed from the examples given so far, the stative causal reading requires internal arguments that denote masses or pluralities, i.e. they can be classified as homogeneous predicates in Krifka's (1989) terms. The eventive reading, by contrast, allows for both homogeneous and quantized predicates; see Herdtfelder and Maienborn (2015). Furthermore, based on a minimal pair such as (30) one might speculate that the two readings correlate with the distinction of strong versus weak referentiality; see Milsark (1977).

(30) a. Das Hemd ist weiß von dem Waschpulver.
      The shirt is white from the washing-powder

   b. Das Hemd ist weiß von Waschpulver.
      The shirt is white from washing-powder

The strong internal NP in (30a) leads most probably to an eventive reading, i.e. the reader infers a washing event that caused the shirt to become white. The weak internal NP in (30b), on the other hand, most probably triggers a stative causal interpretation, according to which the whiteness of the shirt is caused by some washing powder that is spread over the shirt. As suggestive as this minimal pair might appear at first glance, the corpus data in (31)–(32) show that there is no strict correlation between the NP's referentiality and the causal reading; see Herdtfelder and Maienborn (2015).

(31) a … die Schnitzereien an der Tischkante waren grau von Staub.
      the carvings   at the table-edge were grey from dust
                                            Rhein-Zeitung, 17.01.2008

      b. Der Schnee ist grau von dem Staub. Rhein-Zeitung, 08.09.2006
         The snow   is grey from the dust

(32) a … [das Kind] war müde vom   Wege, müde von Schlägen,
         [the child] was tired from.the road   tired from blows
         und matt vom   Hunger
         and dull from.the hunger
         http://www.internet-maerchen.de/maerchen/dukaten.htm, last accessed:
         10.04.2015

      b. Die Sitzbänke seien dreckig von   den Schuhen.
         The benches   were dirty   from the shoes
                                     St. Galler Tagblatt, 11.03.2008

In (31), the same noun *Staub* ('dust') builds the head of a weak (31a) and a strong (31b) NP, and in both cases *von* expresses a stative causal relationship. In (32), *von* receives an eventive causal reading, irrespective of whether its internal argument is weak (32a) or strong (32b).[11] Note furthermore that, given an appropriate context, the readings of the minimal pair in (30) may well be reversed. For instance, a suitable context for a stative reading for (30a) is spelled out in (33a), and a context for an eventive reading for (30b) is provided in (33b).

(33) a. Look what Max and Moritz did! Max spilled washing powder over
        the dark shirt and Moritz poured the fabric softener on the floor.

      b. Our lab studies the effectiveness of different detergents. We tested
        two dirty samples. The shirt was cleaned with washing powder and
        the blouse with liquid detergent.

From these observations we conclude that there might be a preference to build stative causal readings on the basis of a weak NP and eventive readings based on a strong NP, but there is no strict correlation. Thus, the differences between the eventive and the stative interpretation of causal *von*-modifiers cannot be traced back to the properties of the expressions *von* combines with, but originate in the lexical semantics of the preposition. Nevertheless, a lexical semantic account should be able to provide an explanation for the observed tendencies. We will make a suggestion in Sect. 5.

    The semantic approach that we develop in the following aims to account for the four core observations concerning causal *von* that we presented in this section. These are the inferential behavior of causal *von* (2.2), stative *von*'s holistic interpretation (2.3), the commitment to direct causation (2.4) and the coercive potential of causal *von* (2.5).

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[11] The conflated form *vom* 'from.the' yields a weak-referential interpretation of the internal NP in the sense that the NP referent has not yet been introduced into the discourse, see Schwarz (2009).

3 Ontology: events and tropes as causal relata

Let us start with a remark on the particular theory of causation that harmonizes best with our linguistic analysis. As Copley and Wolff (2014: 4) point out, there are basically two broad categories of theoretical approaches. Dependency theories assume that A causes B if and only if B depends on A in some sense. Among these dependency theories, Lewis' (1973) counterfactual theory of causation has had the most significant impact within linguistics; see footnote 1. Production theories (e.g., Talmy's (1988) force dynamics, Wolff's (2007) dynamics model, or Copley and Harley's (2012) force-theoretic framework) are based on the assumption that A causes B if and only if a physical transmission or configuration of forces holds among A and B.

Production theories emphasize particular properties of causation that have no natural place within dependency theories. This concerns in particular the temporal order between cause and effect and the existence of some kind of "physical link" between cause and effect (Copley and Wolff 2014: 18f).[12] These properties fall out naturally from theories based on force or energy transmission; see Copley and Wolff (2014) for an extensive evaluation and comparison of dependency theories and production theories of causation. While our linguistic analysis of causal *von*-modifiers is compatible with both a Lewis/Dowty-style counterfactual conception of causation (in Eckardt's (2000) event semantic guise) and Copley and Harley's (2012) force-theoretic framework, our observations on the semantics of *von* favor the latter approach, because it provides a motivation why spatiotemporal contiguity is relevant to direct causation.

Our further discussion of causation will be focused on the notion of direct causation. We consider this the core causal relation, which is verbalized, e.g., by *von*-modifiers. We leave the question of how direct causation relates to indirect causation and possibly further, more abstract notions of causation involving facts and propositions (e.g., Asher 1993; Solstad 2010) for future exploration.

With this theoretical background in place, we can now turn to matters of ontology. As mentioned in the introduction, current linguistic theories generally take causation to be a relation that holds between Davidsonian events, for example, Eckardt (2000), Hobbs (2005) and Vecchiato (2011) among many others. That is, cause and effect are conceived of as concrete spatiotemporal entities, rather than being of a more abstract nature, such as propositions. This perspective is corroborated by our observation that causal *von*-modifiers—qua expressing direct causation—involve spatiotemporal contiguity. Thus, there are good reasons to adhere to an analysis of causal *von* that rests on concrete spatiotemporal entities as causal relata. In the eventive case, these are Davidsonian events. Hence, we assume a causal relation 'cause (e_1, e_2)' as in (34a). What about the stative case? What is it

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[12] If we wanted to impose a temporal precedence requirement on cause and effect in Lewis' counterfactual theory—an option that Lewis (1973: 566) rejected with reference to the possibility for backward causation and causal loops—such a temporal order between cause and effect would need to be stipulated. Already Dowty (1979: 110) questioned this position, given that natural languages seem to coincide in demanding that the expression of causation always involve a temporal order according to which the cause precedes or is at least simultaneous with the effect.

that causes, for instance, the whiteness of the square in sentence (3b)? What is at stake here are concrete properties of an individual: The cause for the square being white is the whiteness of the hailstones. More recently, Moltmann (2007, 2009, 2013, 2015) has proposed the notion of tropes as reification of this kind of properties. In the following, we will therefore adopt Moltmann's proposal. That is, besides (34a), which covers the eventive case, we assume that 'cause' may also relate two tropes as in (34b). The latter variant corresponds to the stative case.

(34) a. cause (e_1, e_2) with e_1, e_2 as variables over events
      b. cause (r_1, r_2) with r_1, r_2 as variables over tropes

Let us comment briefly on Moltmann's notion of tropes, before turning to some further remarks concerning events as causal relata.[13,14]

Following Moltmann (2009: 51), tropes are "concrete manifestations of a property in an individual". Unlike properties, which are conceived as universals, tropes are particulars, which involve the constitutive role of a bearer. That is, tropes are particular property manifestations that depend on an individual (= their bearer). They act as implicit arguments of adjectives and can be referred to by adjective nominalizations such as German *Schönheit* 'beauty', and *Zufriedenheit* 'satisfaction' or English *redness*, *happiness*, and *paleness*. Trope arguments are targeted by modifiers such as the ones in (35). As Moltmann (2013: 300) points out, "these modifiers represent precisely the kinds of properties that tropes are supposed to have, such as properties of causal effect, of perception, and of particular manifestation."[15]

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[13] The causal patterns in (34) require that their arguments be of the same type. Either both arguments are events, or they are both tropes. The two remaining logical possibilities (i) and (ii) are ruled out for conceptual reasons.

  (i) cause (e, r)
  (ii) cause (r, e)

As to (i), an event can only cause a change of state, i.e., the initiation of a trope but not a bare trope per se. As to (ii), to cause an event requires some dynamic input, a transition. Again, a bare trope cannot initiate an event. So, the two patterns in (34) are, in fact, the only available options of how direct causation can be realized; see also Schaffer's (2014) metaphysical harmony requirement for causal relata.

[14] A reviewer suggests to resort to a propositional theory of causation in the spirit of Lewis (1973) by assuming that 'cause', besides expressing a relation between the occurrence of two events (see footnote 1), may also establish a relation between the holding/occurrence of two tropes. In our view, such a move raises further ontological questions which would require further exploration. The present paper retains an entity-based approach to causation by assuming that 'cause' is a relation between two entities that are either events or tropes.

[15] See Maienborn (to appear) for an overview of the ontological properties of events and tropes as opposed to (certain) states.

(35) a. Mary is visibly/profoundly happy.
     b. Mary is extremely/frighteningly pale.

That is, tropes share with events the property of being particular entities that have causal force. In the following, we want to exploit this parallel for developing a uniform approach to eventive and stative causation. For the present purposes, (36) may serve as an illustration for a trope-based semantics of an adjective such as *white*. The variable x ranges over physical objects, i.e. x is of type PHYS, and the variable r is of type TROPE.

(36) *weiß* ('white'):   λx:PHYS λr:TROPE [whiteness (r, x)]

The notion of events that we refer to here is to be understood in its broad sense, which also includes processes and D(avidsonian) states besides proper events (i.e. accomplishments and achievements); see Bach's (1986b) notion of "eventualities". The following corpus data show that processes, e.g., trying on or walking about (37b), and D-states, e.g., sitting, standing, sleeping (37c), may also serve as causes expressed by *von*-modifiers. In (37a), for instance, it is the long holding D-state of sitting (in combination with the trip) that causes the legs to become a bit tired.[16]

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[16] We adopt the following ontological core assumptions:

(i)   Eventualities (events, processes, Davidsonian states) are particular spatiotemporal entities with functionally integrated participants. They are perceptible, causally efficacious, can be located in space and time, and have a unique manner of realization.
(ii)   Kimian states are abstract objects for the exemplification of a property P at a holder x and a time t. K-states are reified entities of thought and discourse, they can be located in time, but they have no location in space nor are they perceptible or causally efficacious.
(iii) Tropes are particular manifestations of a property in an individual. They are perceivable, causally efficacious, can be located in space and time, but they do not involve participation. (Whether location in space is a property of all tropes or just a subset of them, is still a matter of debate. In any case, those tropes that are relevant here—in particular sensoric tropes (see Sect. 2.2)—can be located in space; see, e.g., *the darkness in the room*, *the redness on her cheeks*, *the humidity in the clothes*.)

See Maienborn (2005, to appear) for a detailed discussion and particularly for the distinction of Davidsonian states (D-states) as opposed to Kimian states (K-states).

(37) a. Tritt   man auswärts   an, kann es sein, dass die Beine
        Compete one away-from-home PRT can it be   that the legs
        von   der Reise und vom   langen Sitzen etwas müde sind.
        from the trip and from.the long   sit   a-bit tired are
        'If one competes at an away game, it's possible that one's legs will be
        a bit tired from the trip and sitting so long.'

                                                    Die Südostschweiz, 07.10.2009

    b. Jetzt bin ich aber auch kaputt   vom   vielen Ausprobieren,
        Now am I   PRT PRT wrecked from.the much   try-out
        Schlangestehen   und Rumlaufen!
        stand-in-line   and walk-around
        'Now I'm pretty wrecked from all that trying out, standing in line,
        and walking around.'

                            http://www.blogigo.de/Tagebuch_eines_Teenies/200503,
                            last accessed: 10.04.2015

    c. Ihre Körper waren noch warm vom   Schlaf
        Their bodies were still warm from.the sleep
                            http://www.budostudienkreis.de/KindKara/KBudoLit/
                            Maerch2.htm, last accessed: 10.04.2015

Note, however, that the cases of D-state and process causation pattern with events in requiring temporal precedence of the cause with respect to the effect. That is, they refer to maximal phases of, e.g., walking about, sleeping or sitting. Hence, just as in the eventive case, they involve quantized eventuality predicates.

K(imian) states, by contrast, don't qualify for causes expressed by *von*-modifiers. They differ sharply from D-states on the one hand and tropes on the other hand in this respect. The minimal pair in (38) compares a trope referring adjectival nominalization with a nominalized infinitival copular expression, which refers to K-states (e.g., Bücking 2012; Moltmann 2013). As (38) shows, only the former are legitimate arguments of causal *von*-modifiers. That is, the concrete humidity of the air causes the beds to be wet; see (38a). The K-state of the air being humid, by contrast, has no causal force; see (38b).

(38) a.   Die Betten waren nass von   der Luftfeuchtigkeit.
          The beds   were wet from the air-humidity
    b. * Die Betten waren nass vom   Feucht-Sein   der   Luft.
          The beds   were wet from.the humid-be.inf of.the air

Let us have a closer look at the stative readings of causal *von* and how they fit with the pattern 'cause (r_1, r_2)' in (34b). The resulting trope r_2 is provided by the adjectival predicate; see (36). But what about the causing trope r_1? Herdtfelder and Maienborn (2015) corpus study attested some instances of trope-denoting internal NPs such as (7d), repeated as (39).

(39) Die   Luft ist   schwer von   Blütenduft.
      The   air   is   thick   from   blossom-scent
      http://www.zwergtaucher.com/philippinen/Bohol.pdf, last accessed: 10.04.2015

In (39), a trope of the blossoms, namely their particular scent, is the cause for the air's heaviness. What is striking, however, is that in 95% of Herdtfelder and Maienborn's stative *von* data the internal NP denotes an object instead of a trope; see, e.g., (40).

(40) a. Seine Kleider waren stets   weiß   vom   Mehlstaub …
          His   clothes were   always white from.the flour-dust
          http://www.hekaya.de/maerchen/die-muellerssoehne-und-der-ashdacha–
          asien_143.html, last accessed: 10.04.2015

      b. Ihre   schwarze Jacke ist   nass von   Tränen.
          Her   black   jacket is   wet   from   tears
                                           Nürnberger Zeitung, 09.01.2009

In all these cases, it is not the object itself that acts as cause, but some particular property manifestation in that object. That is, the causing trope r_1 is inferred via the given object. For instance, what causes the whiteness of the clothes in (40a) is the whiteness of the flour dust. If the flour dust were not white, the clothes would not be white, either. And the cause for the jacket being wet in (40b) is the wetness of the tears. We may therefore safely conclude that all stative readings of causal *von* indeed follow the pattern 'cause (r_1, r_2)'. Nonetheless, we should provide an explanation for the puzzling fact that almost all cases of trope causation involve coercion of the causing trope from a given object. The reason, we suggest, lies in the ontological nature of tropes. They are particular property manifestations in an individual, and as such they do not exist independently of their bearers; see Moltmann (2009: 92). That is, tropes can best be identified through their bearers.[17] This motivates the predominance of internal arguments of type 'object' in the stative reading of causal *von*. They are the bearers of the causing trope r_1. Based on the bearer and the resulting trope r_2, r_1 may be readily inferred as being basically of the same kind as r_2; see the remarks on the inference pattern in (12)/(13).

In sum, the two patterns of event causation and trope causation that we proposed in (34) provide the right kind of generalization for the sortal type of causal *von*'s arguments. We take (34) as the ontological basis for spelling out the notion of direct causation. The conditions on spatiotemporal contiguity that are imposed by direct causation are formulated in the following ontological axioms. (The functions τ and

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[17] Note that in those cases where the cause is given directly by a trope expression, this always involves additional information about the bearer of the trope; see the compounds *Blütenduft* ('blossom-scent') in (39) or *Luftfeuchtigkeit* ('air-humidity') in (38a).

σ map eventualities and tropes onto their temporal and spatial dimensions, respectively.)

(41) Spatiotemporal contiguity axioms for eventive causation[a]:
   a. $\forall e_1 \forall e_2$ cause $(e_1, e_2) \rightarrow \tau(e_1) \supset\subset \tau(e_1)$ $\supset\subset$: temporal abutment
   b. $\forall e_1 \forall e_2$ cause $(e_1, e_2) \rightarrow \sigma(e_1) \circ \sigma(e_2)$ ○: spatial contact

[a] Our formulation of the conditions on spatiotemporal contiguity for the eventive case is similar in spirit to Vecchiato's (2011: 170) definition. Vecchiato does not take into account stative causation, though. See, e.g., Kamp and Reyle (1993) for the temporal relation of abutment

In the eventive case, the causing event e_1 immediately precedes the resulting event e_2; see (41a). Furthermore, there is some kind of physical contact between the two events. This is formulated in (41b) in terms of spatial contact. For the case of eventive causal *von*, this amounts to demanding that the bearer of the resulting trope be in spatial contact with e_1, typically by taking part in e_1.

The axioms in (42) account for the respective conditions in the stative case: The temporal extension of the resulting trope r_2 lies within the temporal extension of the causing trope r_1; see (42a), and r_2's spatial extension is included by the spatial extension of r_1; see (42b).

(42) Spatiotemporal contiguity axioms for stative causation:
   a. $\forall r_1 \forall r_2$ cause $(r_1, r_2) \rightarrow \tau(r_1) \supseteq \tau(r_2)$
   b. $\forall r_1 \forall r_2$ cause $(r_1, r_2) \rightarrow \sigma(r_1) \supseteq \sigma(r_2)$

The ontological axioms in (41) and (42) spell out the conditions on direct causation that we identified in Sect. 2.4. They are independently motivated due to the spatiotemporal nature of events and tropes and they provide a straightforward explanation of some of causal *von*'s core properties observed in Sect. 2. In particular, they account for the inferential pattern in (11), and they provide an explanation for the characteristic holistic effect observed for the stative reading of causal *von*; see Sect. 2.3.

According to the inference pattern in (11), stative *von* implies that *von*'s internal NP referent is located on the subject referent at the time of the predication. This inference follows from the axiom (42b). Since tropes are dependent on their bearers, spatial inclusion among tropes implies spatial contact between their bearers. That is, in order for the spatial extension of the resulting trope r_2 to fall within the spatial extension of the causing trope r_1, the bearer of r_1 must be located on the bearer of r_2.

Next, what about the holistic effect of stative causal *von*? Why is it that in (3b), for instance, the hailstones are understood as being located all over (relevant parts of) the square? This can be explained with reference to Löbner's (2000) "totality condition" on predication. Löbner shows that the arguments of a predicate are always homogeneous, or indivisible, with respect to the predication. A predication such as *The tiger is white* means that the tiger is all white (in its relevant parts). If the tiger were, say, half white and half black, this would lead to a truth value gap. In this case, neither is it true that the tiger is white nor that the tiger is not white.

Löbner (2000: 239) formulates this totality condition in terms of a *Presupposition of Indivisibility*: "Whenever a predicate is applied to one of its arguments, it is true or false of the argument as a whole." Löbner's Presupposition of Indivisibility readily accounts for the observed holistic effect of stative causal *von*. In the case of (3b), e.g., it warrants that the predication of being white must hold for (the surface of) the whole square. That is, the spatial extension of the square's whiteness ($\sigma(r_2)$) covers the whole square. Therefore, given (42b), the spatial extension of the hailstones' whiteness ($\sigma(r_1)$) must include this region. From this it follows that the square is covered by the hailstones. This explains the characteristic holistic effect observed with the stative reading of causal *von*. The holistic interpretation is accounted for on the basis of independently motivated assumptions concerning spatiotemporal contiguity restrictions on trope causation and on the nature of predication. Our explanation shares with Rapoport (2014) the assumption that the source of the holistic interpretation is to be found in the semantics of the preposition; see Sect. 2.3. With (42) we propose an ontologically grounded implementation of this assumption.

So far, we have developed a semantic analysis of causal *von* in terms of direct causation that reduces the differences between its eventive and its stative readings to a sortal contrast. The causal relation holds either between events or between tropes with their respective spatiotemporal contiguity conditions. Interpretive characteristics, such as the holistic effect observed with the stative reading of causal *von*, follow from these assumptions straightforwardly. In the following, we will show that the selection for the sortal type, 'event' or 'trope', and hence for *von*'s reading, is triggered by the syntactic position of the modifier.

4 On the syntax of causal *von*-modifiers

In this section we will present syntactic and semantic arguments that point towards different base adjunction sites for eventive and stative causal *von*-modifiers in adjectival copula sentences. This syntactic difference will then be exploited for developing a compositional semantics for causal *von* in the next section.

The corpus study reported in Herdtfelder and Maienborn (2015) established, first of all, that Adj > PP is the unmarked order for both readings. Deviations from this order are particularly marked in information structural terms; see Herdtfelder and Maienborn (2015) for details. Specifically, the corpus sentences were analyzed with respect to (i) the (non-)adjacency of the adjective and the *von*-PP, and (ii) the syntactic order of the adjective and the *von*-PP in the case of adjacency. The relevant findings are the following:

(43) Eventive reading:
       (i) 88% adjacent, 12% non-adjacent
       (ii) 75% Adj > PP, 25% PP > Adj

(44) Stative reading:
    (i) 97% adjacent, 3% non-adjacent
    (ii) 94% Adj > PP, 6% PP > Adj

The data in (43) and (44) support the view that Adj > PP is the base order. Given that German has an underlying SOV word order, this implies that the causal *von*-modifier must be part of the AP, otherwise the copula could not combine first with its AP-complement. Thus, from these observations we may conclude that the *von*-PP is a modifier that adjoins to some projection of the adjective.

The corpus data show furthermore that, beyond this basic conformity, the two readings differ with respect to both the extent of the PP's adjacency to the adjective and its syntactic mobility. A χ^2 test (e.g., Siegel 1956) revealed that non-adjacency is significantly less frequent with the stative than with the eventive reading (3 vs. 12%; $\chi^2(1) = 7.83$, $p < .05$). A second, independent χ^2 test revealed that in the adjacent cases the order PP > Adj is significantly less frequent with the stative than with the eventive reading (6 vs. 25%; $\chi^2(1) = 17.73$, $p < .01$). Thus, the two readings are accompanied by characteristic distributional differences. Specifically, the corpus data support the view that stative *von* is positioned closer to the adjective than eventive *von* and does not admit intervening linguistic material. This hints at the possibility of different AP-internal base adjunction sites.

In the following, we will substantiate this assumption and argue that eventive *von* adjoins at the AP-periphery (AP-adjunct), whereas stative *von* has a base position in the immediate vicinity of the adjective (A-adjunct).[18] The following syntactic tests concerning sentential negation, topicalization and pseudo-clefts support this view.

First, the negation data in (45) show that eventive causal *von*-modifiers may be separated from the adjective by the sentence adverb *nicht* ('not'). Sentence (45a) allows for neutral sentence accent. Stative causal *von*, by contrast, prohibits placing the negation adverb between the PP and the adjective under neutral accent conditions; see (45b).[19]

(45) a.   Paul war   von   der   Reise nicht   müde.
           Paul was   from the   trip   not   tired
     b. * Die Jacke war   von   den   Tränen nicht nass.
            The jacket was   from the   tears   not   wet

That is, whereas eventive *von* may take narrow or wide scope with respect to sentential negation, stative *von* only takes narrow scope. For instance, sentence

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[18] Note that this assumption of two different base adjunction sites within the AP—one at the AP-core, and one at the AP-periphery—parallels the case of different adjunction sites for modifiers within the domains of VP (e.g., Frey and Pittner 1998; Maienborn 2001; Frey 2003) or NP (e.g. Bücking 2012); see below. That is, the proposal of an AP internal structural split that has an impact on composition, which we will develop here, is not an ad hoc solution to the problem of causal *von*-modifiers but rather reflects a more general pattern of how modifiers may combine with their targets.

[19] Sentence (45b) could only be interpreted as involving metalinguistic negation, e.g., as in (i).

(i) Die Jacke war von   den Tränen nicht nass sondern triefend.
    The jacket was from the tears   not   wet   but   dripping wet.

(46a) has both a narrow scope and a wide scope reading. It may express (i) that it was not the case that Max got tired due to running, or (ii) that Max ran without getting tired. Sentence (46b), by contrast, only has a narrow scope reading, according to which it was not the case that the wall was black due to some soot. It cannot be interpreted as expressing that there was some soot without the wall being black from it.

(46) a. Max   war   nicht müde   vom   Laufen.
          Max   was   not   tired   from.the   running
      b. Die   Wand   war   nicht   schwarz   vom   Ruß.
          The   wall   was   not   black   from.the   soot

Next, the topicalization data in (47) indicate that the eventive, but not the stative reading tolerates separation of the *von*-modifier from the adjective. Recall our discussion of the eventive/stative ambiguity in (4)–(6). Interestingly, if the *von*-PP is topicalized, as in (47), only the eventive reading survives. That is, (47) only expresses that some event related to the cream was the cause for Otto's face turning white.[20] The absence of the stative reading is shown by the continuations in (47a) and (47b): The sentence allows the continuation in (47a), which makes the eventive reading explicit, but does not tolerate the stative explication in (47b).

(47) Von   der Salbe ist Ottos   Gesicht weiß   only eventive reading
      From   the cream is   Otto's face   white
      a. …   denn   sie hatte eine hohe   Bleichwirkung.
                because it   had   a   high   bleaching effect
      b. #…   denn   sie ist dick   aufgetragen.
                because it   is   thickly applied

Finally, the data in (48) illustrate that eventive and stative *von* also differ with respect to the option of building pseudo-clefts. This is only possible with eventive *von*.

(48) a. Was   Paul   von   der   Reise   war, ist todmüde.
          What   Paul   from the   trip   was   is   dead-tired
      b. *Was   die   Treppe von   dem   Staub   war, ist aschgrau.
          What   the   stairs from the   dust   was, is   ash-grey

All these syntactic data support the view that stative *von* is positioned closer to the adjective than eventive *von*: it does not admit interspersed linguistic material

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[20] The observation concerning (47) only refers to the standard topicalization of a constituent into the German prefield. The main sentence accent remains on the predicate *weiß* in this case. Frey (2006) shows that this kind of fronting is to be distinguished from topicalization triggered by a strong contrastive focus. The latter option is marginally also available for the stative reading.

and appears to be extremely reluctant to leave its position close to the adjective. This conclusion is further corroborated by two semantic arguments.

First the data in (49) show that stative *von* combines with the adjective and provides further manner-like (i.e. qualitative) information about the given property. This quality can be taken up (somewhat marginally) by the proform *so* as in (49a) or can be compared via the modifier *anders* ('differently') as in (49b). This is excluded for eventive *von*; see (50).[21]

(49) a. Der Platz   war   weiß   von   Hagelkörnern,   und   der   Rasen   war
       The   square   was   white   from   hailstones   and   the   lawn   was
       auch   so   weiß.
       also   so   white

    b. Das   Hemd   war   nass   von   den   Tränen,   aber   die   Jacke   war
       The   shirt   was   wet   from   the   tears   but   the   jacket   was
       anders   nass.
       differently   wet

(50) a. * Pauls   Haut   war   wund   vom   Liegen,   und   Ottos   Haut   war
       Paul's   skin   was   sore   from   lying   and   Otto's   skin   was
       auch   so   wund.
       also   so   sore

    b. * Max   war   satt   von   der   Pizza,   aber   Moritz   war   anders
       Max   was   full   from   the   pizza   but   Moritz   was   differently
       satt.
       full

In (49a), *so* has a manner-like, quality reading. It compares the way the square is white, namely due to hailstones, with that of the lawn. Following Moltmann's (2015) perspective on manner modification, we therefore conclude that stative *von*-modifiers specify a trope's quality. This option is not available in (50a). The eventive *von*-modifier cannot be taken up by the proform *so* in order to express that Otto's skin was also sore from lying. Furthermore, the manner modifier *anders* ('differently'), following Moltmann (2015: 837), conveys a relation of qualitative difference between tropes. The contrast between (49b) and (50b) indicates that this qualitative difference may relate to the contribution of a stative *von*-modifier but does not extend to eventive *von*-modifiers. That is, whereas (49b) could refer to a situation in which the shirt was wet from tears and the jacket was wet from blood, there is no way for (50b) to refer to a situation in which Max was full from eating a pizza and Moritz was full from eating, say, a chocolate cake.

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[21] Note that *so* in (49a) does not take up the degree of whiteness but its quality, i.e., whiteness caused by hailstones. The similarity-modifier *anders* in (49b) also does not compare the degree of wetness but expresses that the jacket's wetness is of a different quality, e.g., it could be wet from blood. See the discussion between Anderson and Morzycki (2015) and Moltmann (2015) on the connection between degrees, manners, and kinds.

Furthermore, the modifier *ähnlich* ('similarly') may express qualitative or quantitative similarity; see Moltmann (2015). With stative *von* as in (51a) both readings are available. (51a) can be interpreted as expressing that the field has a similar quality of blackness, i.e. it was also black from birds. Alternatively, it might express that the field has a similar degree of blackness (which might be due to another cause, e.g., black seeds spread over the field). Eventive *von* in (51b) only supports the degree reading. That is, the degrees to which Anna and Maria were tired are similar, but Maria could be tired, for instance, from running a marathon. (51b) does not have a reading according to which Maria was tired due to a similar cause as Anna was.

(51) a. Der Himmel war sehr schwarz von Vögeln, und das Feld war
        The sky   was very black   from birds   and the field was
        ähnlich   schwarz.
        similarly black
     b. Anna war sehr müde von Tabletten, und Maria war ähnlich
        Anna was very tired from pills   and Maria was similarly
        müde.
        tired

The second argument concerns the behavior of stative versus eventive *von* with respect to certain degree modifiers such as *sehr* ('very'), *ganz* ('completely'), or *total* ('totally') that according to Moltmann act as trope predicates.[22] As (52) shows, those adjectival modifiers are compatible with both types of *von*-modifiers.[23] However, if we reverse the order of the adjective and the *von*-PP, as in (53), the degree expression takes scope not only over the adjective but also over *von*. This is (somewhat marginally) possible with stative *von* (53a), but excluded for eventive *von* (53b). The same observation can be made with respect to the attributive use of the adjective; see (54).

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[22] More specifically, Moltmann (2009: 63) notes that "[a]djective modifiers like *completely*, *partially* and *very* [...] should be considered predicates that apply to trope types and make reference to a scale of trope types." For our present purposes of motivating different base adjunction sites for stative and eventive *von* we may neglect this further complication here and simply assume that these modifiers take (some kind of) a trope argument. See Moltmann (2009: 71ff) for a semantic analysis of the different readings of *completely*, which involve either a maximal degree or a maximal number of parts.

[23] Note that the adjectives in (52)–(54), *nass* ('wet') and *dreckig* ('dirty'), are both lower-bound absolute adjectives. That is, they involve a scale with a minimum standard; see Kennedy (2007), Morzycki (2013: 131). Thus, the differences observed in (52)–(54) cannot be due to any distinctions concerning the adjectives but rather have their source in the two types of *von*-modifiers.

(52) a. Das Hemd war sehr / ganz   / total   nass von   den Tränen.
          The   shirt   was   very / completely / totally wet   from the tears
      b. Max war sehr / ganz   / total   dreckig von   der Reise.
          Max was   very / completely / totally dirty   from the trip

(53) a. Das Hemd war sehr / ganz   / total   von   den Tränen nass.
          The   shirt   was   very / completely / totally from the tears   wet
      b. * Max war sehr / ganz   / total   von   der Reise dreckig.
          Max was   very / completely / totally from the trip   dirty

(54) a. das sehr / ganz   /total   von   den Tränen nasse   Hemd
          the   very / completely / totally from the tears   wet.AGR   shirt
      b. * das sehr / ganz   / total   von   der Reise   dreckige   Kind
          the   very / completely / totally from the trip   dirty.AGR   child

The syntactic and semantic arguments presented so far take into account a wide range of syntactic and semantic observations. Taken together they yield concurring evidence for the different syntactic status of eventive and stative *von*-modifiers. Both types of modifiers are part of the AP. However, stative *von* takes a base position close to the adjective. This enables it to specify further the quality of the trope that is introduced by the adjective [see (49)–(51)], and it motivates *von*'s reluctance to leave the A-vicinity; see (45)–(48).[24] Furthermore, degree modifiers may take scope over stative *von*; see (52)–(54). Eventive *von*, by contrast, takes a base position that is more distant from the adjective and lies outside the scope of degree modifiers. These observations lead us to propose that stative *von* is an A-adjunct, whereas eventive *von* adjoins at the AP-periphery.[25]

From a broader perspective, this conclusion fits well in a more general picture of modification according to which lexical categories with referential arguments systematically offer a head-adjacent and a peripheral adjunction site for (intersective) modifiers, with implications for the modifier's compositional contribution. This approach has been pursued, e.g., by Maienborn (2001) for locative modifiers in the verbal domain and by Bücking (2012) in the nominal domain. Our above observations suggest that the generalization also extends to the adjectival domain. In the next section, we will develop this perspective further and spell out a compositional semantics for adjectival *von*-modifiers.

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[24] See, e.g., Frey (2003) on the analogous behavior of verb-adjacent manner modifiers.

[25] If we assume a functional DegP-shell above the AP, we could alternatively analyze stative *von* as AP-adjunct and eventive *von* as DegP-adjunct. We will not delve into this issue deeper. For our purposes of developing a compositional semantics for causal *von*-modifiers it suffices to assume a simple AP-syntax with DegP in the specifier position of A. That is, we adopt, what Morzycki (2013: 148ff) calls, the "small DegP view", instead of a "big DegP view". But nothing really hinges on this point.

5 Compositional semantics with type accommodation

The previous section has established a correlation between the semantic interpretation of a causal *von*-modifier: eventive or stative, and its syntactic base position: AP-adjunct or A-adjunct. This will serve as the starting point for developing a compositional semantics for the interpretation of causal *von*-modification. Our analysis of causal *von*-modifiers will be spelled out in Asher's (2011) Type Composition Logic (TCL), which provides us with a context-sensitive model of type-driven lexical semantics.

TCL is motivated by the widely accepted observation that a felicitous predication requires that the type restrictions which the predicate imposes on its arguments be met by the types of the arguments. As Asher argues, natural language predication is in fact guided by a rich system of types that interact in an intricate way to determine the interpretation of complex expressions. This idea is implemented in TCL by assuming two levels of semantic representation: a level of Logical Form with the usual model-theoretic interpretation, and a level of types with a proof-theoretic interpretation. Types, which Asher conceives of as mental concepts, may convey arbitrarily fine-grained information organized in terms of a type hierarchy.

Let us begin by providing the semantic ingredients of *von*'s stative reading for sentence (3b). The lexical entry for the adjective *white*, which we introduced in (36), is repeated in (55).

(55) *weiß* ('white'): $\lambda x{:}\textsc{phys}$ $\lambda r{:}\textsc{trope}$ [whiteness (r, x)]

In (55), a variable's type restriction is added after a colon. This is a simplified notation. Full-fledged TCL formulas use additional variables π as context parameters that keep track of the selectional restrictions that are collected when computing the semantics of complex expressions. By means of π, type information is percolated and specified in the course of the composition; see Asher (2011: §4.3).[26] That is, the full TCL representation for *weiß* corresponds to (56). In the following, we will use Asher's TCL notation for the sake of explicitness. However, when a variable is bound and is therefore is no longer compositionally active, we will resort to the abbreviated notation in (55), in order to facilitate readability.

(56) *weiß* ('white'): λx λr $\lambda \pi$ [whiteness (r, x, π $*\textsc{arg}_1^{\text{whiteness}}{:}\textsc{trope}$ $*\textsc{arg}_2^{\text{whiteness}}{:}\textsc{phys}$)]

Furthermore, we assume an operation of *Existential Trope Closure* (ETC) at the AP-boundary as in (57). ETC binds the adjective's trope argument existentially and introduces an argument for a Kimian state s (see Sect. 3) at which the individual y is the bearer of the trope. ETC can be seen as the AP-correspondence to the existential event closure at the VP-boundary (e.g., Kamp and Reyle 1993).

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[26] Type restrictions are added to a contextual parameter π by means of concatenation '*'.

(57) ETC (existential trope closure):
$\lambda Q \; \lambda y \; \lambda s \; \lambda \pi' \; \exists r'$:TROPE [state (s, r', π' *ARG$_1^{\text{state}}$:K-STATE) & Q(y)(r')(π')]

The lexical entry for the copula *sein* ('to be') in (58) basically amounts to a simple identity mapping. This will suffice for our present needs. (59) gives the minimal part of an I^0-semantics that is of interest here. Its core contribution consists in the existential binding of the VP's eventive [type: EV(ENT)] or stative (type: K-STATE) argument. The semantic representation of definite NPs will be abbreviated as in (60).

(58) *sein* ('to be'): $\lambda P \; \lambda x \; \lambda s \; \lambda \pi \; [P(x)(s)(\pi \; $*ARG$_1^{\text{P}}$:K-STATE)]

(59) I^0: $\lambda P \; \lambda x \; \lambda \pi \; \exists s$:EV $\sqcup$ K-STATE [P (s, x, π)]

(60) *der Platz* ('the square'): def-sq:PHYS [square (sq)]

The relevant steps of a compositional derivation for a simple copula sentence are given in (61).

(61) a. [$_{\text{AP}}$ weiß]:
$\lambda Q \; \lambda y \; \lambda s \; \lambda \pi' \; \exists r'$:TROPE [state (s, r', π' *ARG$_1^{\text{state}}$:K-STATE) & Q(y)(r')(π')]
($\lambda x \; \lambda r \; \lambda \pi$ [whiteness (r, x, π *ARG$_1^{\text{whiteness}}$:TROPE *ARG$_2^{\text{whiteness}}$:PHYS)])
= $\lambda y \; \lambda s \; \lambda \pi' \; \exists r'$:TROPE [state (s, r', π' *ARG$_1^{\text{state}}$:K-STATE)
  & whiteness (r', y, π' *ARG$_2^{\text{whiteness}}$:PHYS)]
b. [$_{\text{VP}}$ [$_{\text{AP}}$ weiß] sei-]:
$\lambda P \; \lambda x \; \lambda s \; \lambda \pi \; [P(x)(s)(\pi \;$ *ARG$_1^{\text{P}}$:K-STATE)] ($\lambda y \; \lambda s \; \lambda \pi' \; \exists r'$:TROPE
[state (s, r', π' *ARG$_1^{\text{state}}$:K-STATE) & whiteness (r', y, π' *ARG$_2^{\text{whiteness}}$:PHYS)])
= $\lambda x \; \lambda s \; \lambda \pi \; \exists r'$:TROPE [state (s, r', π *ARG$_1^{\text{state}}$:K-STATE)
  & whiteness (r', x, π *ARG$_2^{\text{whiteness}}$:PHYS)]
c. [$_{\text{I'}}$ [$_{\text{VP}}$ [$_{\text{AP}}$ weiß] ist]]:
$\lambda P \; \lambda x \; \lambda \pi \; \exists s$:EV $\sqcup$ K-STATE [P (s, x, π)] ($\lambda x \; \lambda s \; \lambda \pi \; \exists r'$:TROPE
[state (s, r', π *ARG$_1^{\text{state}}$:K-STATE) & whiteness (r', x, π *ARG$_2^{\text{whiteness}}$:PHYS)])
= $\lambda x \; \lambda \pi \; \exists s$:K-STATE $\exists r'$:TROPE [state (s, r', π) & whiteness (r', x, π
  *ARG$_2^{\text{whiteness}}$:PHYS)]
d. [$_{\text{IP}}$ der Platz [$_{\text{VP}}$ [$_{\text{AP}}$ weiß] ist]]:
$\lambda x \; \lambda \pi \; \exists s$:K-STATE $\exists r'$:TROPE [state (s, r', π) & whiteness (r', x, π
*ARG$_2^{\text{whiteness}}$:PHYS)] (def-sq:PHYS [square (sq)])
= $\lambda \pi \; \exists s$:K-STATE $\exists r'$:TROPE [state (s, r', π) & whiteness
  (r', def-sq:PHYS [square (sq)], π)]

According to (61d), the sentence expresses that there is a K-state s at which the square is the bearer of a particular manifestation of whiteness r'.

Now we may turn to stative *von*. The lexical entry in (62) may serve as a starting point:

(62) *von* ('from'): stative reading (1. version)
$\lambda c \; \lambda P \; \lambda v \; \lambda c' \; \lambda \pi \; [P(v)(c')(\pi)$ & cause (c, c', π *ARG$_1^{\text{pred(c)}}$:TY$^{\text{PS}}$(c) *ARG$_1^{\text{P}}$:
TY$^{\text{PS}}$(P) *ARG$_1^{\text{cause}}$:TROPE *ARG$_2^{\text{cause}}$:TROPE)]

According to (62), a stative causal *von*-modifier relates to a target argument c' of type TROPE and adds a causal relation 'cause' between a trope c and the target c'. Furthermore, additional type presuppositions relating to c and c' that are collected in the course of the composition are inherited and percolate to causal *von*'s contextual parameter π.[27]

The lexical entry in (62) accounts for the strictly compositional meaning contribution of stative *von*: It adds a causal relation between tropes and guarantees that its type requirements are consistent with those of all compositionally relevant predicates. What (62) still lacks is a proper handling of type conflicts. As our previous discussion has shown, stative *von* does not only accept trope referring expressions as internal arguments but also tolerates expressions of type PHYS. This can be modeled with Asher's so-called "polymorphic" types. These are a special kind of complex types whose value is specified in dependence on other arguments; see Asher (2011: §8.2). Polymorphic types play a key role in handling coercion. If there is a type clash in the course of composition, i.e. the type of a compositionally provided argument does not meet the type requirements of the predicate, type accommodation via polymorphic types may take place. More specifically, a polymorphic type '$\alpha - \alpha(\beta)$' is to be understood as expressing that if a type requirement α cannot be met compositionally, α may be justified via β. That is, type accommodation licenses the introduction of a new variable of type α whose type value is further specified dependent on the compositionally supplied type β.

Notably, Asher (2011: §3.5, §8.1) argues that coercion is crucially a matter of lexical semantics, not of general pragmatics. That is, whether or not a potential type clash may be resolved is something that must be determined in advance in the lexicon; see also Bücking and Maienborn (2015). In line with that, the final version of causal *von*'s stative reading is given in (63).

(63) *von* ('from'):   stative reading (final version)
$\lambda c \, \lambda P \, \lambda v \, \lambda c' \, \lambda \pi \, [P(v)(c')(\pi) \, \& \, \text{cause} \, (c, c', \pi \, *\text{ARG}_1^{\text{pred}(c)}{:}\text{TY}^{\text{PS}}(c) \, *\text{ARG}_1^{\text{P}}{:}$
$\text{TY}^{\text{PS}}(P) \, *\text{ARG}_1^{\text{cause}}{:} \, \text{TROPE} \, - \, \text{TROPE} \, (\text{TY}^+(c) \sqsubseteq \text{PHYS}) \, *\text{ARG}_2^{\text{cause}}{:}\text{TROPE})]$

In (63), the first argument of 'cause' (= c) is required to be of type TROPE. However, if c is of some subtype of PHYS, a trope argument may be accommodated based on the fine-grained type provided by c.[28] In order to see how type accommodation works in detail, the compositional derivation for *von*'s stative reading is spelled out in (64) step by step.

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[27] These additional type restrictions stem from the nominal predicate of *von*'s internal argument in the case of c, and from the predicate P in the case of c'; see the example derivation in (64) below. The type function $\text{TY}^{\text{PS}}(x)$ yields the presupposed type for x; e.g., PHYS in the case of *den Hagelkörnern* ('the hailstones'). Note furthermore that Asher pursues an alternative analysis of modification, which postulates prophylactic argument positions for potential modifiers within the head; see Asher (2011: 109, 233). This rather unorthodox move is motivated by the need of passing on the type restrictions of the head to the resulting complex expression. For conceptual reasons we prefer a more standard analysis which takes the modifier to be a functor that adds its semantic content to its target argument via predicate conjunction; see Bücking and Maienborn (2015) for a more thorough comparison and discussion.

[28] The type function $\text{TY}^+(x)$ maps x onto its most specific (so-called "proffered") type; e.g., HAILST(ONE) in the case of *den Hagelkörnern* ('the hailstones'); see Asher (2011: 41). For ease of readability we do not adopt Asher's notational convention to mark accommodated types by Greek letters.

(64) Der Platz ist weiß von den Hagelkörnern. ('The square is white from the hailstones.')

 a. [$_{PP}$ von den Hagelkörnern]:

 $\lambda c\ \lambda P\ \lambda v\ \lambda c'\ \lambda \pi\ [P(v)(c')(\pi)\ \&\ cause\ (c, c', \pi\ *ARG_1^{pred(c)}:TY^{PS}(c)$
 $*ARG_1^P:TY^{PS}(P)\ *ARG_1^{cause}:TROPE - TROPE\ (TY^+(c) \sqsubseteq PHYS)\ *ARG_2^{cause}:TROPE)]$
 (def-h:PHYS [hailst (h)])

 $= \lambda P\ \lambda v\ \lambda c'\ \lambda \pi\ [P(v)(c')(\pi)\ \&\ cause\ (def-h:PHYS [hailst (h)], c', \pi$
  $*\underline{ARG_1^{hailst}:PHYS}\ *ARG_1^P:TY^{PS}(P)\ *\underline{ARG_1^{cause}:TROPE - TROPE\ (HAILST \sqsubseteq PHYS)}$
  $*ARG_2^{cause}:TROPE)]$ <div align="right">type conflict</div>

 b. Abstraction:

 $\lambda x\ \lambda \pi'\ [cause\ (x, c', \pi')]$ (def-h:PHYS [hailst (h)]) $(\pi\ *\underline{ARG_1^{hailst}:PHYS}$
 $*ARG_1^P:TY^{PS}(P)\ *\underline{ARG_1^{cause}:TROPE - TROPE\ (TY^+(c) \sqsubseteq PHYS)}\ *ARG_2^{cause}:TROPE)$

 c. Coercion functor for stative *von*:

 $\lambda P\ \lambda y\ \lambda \pi''\ \exists r:TROPE(HAILST)\ [P(r)(\pi'')\ \&\ \phi_{TROPE(HAILST)}\ (r, y, \pi'')]$

 d. Application of the coercion functor to the abstracted part:

 $\lambda P\ \lambda y\ \lambda \pi''\ \exists r:TROPE(HAILST)\ [P(r)(\pi'')\ \&\ \phi_{TROPE(HAILST)}\ (r, y, \pi'')]$
 $(\lambda x\ \lambda \pi'[cause\ (x, c', \pi')])$

 $= \lambda y\ \lambda \pi''\ \exists r:TROPE(HAILST)\ [\lambda x\ \lambda \pi'\ [cause\ (x, c', \pi')](r)(\pi'')\ \&$
  $\phi_{TROPE(HAILST)}\ (r, y, \pi'')]$

 $= \lambda y\ \lambda \pi''\ \exists r:TROPE(HAILST)\ [cause\ (r, c', \pi'')\ \&\ \phi_{TROPE(HAILST)}\ (r, y, \pi'')]$

 e. (64b) with type accommodation:

 $\lambda y\ \lambda \pi''\ \exists r:TROPE(HAILST)\ [cause\ (r, c', \pi'')\ \&\ \phi_{TROPE(HAILST)}\ (r, y, \pi'')]$
 (def-h:PHYS [hailst(h)]) $(\pi\ *\underline{ARG_1^{hailst}:PHYS}\ *ARG_1^P:TY^{PS}(P)\ *\underline{ARG_1^{cause}:}$
 $\underline{TROPE - TROPE\ (HAILST \sqsubseteq PHYS)}\ *ARG_2^{cause}:TROPE)$

 $= \exists r:TROPE(HAILST)\ [cause\ (r, c', \pi\ *ARG_1^P:TY^{ps}(P)\ *ARG_2^{cause}:TROPE)\ \&$
  $\phi_{TROPE(HAILST)}\ (r, def-h:PHYS [hailst(h)], \pi)]$

 f. (64a) with type accommodation:

 $\lambda P\ \lambda v\ \lambda c'\ \lambda \pi\ \exists r:TROPE(HAILST)[P(v)(c')(\pi)\ \&\ cause\ (r, c', \pi\ *ARG_1^P:TY^{PS}(P)$
 $*ARG_2^{cause}:TROPE)\ \&\ \phi_{TROPE(HAILST)}\ (r, def-h:PHYS [hailst(h)], \pi)]$

 g. [$_A$ [$_A$ weiß] [$_{PP}$ von den Hagelkörnern]]:

 $\lambda P\ \lambda v\ \lambda c'\ \lambda \pi\ \exists r:TROPE(HAILST)[P(v)(c')(\pi)\ \&\ cause\ (r, c', \pi\ *ARG_1^P:TY^{PS}(P)$
 $*ARG_2^{cause}:TROPE)\ \&\ \phi_{TROPE(HAILST)}\ (r, def-h:PHYS [hailst(h)], \pi)]$ $(\lambda x\ \lambda r\ \lambda \pi$
 $[whiteness\ (r, x, \pi\ *ARG_1^{whiteness}:TROPE\ *ARG_2^{whiteness}:PHYS)])$

 $= \lambda v\ \lambda c'\ \lambda \pi\ \exists r:TROPE(HAILST)[whiteness\ (c', v, \pi\ *ARG_1^{whiteness}:TROPE$
  $*ARG_2^{whiteness}:PHYS)\ \&\ cause\ (r, c', \pi\ *ARG_1^{whiteness}:TROPE\ *ARG_2^{cause}:TROPE)$
  $\&\ \phi_{TROPE(HAILST)}\ (r, def-h:PHYS [hailst(h)], \pi)]$

h. [$_{AP}$ [$_A$ [$_A$ weiß] [$_{PP}$ von den Hagelkörnern]]]:
λQ λy λs λπ' ∃r':TROPE [state (s, r', π' *ARG$_1^{state}$:K-STATE) & Q(y)(r')(π')]
(λv λc' λπ ∃r:TROPE(HAILST)[whiteness (c', v, π *ARG$_1^{whiteness}$:TROPE
*ARG$_2^{whiteness}$:PHYS) & cause (r, c', π *ARG$_1^{whiteness}$:TROPE *ARG$_2^{cause}$:TROPE)
& φ$_{TROPE(HAILST)}$ (r, def-h:PHYS [hailst(h)], π)])
= λy λs λπ' ∃r':TROPE ∃r:TROPE(HAILST) [state (s, r', π' *ARG$_1^{state}$:K-STATE)
& whiteness (r', y, π' *ARG$_2^{whiteness}$:PHYS) & cause (r, r', π')
& φ$_{TROPE(HAILST)}$ (r, def-h:PHYS [hailst(h)], π')]

i. [$_{IP}$ der Platz [$_{VP}$ [$_{AP}$ [$_A$ [$_A$ weiß] [$_{PP}$ von den Hagelkörnern]]] ist]]:
λπ' ∃s:K-STATE ∃r':TROPE ∃r:TROPE(HAILST) [state (s, r', π') & whiteness
(r', def-h:PHYS [hailst(h)], π') & cause (r, r', π') & φ$_{TROPE(HAILST)}$
(r, def-h:PHYS [hailst(h)], π')]

The combination of *von* with the NP *den Hagelkörnern* leads to a type conflict in
(64a): The hailstones are required to be both of type TROPE and type PHYS. In this case,
type accommodation via polymorphic types takes place; see the generalized rule in
Asher (2011: 225): First, the problematic subformula (which hosts the type conflict)
undergoes λ-abstraction; see (64b). Then, the coercion functor (64c) is applied to the
abstracted part; [see 64d)]. This coercion functor introduces a new variable c and
links it to the abstracted variable y via an underspecified predicate φ$_{TROPE(HAILST)}$ (c, y).
That is, c must be some hailstone-dependent trope. The result is inserted into the
original term yielding the revised logical form for *von den Hagelkörnern* in (64f).
Now that the compositional conflict is locally resolved, the subsequent composition
proceeds as usual; see (64g–i). The resulting semantic representation for *von*'s stative
reading in (64i) states that there is a state s of a definite square exhibiting a particular
whiteness r' which is caused by a hailstone-dependent trope r that is related in a
semantically underspecified way to some definite hailstones.

This is how far the compositional semantics gets us. From (64i) we know that
some property manifestation of the hailstones is the reason for the square being
white. Before turning to the pragmatic specification that legitimates the above type
accommodation, let us first spell out *von*'s eventive reading. The eventive variant of
von's lexical entry is provided in (65).

(65) *von* ('from'):   eventive reading (first version)
λc λP λv λc' λπ [P(v)(c')(π) & cause (c, c', π *ARG$_1^{pred(c)}$:TY^{PS}(c) *ARG$_1^P$:
TY^{PS}(P) *ARG$_1^{cause}$: EV − EV (TY$^+$(c) ⊑ PHYS) *ARG$_2^{cause}$:EV)]

Eventive causal *von* patterns with stative causal *von* in tolerating internal arguments
that denote physical objects; see, e.g., (25). That is, if *von*'s internal argument c is
not of the requested type EV(ENT) but rather PHYS, type accommodation will take
place as in the stative case above. Note that the lexical entry of German causal *von*
differs from Russian *ot* in this respect; see our discussion of (27)–(29) in Sect. 2.5.
Eventive *ot* requires its internal argument c to be of type EV(ENT) and does not
support type accommodation via a polymorphic type.

As it stands, the lexical entry in (65) would work fine in combination with eventive expressions such as dying or waking up in (66a,b) or with the eventive copula *werden* ('become') in (66c).

(66) a. Cleopatra starb von einem Schlangenbiss.
      Cleopatra died from a snake-bite
    b. Paul wachte von Anjas Lachen auf.
      Paul woke from Anja's laughing up
    c. Anna wurde vom Laufen müde.
      Anna became from.the running tired

Yet, (65) does not work for stative copula sentences; they don't meet eventive *von*'s type requirements concerning c'. Our previous discussion of *von*'s eventive reading indicates, though, that copula sentences in combination with eventive causal *von*-modifiers are understood as expressing result states. That is, the compositionally provided state is coerced into a result state of a becoming event. This observation motivates the following revision of *von*'s lexical entry.

(67) *von* ('from'): eventive reading (final version)
$\lambda c\ \lambda P\ \lambda v\ \lambda c'\ \lambda\pi$ [P(v)(c')(π) & cause (c, c', π *ARG$_1^{pred(c)}$:TY^{PS}(c) *ARG$_1^P$:
TY^{PS}(P) *ARG$_1^{cause}$: EV — EV (TY$^+$(c) $\sqsubseteq$ PHYS) *ARG$_2^{cause}$:EV — EV$_{BECOME}$
(TY$^+$(P) $\sqsubseteq$ K-STATE))]

That is, if the modifier's target argument c' is not of the expected type EVENT but of type K-STATE, this type conflict can be resolved by assuming a becoming event that is dependent on the given state. Example (68) illustrates the derivation of the compositional semantics for sentence (3a).

(68) Paul ist müde von der Reise. ('Paul is tired from the trip.')
    a. [$_{PP}$ von der Reise]:
       $\lambda c\ \lambda P\ \lambda v\ \lambda c'\ \lambda\pi$ [P(v)(c')(π) & cause (c, c', π *ARG$_1^{pred(c)}$:TY^{PS}(c)
       *ARG$_1^P$: TY^{PS}(P) *ARG$_1^{cause}$: EV — EV (TY$^+$(c) $\sqsubseteq$ PHYS) *ARG$_2^{cause}$:
       EV — EV$_{BECOME}$ (TY$^+$(P) $\sqsubseteq$ K-STATE))] (def-j:EV [journey(j)])
       = $\lambda P\ \lambda v\ \lambda c'\ \lambda\pi$ [P(v)(c')(π) & cause (def-j:EV [journey(j)], c', π
       *ARG$_1^{journey}$:EV *ARG$_1^P$: TY^{PS}(P) *ARG$_1^{cause}$: EV *ARG$_2^{cause}$:EV — EV$_{BECOME}$
       (TY$^+$(P) $\sqsubseteq$ K-STATE))] type compatibility
    b. [$_A$ müde]:
       $\lambda x\ \lambda r\ \lambda\pi$ [tiredness (r, x, π * ARG$_1^{tiredness}$:TROPE * ARG$_2^{tiredness}$:ANIMATE)]
    c. [$_{AP}$ müde]:
       $\lambda Q\ \lambda y\ \lambda s\ \lambda\pi'\ \exists r'$:TROPE [state (s, r', π' *ARG$_1^{state}$:K-STATE) & Q(y)(r')(π')]
       ($\lambda x\ \lambda r\ \lambda\pi$ [tiredness (r, x, π * ARG$_1^{tiredness}$:TROPE *ARG$_2^{tiredness}$:ANIMATE)])
       = $\lambda y\ \lambda s\ \lambda\pi'\ \exists r'$:TROPE [state (s, r', π' *ARG$_1^{state}$:K-STATE) & tiredness
       (r', y, π' *ARG$_2^{tiredness}$:ANIMATE)]

d. $[_{AP}$ $[_{AP}$ müde] $[_{PP}$ von der Reise]]:

   λP λv $\lambda c'$ $\lambda \pi$ $[P(v)(c')(\pi)$ & cause (def-j:EV [journey(j)], c', π $*\underline{ARG_1^P}$: $\text{TY}^{\text{PS}}(P)$ $*\underline{ARG_2^{\text{cause}}}$:EV $-$ EV$_{\text{BECOME}}$ ($\text{TY}^+(P)$ $\sqsubseteq$ K-STATE)] (λy λs $\lambda \pi'$ $\exists r'$:TROPE [state (s, r', π' $*\underline{ARG_1^{\text{state}}}$:K-STATE) & tiredness (r', y, π' $*\underline{ARG_2^{\text{tiredness}}}$:ANIMATE)])

   $=$ λv $\lambda c'$ $\lambda \pi$ $\exists r'$:TROPE [state (c', r', π $*\underline{ARG_1^{\text{state}}}$:K-STATE) & tiredness (r', v, π $*\underline{ARG_2^{\text{tiredness}}}$:ANIMATE) & cause (def-j:EV [journey(j)], c', π $*\underline{ARG_1^P}$: $\text{TY}^{\text{PS}}(P)$ $*\underline{ARG_2^{\text{cause}}}$:EV $-$ EV$_{\text{BECOME}}$ ($\text{TY}^+(P)$ $\sqsubseteq$ K-STATE))]   type conflict

e. Abstraction:

   λy $\lambda \pi$ [cause (def-j:EV [journey(j)], y, π)] (c')(π $*\underline{ARG_2^{\text{cause}}}$: EV $-$ EV$_{\text{BECOME}}$ (TIREDNESS-STATE) $*$ ARG$_1^{\text{state}}$:K-STATE)

f. Coercion functor for eventive *von*:

   λP λz $\lambda \pi''$ $\exists e$:BECOME(TIREDNESS-STATE) $[P(e)(\pi'')$ & $\phi_{\text{BECOME(TIREDNESS-STATE)}}$ (e, z, π'')]

g. Application of the coercion functor to the abstracted part:

   λP λz $\lambda \pi''$ $\exists e$:BECOME(TIREDNESS-STATE) $[P(e)(\pi'')$ & $\phi_{\text{BECOME(TIREDNESS-STATE)}}$ (e, z, π'')] (λy $\lambda \pi$ [cause (def-j:EV [journey(j)], y, π)])

   $=$ λz $\lambda \pi''$ $\exists e$:BECOME(TIREDNESS-STATE) [λy $\lambda \pi$ [cause (def-j:EV [journey(j)], y, π)](e)(π'') & $\phi_{\text{BECOME(TIREDNESS-STATE)}}$ (e, z, π'')]

   $=$ λz $\lambda \pi''$ $\exists e$:BECOME(TIREDNESS-STATE) [cause (def-j:EV [journey(j)], e, π'') & $\phi_{\text{BECOME(TIREDNESS-STATE)}}$ (e, z, π'')]

h. (64e) with type accommodation:

   λz $\lambda \pi''$ $\exists e$:BECOME(TIREDNESS-STATE) [cause (def-j:EV [journey(j)], e, π'') & $\phi_{\text{BECOME(TIREDNESS-STATE)}}$ (e, z, π'')] (c')(π $*\underline{ARG_2^{\text{cause}}}$: EV $-$ EV$_{\text{BECOME}}$ (TIREDNESS-STATE) $*$ARG$_1^{\text{state}}$:K-STATE)

   $=$ $\exists e$:BECOME(TIREDNESS-STATE) [cause (def-j:EV [journey(j)], e, π) & $\phi_{\text{BECOME(TIREDNESS-STATE)}}$ (e, c', π $*$ARG$_1^{\text{state}}$:K-STATE)]

i. (64d) with type accommodation:

   λv $\lambda c'$ $\lambda \pi$ $\exists r'$:TROPE $\exists e$:BECOME(TIREDNESS-STATE) [state (c', r', π $*\underline{ARG_1^{\text{state}}}$: K-STATE) & tiredness (r', v, π $*$ARG$_2^{\text{tiredness}}$:ANIMATE) & cause (def-j:EV [journey(j)], e, π) & $\phi_{\text{BECOME(TIREDNESS-STATE)}}$ (e, c', π $*$ARG$_1^{\text{state}}$:K-STATE)]

j. $[_{IP}$ Paul $[_{VP}$ $[_{AP}$ $[_{AP}$ müde] $[_{PP}$ von der Reise]] ist]]:

   $\lambda \pi$ $\exists c'$:K-STATE $\exists r'$:TROPE $\exists e$:BECOME(TIREDNESS-STATE) [state (c', r', π) & tiredness (r', paul, π) & cause (def-j:EV [journey(j)], e, π) & $\phi_{\text{BECOME(TIREDNESS-STATE)}}$ (e, c', π)]

Observe that *von*'s internal NP *der Reise* ('the trip') is of type EVENT. Thus, no type accommodation is required to compute the semantic representation of the PP; see (68a). Note furthermore that there is no way to combine the *von*-modifier directly with the adjective. Within the lexical entry of eventive *von* no provisions are made for accommodating a trope argument in the c'-position. This implies that an eventive *von*-modifier can only combine with an adjectival predicate after the ETC operation has taken place; see (68b,c). This accounts for our syntactic observations from Sect. 4: eventive *von* adjoins at the AP-periphery. The combination of the causal *von*-modifier with AP yields a type conflict (EVENT vs. K-STATE); see (68d). This conflict can be resolved due to *von*'s polymorphic

type for c'. As in the stative case above, the problematic subformula is λ-abstracted (68e); and the coercion functor (68f) is applied to the abstracted part (68 g). The result is inserted into the original term yielding the revised logical form for a modifying eventive *von*-PP in (68i). After type accommodation has taken place the subsequent composition proceeds as usual leading to (68j) as the final semantic representation.

In prose: There is a state c' of Paul exhibiting a particular tiredness r' whose start e was caused by a definite trip. Note that, although an eventive argument e was inserted to resolve the type conflict in (68d), the AP's state argument is the one that remains compositionally active afterwards. That is, the given type accommodation is a local operation that does not affect the interpretation and later compositional behavior of the expression; it only affects the local predication (see Asher 2011: 223). In other words, a sentence such as (68) is still stative, even though it requires the accommodation of an event.

The interpretation of a sentence such as (69) requires type accommodation for both *von*'s internal and its external argument. The resulting semantic representation is given below: There is a state c' of Paul exhibiting a particular fullness r' that was initiated by an underspecified event e' related to a definite pizza.

(69)   Paul war satt von der Pizza. ('Paul was full from the pizza.')
λπ ∃c':K-STATE ∃r':TROPE ∃e:BECOME(FULLNESS-STATE) ∃e':EV(PIZZA)
[state (c', r', π) & fullness (r', paul, π) & cause (e', e, π) &
$\phi_{\text{BECOME(FULLNESS-STATE)}}$ (e, c', π) & $\phi_{\text{EV(PIZZA)}}$ (e', def-p:PHYS [pizza (p)], π)]

The stative and eventive variants of causal *von* in (63) and (67) can be merged into a single lexical entry:

(70)   *von* ('from'):   eventive and stative reading
λc λP λv λc' λπ [P(v)(c')(π) & cause (c, c', π $*\text{ARG}_1^{\text{pred(c)}}$:TY$^{\text{PS}}$(c) $*\text{ARG}_1^{\text{P}}$:
TY$^{\text{PS}}$(P) $*\text{ARG}_1^{\text{cause}}$: EV ⊔ TROPE — EV ⊔ TROPE (TY$^+$(c) ⊑ PHYS)
$*\text{ARG}_2^{\text{cause}}$:EV ⊔ TROPE — EV$_{\text{BECOME}}$ (TY$^+$(P) ⊑ K-STATE))]

The lexical entry in (70) summarizes the lexical part of our analysis.[29] It determines that *von*'s causal relata belong to the summation of the domains of events and tropes, and it licenses type accommodation if the causer argument c is instead a physical object. As for c', type accommodation is only available in the eventive case, provided that the compositionally supplied target is a K-state. (70) ensures that the stative reading of causal *von* can only be generated if the modifier adjoins before the ETC operation takes place, i.e. the stative reading is based on A-adjunction. Only then will the modifier be able to target the adjectival trope argument. The eventive reading, on the other hand, can only be derived with the modifier adjoining

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[29] Given our observations concerning Russian causal *ot* in Sect. 2.5, *ot*'s lexical entry would differ from (70) only in not offering event coercion for the first argument of c; see (i).

(i)   Russian causal *ot*:
λc λP λv λc' λπ [P(v)(c')(π) & cause (c, c', π $*\text{ARG}_1^{\text{pred(c)}}$:TY$^{\text{PS}}$(c) $*\text{ARG}_1^{\text{P}}$: TY$^{\text{PS}}$(P)
$*\text{ARG}_1^{\text{cause}}$: EV ⊔ TROPE — TROPE (TY$^+$(c) ⊑ PHYS) $*\text{ARG}_2^{\text{cause}}$:EV ⊔ TROPE — EV$_{\text{BECOME}}$ (TY$^+$(P) ⊑ K-STATE))].

at the AP-level, after ETC has taken place. Only then can *von*'s coercive option concerning c' be exploited. Thus, (70) accounts for the observed syntactic distribution of the two *von*-versions based on a single lexical entry with maximally identical semantic content.[30]

With this compositional analysis in place, we may now turn back to our observation from Sect. 2.5 that there is a strong tendency to build stative causal readings with weak NPs, whereas eventive readings go along with both strong and weak NPs; see the discussion of (30)–(33). Though a full explanation of the referential properties must await future research, our analysis suggests the following motivation for the observed preference. Stative *von*-modifiers are required to combine directly with the adjectival head; only then are they able to target the adjectival trope argument. In doing so, their semantic content feeds into that of the adjectival predicate. The result is a complex adjectival predicate. Thus, the formation of a complex predicate 'A + *von*-modifier' may be viewed as a further case of pseudo-incorporation; see Dayal (2011), Espinal and McNally (2011), Frey (2015) and Gehrke (to appear). Take, for instance, complex predicates such as 'red from blood', 'red from autumn leaves' or 'red from the evening glow'. These denote different kinds of redness. This is why stative *von*-modifiers are understood as providing manner-like information [see (49)–(50)], and why they only take narrow scope with respect to sentential negation; see (46). Weak NPs fit best into this complex predicate structure; see, e.g., Carlson (2003) and the literature on pseudo-incorporation. Eventive *von*-modifiers, on the other hand, do not relate to the adjectival trope argument. That is, they do not shape further the adjectival predicate but provide an independent cause for the respective trope to show up. The ETC operation in (57), which applies at the AP-boundary and whose effect is to bind the trope argument existentially and to introduce a K-state argument as referential target for the subsequent composition, marks the divide between building up a possibly complex trope predicate and the trope's instantiation in a bearer.

6 Pragmatic type specification

The last piece of our analysis concerns the pragmatic specification of the Logical Form. Underspecified predicates that were introduced to solve a type conflict require a type specification process that is modeled in TCL in terms of a modal logic with a weak conditional operator '>'; see Asher (2011: 227ff). The coercive intervention is pragmatically legitimated only if there is a sensible type specification for those underspecified predicates that were introduced in the course of type accommodation; otherwise, the coercive rescue fails. In (71), two such type specification rules are provided for illustration. Their application yields plausible interpretations for sentences (69) and (64).

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[30] One could think of extending *von*'s lexical entry further such that it would also cover the agentive reading of *von*; see (7e). One possible option would be to analyze agentive *von* as a special case of eventive causal *von* by allowing type accommodation from agents to events. We leave this question for future research.

(71) Defeasible type specification rules ('$>$': weak conditional)

    a. $\alpha \sqsubseteq$ FOOD $\&$ $\beta \sqsubseteq$ ANIMATE $\&$ cause (EV (β, α), BECOME
       (K-STATE (FULLNESS (β)))) $>$ EV (β, α) $=$ EAT (β, α)

    b. $\alpha \sqsubseteq$ PHYS $\&$ $\gamma \sqsubseteq$ PHYS $\&$ $\beta(\gamma) \sqsubseteq$ SENSORIC_TROPE (γ) $\&$ cause (TROPE (α), $\beta(\gamma)$)
       $>$ TROPE (α) $=$ $\beta(\alpha)$

The rule in (71a) says that if α is a subtype of food, and β is a subtype of an animate being, and some event involving individuals of type β and α causes a change of state that results in the individual of type β exhibiting fullness, then this event most probably is an eating event. Rule (71a) provides us with a plausible pragmatic specification for sentence (69). While the compositional semantics remains underspecified with respect to the kind of event that caused the fullness, drawing the inference in (71a) will lead to a pragmatic specification according to which Paul was full because of eating the pizza.

Rules such as (71a) reflect our world knowledge and they may take into account further factors such as context and plausibility; see our remarks on several pragmatic specification options for sentence (25b) in Sect. 2.5.

Finally, to account for the stative case we propose the inference rule in (71b): If some trope of a physical object of type α causes a sensoric trope β (i.e. an optic, haptic or olfactoric trope) in a physical object of type γ, then that trope corresponds to β. In the case of our example sentence (64), this inference rule guarantees that the square's whiteness is due to the whiteness of the hailstones. Thus, the rule in (71b) is the source of the inference pattern (12), which we used as a diagnostic for *von*'s stative reading in Sect. 2.2. As we noted earlier, this inference pattern is not strictly logically valid but is subject to some pragmatic fine tuning; see the discussion of (12)–(13). The default rule in (71b) reflects this pragmatic bias, and it provides an explanation for the intuitive impression mentioned at the beginning that there is some kind of "property transfer" from the cause to the effect in the stative case.

Furthermore, recall the observation in Sect. 2.2 that the stative reading of causal *von*-modifiers has a limited distribution and is only licensed in combination with adjectives that denote optic, haptic or olfactoric properties. Our present analysis allows for the derivation of under-specified semantic representations with any kind of tropes, but then type justification fails, assuming that there are no further type specification rules apart from (71b). That is, no well-formed type specification for the underspecified predicate $\phi_{\text{TROPE}(\alpha)}$ can be derived for non-sensoric tropes. An alternative solution would be to constrain *von*'s lexical entry further, as in (72). This would impede combining stative *von* with expressions that denote properties other than sensoric ones.

(72) *von* ('from'):
    $\lambda c\, \lambda P\, \lambda v\, \lambda c'\, \lambda\pi$ [P(v)(c')(π) $\&$ cause (c, c', π *ARG$_1^{\text{pred}(c)}$:TY$^{\text{PS}}$(c)
    *ARG$_1^{\text{P}}$:TY$^{\text{PS}}$(P) *ARG$_1^{\text{cause}}$: EV $\sqcup$ TROPE $-$ EV $\sqcup$ TROPE (TY$^+$(c) $\sqsubseteq$ PHYS)
    *ARG$_2^{\text{cause}}$:EV $\sqcup$ SENSORIC_TROPE $-$ EV$_{\text{BECOME}}$ (TY$^+$(P) $\sqsubseteq$ K-STATE))]

A choice between the alternatives has to take into account causal *von*'s broader combinatorial behavior with expressions other than adjectives. If the same kinds of limitations are observed there, this would indicate that we are dealing with a lexical restriction of *von*. Otherwise, a solution at the level of types seems more appropriate. Finally, it also remains to be clarified whether rule (71b) should have the status of a default inference. We leave these questions for future exploration.

7 Conclusion

The present paper has developed a semantic analysis of causal *von*-modifiers that accounts for the core empirical observations concerning the combinatorics and interpretation of causal *von* that we presented in Sect. 2. The eventive/stative ambiguity that we diagnosed for causal *von* could be traced back to a sortal contrast of the causal relata, which can be either Davidsonian events or tropes in the sense of Moltmann (2007, 2009, 2013, 2015). Furthermore, this sortal contrast was argued to be reflected by the syntax. We proposed that eventive and stative *von*-modifiers occupy distinct syntactic base positions: stative *von* is adjoined to A, and eventive *von* adjoins to AP. Based on this syntactic difference, we presented a compositional account that derives the two readings from a single lexical entry for *von* with maximally simple lexical content: cause (c, c').

Our compositional account includes measures to solve type conflicts—always provided that these are lexically sanctioned. A comparison of German causal *von* with its counterpart *от* in Russian revealed that *от* patterns with *von* in also having an eventive and a stative reading. However, *от* is more restrictive in not tolerating type accommodation in the eventive case. Unlike *von*, *от* does not offer a rescue strategy to infer a plausible event from a given object referent; see (27)–(29). This crosslinguistic difference supports an approach to coercion that takes the potential to reinterpret and adapt expressions according to combinatoric demands to be basically a matter of lexical semantics rather than being guided by general pragmatic strategies alone. We see this approach as providing a promising perspective for developing a sufficiently restrictive model of lexical semantics that is able to properly account for the observed flexibility and adaptivity of lexical meaning while adhering to compositionality as the core combinatoric principle.

Further characteristic features of the interpretation of causal *von*-modifiers, such as their inferential behavior or the holistic effect on the interpretation of the internal argument of stative *von,* could be explained as following from independently motivated conceptual assumptions. These concern in particular the spatiotemporal grounding of causation in terms of spatiotemporal contiguity axioms. The inference that *von*'s internal NP referent is located on the subject referent at the time of the predication follows from the fact that stative causation relies on spatial inclusion between the causing and the resulting trope. The holistic effect of stative causal *von*, i.e. the inference that *von*'s internal NP referent is not only located somewhere on the subject referent but actually covers (all relevant parts of) it, is accounted for by appealing to Löbner's (2000) Presupposition of Indivisibility.

Our analysis of *von*-modifiers makes a case for direct causation in the sense of Wolff ([2003](#)) as a linguistically relevant notion. Causal *von* turned out to be a linguistic expression that may only express direct causation. Furthermore, the ontological properties of direct causation, which we spelled out in terms of spatiotemporal contiguity axioms, as well as its logical properties, e.g., non-transitivity, set direct causation clearly apart from indirect causation. This raises the question of whether the analysis of natural language meaning requires not only one but two basic causal relations, direct versus indirect causation. One option that could be explored, taking up Copley and Wolff's ([2014](#)) discussion and comparison of the two major theoretical approaches to causation, is to define direct causation force-theoretically and indirect causation in terms of a counterfactual foundation. Alternatively, if we want to stick with one fundamental relation 'cause', the observed differences concerning direct and indirect causation as well as other, more abstract causal relations involving facts, propositions, etc. could possibly be accounted for in terms of a broader spectrum of sortal differences with concomitant axiomatic specifications. We leave these questions concerning the ontological basis of 'cause' for future research.

While we remain neutral as to whether natural language meaning requires one or more core relations of causation, our analysis makes a strong case for assuming a stative notion of (direct) causation on a par with eventive causation. Up to now, the focus of linguistic research has been almost exclusively on causation as a relation among events. Apart from a few cursory remarks, the case of stative causation has been widely neglected. Our analysis of causal *von* counterbalances this eventive bias by arguing that there is in fact a stative variant of causation on a par with eventive causation. Moreover, we argued that the two variants differ only in terms of the type of their arguments: events versus tropes. All further differences, as well as an explanation, why it is just events and tropes—but not, for instance, K-states—that enter (direct) causal relations, could be derived from very general assumptions concerning the ontological nature of events and tropes as spatiotemporal particulars. Thus, apart from providing an analysis of causal *von*-modifiers, our study aimed to contribute to a more balanced perspective on causation as one of the core notions of human language and cognition.

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