

# German *wie*-complements: Manners, methods and events in progress

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DRAFT VERSION

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## 1 Introduction

German *wie* ('how' / 'like') is, first of all, a question word asking for manner or method. It occurs in many syntactic environments, most prominently in questions, as in (1). In this paper we focus on clausal complements headed by *wie*, which give rise to two types of readings. First, there is a manner reading, as shown in (2). This reading allows for clarification questions with *wie*, to be answered by the manner (pure manner or method) in which the event was performed (answer 1 and answer 2). Secondly, there is a reading which is not a manner reading but instead is close in meaning to bare infinitives and to *that*-clauses and is preferably translated into English by a progressive, see (3). This reading does not allow for *wie* clarification questions, but only for questions addressing the reason or way the event came about. We name it the *eventive reading* of *wie*-complements.

- (1) Wie hat Berta ihre Tasche gepackt?  
'How did Berta pack her bag?'

- (2) Anna sah, wie Berta ihre Tasche packte. manner reading  
'Anna saw how Berta packed her bag.'

clarification question: Und WIE hat sie ihre Tasche gepackt?  
'And how did she do that?'

answer 1: Sehr hastig. (pure manner)  
'Very hastily.'

answer 2: Zuerst die Turnschuhe, dann ein T-shirt, dann ein Buch (method)  
und oben drauf einen Pulli.  
'Running shoes first, then a T-shirt, then a book, and on top a sweater.'

- (3) Anna sah, wie Berta ihre Tasche packte.  
'Anna saw Berta packing her bag.'

eventive reading

clarification question : #Und WIE hat sie ihre Tasche gepackt?  
'And how did she do that?'

clarification question : Was ist geschehen? / Wie ist das gekommen?  
'What happened?' / 'How come?'

answer: Sie hat sich mit ihrer Schwester gestritten.  
'She had a fight with her sister.'

The semantics of *wie*-complements is puzzling for a number of reasons. First, there is the question of how the eventive reading comes about. Restrictions on embedding verbs make it obvious that eventive *wie*-complements denote neither questions nor propositions, since embedding under *fragen* and *wissen* ('ask', 'know') is blocked (see ex.11 below). According to the commonly agreed on intuition described in the literature, eventive *wie*-complements induce a process-perspective such that the event is presented as a scene or situation. This intuition is confirmed by the fact that nominal labels for eventive *wie* complements are nouns like *Vorgang*, *Szene* or *Begebenheit* ('process', 'scene', 'event') (see 6d below). We will thus assume that eventive *wie*-complements denote events in progress.

Manner *wie*-complements denote, first, questions or propositions. This is obvious in the case of *fragen*, *wissen* ('ask', 'know'). When embedded under perception verbs or report verbs like *sehen* and *erzählen* ('see', 'report'), manner *wie*-complements have to be analyzed as free relative clauses denoting DPs of type *manner*. However, the interrogative as well as the free relative analysis require an interpretation of the wh-word *wie*, and even though the semantics of questions and free relative clauses is in general well understood, there is no agreement about the denotation of manner questions and manner free relatives – are we obliged to add manners to the ontology or is there a more conservative solution? Thus a semantic analysis has to answer the question what the meaning of the wh-word *wie* is — in addition to (or even before) addressing the interpretation of *wie*-complements.

The third and most puzzling issue is the word *wie* itself. There are a number of languages featuring a non-manner interpretation of a manner wh-word, and it would clearly not be adequate to assume that these are two homonymous words in language after language. Focusing on German *wie*, an interpretation is required explaining why *wie* is used to introduce events in progress in addition to manners of events. So the question from the perspective of German (as well as Russian and Polish though not English) is: Why use a manner word to express an event in progress?

The analysis presented in this paper includes four building blocks:

- (A) The similarity interpretation of *wie*;

this interpretation has been suggested, e.g., for equative comparison constructions (*Anna tanzte wie Berta*. 'Anna danced like Berta did') where *wie* is said to express a similarity relation between, e.g. events. The notion of similarity is spelt out in multi-dimensional attribute spaces (Umbach & Gust 2014).

- (B) Two base positions of *wie* in syntax;

we follow, on the one hand, Frey (2003) assuming a verb-adjacent base position of manner adverbs in German and, on the other hand, Legate's (2010) proposal of an in situ base position of English *how* in non-manner clauses.

(C) The semantics of manner *wie*-complements;

we propose to consider manners, pure manners as well as methods, as similarity classes of events of a given event type. Methods, in particular, are understood as similarity classes of sequences of subevents. When occurring as free relative clauses (embedded under e.g., *sehen* 'see'), manner *wie*-complements denote manner similarity classes, and when occurring as interrogative clauses (embedded under e.g., *fragen* 'ask') they denote propositions asserting that the event is in a particular manner similarity class.

(D) The semantics of eventive *wie*-complements;

we start from the observation that eventive *wie*-complements express events in progress and the common idea that an event in progress is an initial sequence of subevents of the respective type plus possible continuations. Furthermore, we make use of the analysis of methods as similarity classes of sequences of subevents and provide a similarity-based characterization of events in progress based on Bonomi (1997). Bringing these two views together, eventive *wie*-complements are analyzed as methods (i.e. similarity classes of sequences of subevents) that share a given initial sequence.

According to this analysis, the core difference between the manner and the eventive reading is the attachment point of the *wh*-word *wie*. In the case of the manner reading it is attached to the event type given by the verb and it generates classes of similar events of this type; in the case of eventive readings it is attached to the event token given by the verb phrase (or higher) and it generates classes of similar continuations of this event.

In Section 2, the data will be discussed. Section 3 presents the (rare) literature on German *wie*-complements and Legate's (2010) article on English *how* clauses. From there on, our paper is organized along the building blocks listed above: Section 4 gives a brief overview over the similarity framework (A), Section 5 presents the analysis starting with syntactic base positions (B), proceeding with the semantics of manner *wie*-complements (C) and eventive *wie*-complements (D).

Although non-manner uses of manner *wh*-words are found in a number of languages including Russian, Polish, French, Greek and Hebrew, and also in English, this paper focuses exclusively on German, since there seems to be considerable semantic variation between languages. While in Russian and Polish non-manner uses of manner *wh*-words match semantically with the findings for German, English non-manner uses of *how* clearly differ in meaning. Cross-linguistics comparison requires substantial additional research, which has to be left for future work.

## 2 The data

When considering a sentence in isolation hosting a *wie*-complement the reading of the complement may not be obvious. The difference between the manner reading and the eventive reading of example (1) is manifest only when taking the different clarification questions into account. In this section, a number of tests will be reviewed distinguishing the two readings – accenting, continuations, nominal labels, and adverb position. Finally, matrix verbs licensing the respective readings are described. Manner and eventive readings will be distinguished by subscripts ( $wie_M$  /  $wie_E$ ).

As for terminology, we will use the term *manner* in a broad sense covering *pure manner* (4a) (i.e. manner in a narrow sense), *instrument* (4b), and *method* (4c, d). Methods may be given as single more concrete events or as sequences of subevents. We will focus on the latter.

- (4) a. She danced frantically.  
 b. She opened the can with a knife.  
 c. She solved the problem by taking a loan.  
 d. She drove to Metz by first going to Dijon, then from Dijon to Nancy and finally from Nancy to Metz.

Consider the manner *wie* complement in (5). Accent on the wh-word is licit although not obligatory, cf. (a). The sentence is naturally continued by specifying a manner or method, cf. (b). Nominal paraphrases make use of the nouns *Art* or *Weise* ('manner', 'way'), cf. (c).

- (5) a. Anna sah, *wie<sub>M</sub>* / *WIE<sub>M</sub>* Berta ihre Tasche packte,  
 b. ... nämlich wild durcheinander /  
 ... nämlich zuerst die Turnschuhe, dann ein paar T-shirts, und oben drauf einen Pullover.  
 'Anna saw how Berta packed her bag, ... namely messy /  
 ... namely running shoes first, then some T-shirts and on top a sweater.'  
 c. Anna sah, auf *welche Art* / *in welcher Weise* Berta ihre Tasche packte.  
 'Anna saw the manner / the way in which Berta packed her bag.'

Eventive readings do not license accenting of the wh-word, (6a). Subsequent sentences preferably add another event, while *namely*-specifications are blocked, (6b, c). Labels in paraphrases are nominals like *Szene*, *Situation*, *Vorgang* and *Begebenheit* ('scene', 'situation', 'process', 'event'), confirming the intuition that eventive *wie* complements emphasize a process, see (6d).

- (6) a. Anna sah, *wie<sub>E</sub>* / \**WIE<sub>E</sub>* Berta ihre Tasche packte,  
 b. ... und das Haus durch die Hintertür verließ.  
 c. ... \*nämlich wild durcheinander.  
 'Anna saw Berta packing her bag,  
 ... and leaving the house by the backdoor. / ... \*namely messy.'  
 d. Anna sah die *Szene* / *die Situation* / *den Vorgang*, *wie* Berta ihre Tasche packte.  
 'Anna saw the scene / situation / process when Berta was packing her bag.'

If *wie* is combined with a gradable adverb, it acts as a degree modifier and the adverb is fronted together with the wh-word. Degree readings of *wie*-complements allow accent on the wh-word, subsequent degree specifications, see (7a), and paraphrases make use of degree nominals, e.g., *Geschwindigkeit* 'speed', (7b). Otherwise they pattern with manner readings, which is why they will not be considered separately from the manner cases.

- (7) a. Anna sah, *wie<sub>M</sub>* schnell / *WIE<sub>M</sub>* schnell Berta ihre Tasche packte [... nämlich blitzartig].  
 'Anna saw how fast Berta packed her bag. [... namely in a flash.]'  
 b. Anna sah, *in welcher Geschwindigkeit* Berta ihre Tasche packte.  
 'Anna saw the speed in which Berta packed her bag.'

Even though degree readings will not be in focus in this paper, we will make use of the syntactic behavior of gradable adverbs as an additional feature distinguishing manner readings and eventive readings: If a gradable adverb in a *wie*-complement stays in situ, as in (8a), the eventive reading is the only option, which is evidenced by the fact that accenting and *namely* continuations specifying manners are blocked, (8b). So gradable adverbs provide a reliable test we will frequently make use of: If a

gradable adverb can be inserted next to the verb, the reading must be eventive.<sup>1</sup> But if it is fronted together with the *wh*-word, the *wie*-complement has a degree reading, which we subsume under the notion of manner. We will come back to this issue in Section 5.1.

- (8) a. Anna sah, *wie*<sub>E</sub> Berta schnell ihre Tasche packte.  
'Anna saw Berta quickly packing her bag'
- b. Anna sah, \**WIE*<sub>E</sub> Berta schnell ihre Tasche packte, [\*... nämlich blitzartig.]  
LIT: 'Anna saw HOW Berta quickly packed her bag, [namely in a flash.]'

From the point of view of the matrix clause, *wie*-complements are verbal arguments required by the subcategorization frame of the matrix verb, not to be confused with temporal *wie*-clauses which are adjuncts (as are temporal *als*-clauses), see (9b, c).

- (9) a. Anna sah, *wie*<sub>M/E</sub> Berta ihre Tasche packte. *wie*-complement  
'Anna saw Berta packing her bag.'
- b. Anna sah Berta, *wie* sie gerade ihre Tasche packte. temporal *wie*-clause
- c. Anna sah Berta, *als* sie ihre Tasche packte. temporal *als*-clause  
'Anna saw Berta when she packed her bag.'

Matrix verbs embedding manner readings of *wie*-complements are, on the one hand, interrogative and factive verbs and, on the other hand, perception verbs, cognitive verbs and report verbs, (10a,b). Verbs generally blocking *wh*-interrogatives, like *glauben*, *behaupten* ('believe', 'assert') also block manner readings of *wie*-complements, (10c). In Section 5.1 manner *wie*-complements embedded under interrogative and factive verbs will be analyzed as interrogative clauses denoting questions. When embedded under perception verbs, cognitive verbs and report verbs they will be analyzed as free relative clauses, i.e. DPs denoting manners (which, in turn, will be interpreted as similarity classes).<sup>2</sup>

- (10) a. Anna fragte / wusste / bedauerte, *wie*<sub>M</sub> Berta ihre Tasche packte.  
'Anna asked / knew / regretted how Berta had packed her bag.'
- b. Anna sah / erinnerte sich / erzählte, *wie*<sub>M</sub> Berta ihre Tasche packte.  
'Anna saw / remembered / reported how Berta had packed her bag.'
- c. \*Anna glaubte / behauptete, *wie*<sub>M</sub> Berta ihre Tasche packte.  
'Anna believed / claimed how Berta packed her bag.'

Matrix verbs embedding eventive *wie*-complements are perception verbs, cognitive verbs and report verbs. Eventive readings are blocked under interrogative and factive verbs (and also *believe* type verbs). See (11a, b, c), for evidence and please note that the *wie*-complements in (11) are unambiguously eventive due to adding a degree adverb in its base position. To conclude, the set of verbs embedding eventive readings corresponds to that embedding manner readings to the exclusion of interrogative and factive ones.<sup>3</sup>

<sup>1</sup> One might think that a manner interpretation of (8a) should be possible, in the sense of Anna seeing the manner of Berta's quickly packing her bag. However, native speakers consistently rule out such a reading.

<sup>2</sup> It might be argued that perception verbs embed not only free relatives but also interrogatives. We skip this possibility here for reasons of simplicity.

<sup>3</sup> There is one type of verbs embedding eventive readings but not manner readings, namely *träumen* / *sich vorstellen* 'dream' / 'imagine':

(a) Er wachte vor Lachen auf, weil er geträumt hatte, wie er (laut) einen Witz erzählt.  
'He woke up laughing because he dreamt that he told a joke.'

In (12) verbs are listed which have been attested to embed eventive *wie*-complements in a corpus study (Mieskes et al. 2007), thus disproving the widely held claim in the literature that eventive *wie*-complements can only be embedded by perception verbs (see Section 3). In (13) naturally occurring examples are shown.<sup>4</sup>

- (11) a. Anna sah / erinnerte sich / erzählte, wie<sub>E</sub> Berta ihre Tasche (schnell) packte.  
'Anna saw / remembered / reported how Berta had packed her bag.'
- b. \*Anna fragte / wusste / bedauerte, wie<sub>E</sub> Berta ihre Tasche (schnell) packte.  
'Anna asked / knew / regretted how Berta had packed her bag.'
- c. \*Anna glaubte / behauptete, wie<sub>E</sub> Berta ihre Tasche (schnell) packte.  
'Anna believed / claimed how Berta packed her bag.'

(12) Verbs embedding eventive *wie*-complements

Perception verbs: sehen, beobachten, hören, fühlen, (be)merken<sup>5</sup>, erleben  
'see', 'observe', 'hear', 'feel', 'observe', 'experience'

Cognitive verbs: sich erinnern, daran denken, vergessen, träumen, sich vorstellen  
'remember', 'keep in mind', 'forget', 'dream', 'imagine'

Report verbs: erzählen, berichten, schildern, beschreiben  
'report', 'describe'

- (13) a. Von der Dachterrasse des Hotels kann man beobachten, wie die Sonne den Himmel über der Stadt rot färbt.  
'From the roof terrace of the hotel you can watch the sun coloring the sky over the city red.'
- b. Die Architektin kann sich noch gut daran erinnern, wie sie damals in jede Ecke des Hauses gekrabbelt ist.  
'The architect vividly remembers crawling into every corner of the house.'
- c. Der Eröffnungsfilm erzählt, wie zwei Jungen in die Stadt kommen.  
'The opening film reports about two boys coming into the city.'
- d. Gefrorene Tropfen fallen – Wie Christa Wolf am Dienstag auf dem Dorotheenstädtischen Friedhof in Berlin zu Grabe getragen wurde. (Titelzeile)  
'Frozen drops fall – How Christa Wolf was buried on Tuesday at the 'Dorotheenstädtischer Friedhof' in Berlin. (newspaper headline)
- e. [...] als sie miterlebte, wie Alec einen seiner Bodyguards tötete.  
'[...] when she witnessed Alec killing one of his body guards.'

The examples above raise the question how to decide for an individual example what the intended reading is, since the difference in meaning is sometimes subtle. The example in (13a) cannot have a manner reading since the manner is already given (*den Himmel rot färben* 'color the sky red'), so it

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(example from ZAS Data base, gradable adverb inserted for disambiguation). Frank Sode (p.c.) attributes the fact that manner readings are blocked to the non-factive nature of *träumen*.

<sup>4</sup> DEWAC1, Corpuslinguistik Humboldt University Berlin, and *Süddeutsche Zeitung*.

<sup>5</sup> *Riechen* 'smell' does not allow for eventive readings, possible due to the fact that you cannot smell a process (?? *Er roch wie das Gas (langsam) ausströmte*. 'He smelled the gas slowly stream out').

cannot be asked for.<sup>6</sup> Similarly in (b) a manner reading is unlikely because the verb already specifies a particular manner of movement (*crawling*). The example in (c) is in fact ambiguous though the prominent reading is the eventive one – intuitively a film cannot tell you how the boys came to the city without reporting the event itself. Example (d) is a newspaper headline and is clearly eventive because headlines usually name situations or processes but not manners. Example (e) is again ambiguous between a manner and an eventive reading of the *wie*-complement. Disambiguation is possible with the help of a gradable adverb, say *grausam* ('cruelly'). If it is in its base position, the reading is eventive, and if fronted together with the *wh*-word, it yields a degree reading, (which we subsume under the notion of manner), see (14a, b).

- (14) a. ... *wie<sub>E</sub>* Alec einen seiner Bodyguards *grausam* tötete.  
'... Alec cruelly killing one of his body guards'
- b. ... *wie<sub>M</sub>* *grausam* Alec einen seiner Bodyguards tötete  
'... how cruelly Alec killed one of his bodyguards'

There is another test to distinguish manner and eventive readings which is based on coordination (due to Zimmermann 1991). A manner *wie*-complement can be conjoined with a *wh*-interrogative (of any type including *wie* itself), while an eventive *wie*-complement can only be conjoined with other eventive ones, see (15a, b) (note that licensing/blocking of the adverb *grausam* 'cruelly' indicates the reading of the first conjunct.). We do not, however, follow Zimmermann (1991) in considering the restriction of conjoinability as evidence that there are two homophonous *wie* words with unrelated meanings (see also Section 3).

- (15) a. Sie erzählte, *wie<sub>M</sub>* (*grausam*) Alec den Bodyguard (??? *grausam*) tötete, wann das war, wer dabei war und *wie<sub>M</sub>* er entkam.  
LIT: 'She reported how (cruelly) Alec (cruelly) killed the bodyguard, when that happened, who was present and how he escaped.'
- b. Sie erzählte, *wie<sub>E</sub>* (\**grausam*) Alec den Bodyguard (*grausam*) tötete, *wie<sub>E</sub>* er dann die Waffe entsorgte und *wie<sub>E</sub>* er schließlich entkam.  
LIT: 'She reported how (cruelly) Alec (cruelly) killed the bodyguard, how he then got rid of the weapon and how he finally escaped.'

### 3 The literature

The literature on *wie*-complements is rare. In the Duden grammar (2006) as well as the comprehensive IDS grammar (Zifonun et al. 1997) *wie*-complements are only mentioned in passing, claiming that they are restricted to perception verbs stressing the process character of the perception. Similarly, Bayer (1986) acknowledges that *wie*-complements may have non-manner interpretations while excluding them from the scope of his analysis.

There are a few articles addressing *wie*-complements in particular, namely Clement (1971), Vater (1975), and Falkenberg (1989). They consider only perception verbs, and they unanimously agree that

<sup>6</sup> It may be objected that *rot* in *rot färben* is not a manner but instead a result. Still, it is something you can ask for with the help of *wie* – *Wie hat die Sonne den Himmel gefärbt?* 'How did the sun color the sky?' It may also be objected that *krabbeln* 'crawl' could still allow for manner *wie* since there might be different ways of crawling. Such a reading is not fully excluded. But as before with example (8a) native speakers don't like it.

*wie*-complements, in contrast to *dass* 'that' complements, emphasize the process of the described event and block stative verbs. Falkenberg argues in fact that *wie*-complements are analogous to English progressives (which will be confirmed in Section 5.3).

Zimmermann (1991) lists report verbs in addition to perception verbs and gives an account of the meaning of eventive *wie*-complements in terms of event semantics including its process-like character. She rejects the idea that the expression *wie* in the case of manner and of eventive complements is the same, due to syntactic differences. She claims, however, that *wie* in the case of eventive complements and the temporal conjunction *wie* (9c above) are closely related (she speaks of adverbial vs. non-adverbial conjunction *wie*) and suggests an interpretation of temporal *wie*-clauses subsuming eventive *wie*-complements. Finally, there is a paper by Kratschmer (2013) arguing that *wie* in eventive *wie*-complements is an evidential marker. Kratschmer assumes that eventive readings can only occur with perception verbs, which leads her to a number of misjudgments of data. So all in all there is near to no research on the syntax and semantics of eventive *wie*-complements and their relation to manner *wie*-complements.<sup>7</sup>

One of the basic premises of this paper is that the word *wie* is the same in manner as well as eventive *wie*-complements. It could be argued, however, that there are two homophonous *wie* words and the search for their semantic relation is a futile exercise. Maybe the formal equivalence of manner and eventive *wie* is just a German mishap. This hypothesis is disproved by Legate's (2010) paper on English *how* showing that in colloquial English there are *how* complement clauses which clearly have no manner (or degree) meaning, as in (16).

(16) They told me how the tooth fairy doesn't really exist. = (1) in Legate (2010)

According to Huddleston and Pullum (2002), these clauses are equivalent to *that*-clauses, and *how* in these contexts has to be reanalyzed as a declarative subordinator. Legate does not follow Huddleston & Pullum and instead argues that *how*-clauses as in (16) differ syntactically from *that*-clauses in behaving like DPs instead of CPs and are thus free relative clauses instead of interrogatives. But since in contrast to regular free relatives there is no evidence for movement, *how* must be base generated in its surface position, as shown in her syntactic structure in Fig. 1 (= 27 in Legate 2010).

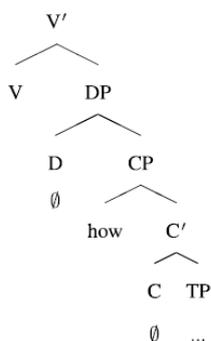


Figure 1 (27 in Legate 2010).

<sup>7</sup> For those missing reference to Barwise's seminal paper on *Scenes and other Situations* (Barwise 1989): In the beginning of our work on eventive *wie*-complements, Barwise's paper played a major role. It soon became obvious, however, that, different from what was suggested in the literature, eventive *wie*-complements are not restricted to perception verbs, and that a number of features attributed to *wie*-complements in the literature are in fact features of visual perception (e.g. simultaneity of the event expressed in the matrix verb and the embedded event, see Vater 1975). Moreover, characteristics like epistemic vs. non-epistemic seeing and veridicality are helpful in distinguishing naked infinitives from *that*-clauses but not in distinguishing manner from eventive *wie*-complements. Our problem seems not to be rooted in perception reports but instead in the expression of manner in language.

The English non-manner *how* clauses presented by Legate differ considerably from German eventive *wie*-complements. First, they are very informal in register, whereas German eventive *wie*-complements are unmarked with respect to register. Secondly, they are embedded by a number of verbs the German equivalents of which cannot embed eventive *wie* complements, e.g., *promise, forgive, find out*, see Legate's examples in (24). Even more important, these examples are evidence that non-manner *how*-clauses license stative content (as in 16 above) and, unlike German eventive *wie*-complements, do not induce a process perspective (actually, none of her examples is a progressive).<sup>8</sup> Moreover, following Legate, English non-manner *how*-clauses can be paraphrased by *the way that* which is surprising for a non-manner meaning.<sup>9</sup> In concluding her paper, Legate poses the question of "why the manner wh-phrase is used in this construction instead of any other wh-phrases in English." (p.131), claiming that this is no coincidence since other languages, e.g., French, Greek and Hebrew, exhibit a similar use of the equivalents of *how*-clauses

Legate's concluding question will be the starting point of the analysis of German eventive *wie*-complements in our paper. We will make use of her syntactic analysis for German without going into the details of English. Moreover, though the list of languages with analogous non-manner uses of manner wh-words is even longer than the one she mentions,<sup>10</sup> we will focus on German, since the case of English demonstrates that there seem to be essential semantic differences between languages.

#### 4 The similarity interpretation of *wie*

In Umbach (2016), a generalized account of German equatives is proposed including scalar as well as non-scalar occurrences, cf. (17). The core of this account is the idea that equatives express similarity, that is, indistinguishability with respect to a given set of dimensions, and that this is the contribution of the standard marker *wie*. Thus the standard marker *wie* is not semantically empty (as assumed in standard degree semantics) but denotes a similarity relation.

- (17) a. Anna ist so groß *wie* Berta.  
'Anna is as tall as Berta.'
- b. Anna ist so schnell gerannt *wie* Berta.  
'Anna ran as fast as Berta.'

<sup>8</sup>While German eventive *wie*-complements do not entail completion (see Section 5.3), English non-manner *how*-complements do, as pointed out by Stephanie Solt (p.c.):

- (a) I saw you cross the street.  
(b) I saw you crossing the street [but after I looked away, I heard the car hit you].  
(c) I saw how you crossed the street to avoid meeting Fred, who was walking towards you.  
(d) I saw how you crossed the street, #but after I looked away, I heard the car hit you

In (a), (c) and (d) the crossing event has to be completed.

<sup>9</sup> However, the *manner* meaning of the expression *way* in the paraphrase seems bleached, Stephanie Solt (p.c.).

<sup>10</sup> Legate provides example in French, Greek and Hebrew. Languages to be included are, e.g., Polish and Russian, and Kambaata, an East Cushitic language, Yvonne Treis, (p.c.)

- (a) Anna widziała, jak Berta pakowała swoją torbę. (Polish)

This sentence has two paraphrases: *Anna saw the way how Berta packed her bag.* / *Anna saw the event of Berta packing her bag.* Lukasz Jedrzejowski, who provided the example, added that in the non-manner version, even though the verb may be perfective, there is the impression of a process.

- c. Anna hat so einen Tisch *wie* Berta.  
'Anna has a table like Berta's.'
- d. Anna hat so getanzt *wie* Berta.  
'Anna danced like Berta.'

The generalized account of equatives builds on the interpretation of the German demonstrative *so* which, following Umbach & Gust (2014), includes a deictic component and a similarity component and creates similarity classes which in the nominal and verbal case though not in the degree case constitute ad-hoc generated kinds. This analysis is adopted for *wie* such that it expresses similarity but has no deictic component.

The standard marker *wie* in equatives is interpreted as denoting a 3-place relation of similarity,  $SIM(x, y, \mathcal{F})$  where  $x$  and  $y$  are items to be compared (individuals or events) and  $\mathcal{F}$  is a contextual parameter called *representation* including, most importantly, the relevant dimensions of comparison. Consider the example in (18): The *wie*-clause is analyzed as a free relative clause. i.e. a DP denoting a set  $m'$  of events similar to Berta's dancing with respect to dimensions of comparison given by the representation  $\mathcal{F}$ , (18c).

The interpretation of the matrix clause includes free variables *target* and  $m$  introduced by *so*<sup>11</sup> asserting that Anna's dancing is in the set of events  $m$  that are similar to *target*. The *wie*-clause is combined with the matrix clause by identifying  $m$  and  $m'$ , which is achieved here by unification ( $\oplus$ ).<sup>12</sup> This analysis accounts for the correlative status of *so* in equatives and is fully transparent, based on a general similarity interpretation of *wie*. We will make use of this interpretation in the analysis of *wie*-complements in Section 5, assuming that the *wh*-word in *wie*-complements has the same meaning as the standard marker, viz. similarity,

- (18) a. Anna hat so getanzt wie Berta getanzt hat.  
'Anna danced like Berta danced.'
- b.  $[[wie]] = \lambda e.\lambda e'. SIM(e, e', \mathcal{F})$
- c.  $[[wie\ Berta\ getanzt\ hat]]$   
 $= \iota m'. \exists e''. dance(e'') \ \& \ ag(e'', berta) \ \& \ m' = \{e' \mid sim(e', e'', \mathcal{F}) \ \& \ dance(e')\}$
- d.  $[[Anna\ hat\ so\ getanzt]]$   
 $= \exists e. dance(e) \ \& \ ag(e, anna) \ \& \ m = \{e' \mid sim(e', target, \mathcal{F}) \ \& \ dance(e')\} \ \& \ e \in m$
- e.  $[[Anna\ hat\ so\ getanzt\ wie\ Berta\ getanzt\ hat]]$   
 $= \exists e. \exists e''. dance(e) \ \& \ ag(e, anna) \ \& \ e \in m \ \& \ dance(e'') \ \& \ ag(e'', berta). \ \& \ e'' \in m$   
 $\ \& \ m = \{e' \mid sim(e', target, \mathcal{F}) \ \& \ dance(e')\} \ \oplus \ \{e' \mid sim(e', e'', \mathcal{F}') \ \& \ dance(e')\}$   
 $= \exists e. \exists e''. dance(e) \ \& \ ag(e, anna) \ \& \ e \in m \ \& \ dance(e'') \ \& \ ag(e'', berta). \ \& \ e'' \in m$   
 $\ \& \ m = \{e' \mid sim(e', e'', \mathcal{F}') \ \& \ dance(e')\}$

<sup>11</sup>In the deictic use of the demonstrative, *target* represents the target of the demonstration gesture while  $m$  represent the set of individuals or event similar to the target of demonstration with respect to the dimensions given by  $\mathcal{F}$ .

<sup>12</sup>Unification is performed here by identification of arguments, see Siekmann (1990) – in (18e) the free variable *target* is filled by the token event  $e''$  (Berta's dancing) and the parameters  $\mathcal{F}$  and  $\mathcal{F}'$  must be identical for unification to be successful.

By using unification instead of functional application the analysis accounts for the correlative status of *so* in equatives and, moreover, the interpretation of *so* is the same as in its deictic and anaphoric usages.

The similarity relation is spelt out with the help of multi-dimensional attribute spaces plus generalized measure functions and classifiers. Multi-dimensional spaces are defined by dimensions of comparison and generalized measure functions map individuals and events to points in these spaces.<sup>13</sup> Attribute spaces are equipped with a set of classifiers providing a "grid" such that points within a cell cannot be distinguished.<sup>14</sup> Similarity of individuals or events is defined by indistinguishability with respect to a representation  $\mathcal{F}$  (including dimensions, measure functions and classifiers) such that two individuals or events are similar if and only if the points they are mapped to are indistinguishable. Similarity defined this way is an equivalence relation.<sup>15</sup>

Let us take the verb *dance* as an example, focus on tango and assume, for the sake of the example, that relevant dimensions of comparison are LEVEL, STYLE, FIGURES, DECORATION. Then a dancing event is "measured" by the function in (19). Now suppose that Berta's dancing is mapped to <high level, Milongero, {Ochos, Ganchos}, +> and suppose that the complex classifier in (20) is the only one. Then points within the range covered by this classifier cannot be distinguished. Accordingly, the similarity class of dancing events similar to Berta's dancing – *dancing like Berta does* – includes all events mapped to points within this range.

$$(19) \quad \mu_{\text{dance}} : D \rightarrow \text{LEVEL} \times \text{STYLE} \times \text{FIGURES} \times \text{DECORATION}$$

where  $\mu_{\text{dance}}(x) = \langle \mu_{\text{LEVEL}}(e), \mu_{\text{STYLE}}(e), \mu_{\text{FIGURES}}(e), \mu_{\text{DECORATION}}(e) \rangle$

and

LEVEL :	<i>BEGINNER &lt; ADVANCED &lt; HIGH LEVEL &lt; PROFESSIONAL</i>
STYLE :	<i>{MILONGERO, VILLA URQUIZA, TANGO DE SALON, CANYENQUE}</i>
FIGURES :	<i>{Ø{OCHOS, GANCHOS, BOLEOS, VOLCADAS, COLGATAS}</i>
DECORATION :	<i>+/-</i>

$$(20) \quad \text{is\_advanced\_milongero}(d) \text{ iff}$$

LEVEL: *ADVANCED* in  $d \vee$  LEVEL: *HIGH LEVEL* in  $d$  & STYLE: *MILONGERO* in  $d$  &  
(FIGURE: {OCHOS} in  $d$  or FIGURE: {OCHOS, GANCHOS} in  $d$ ) & DECORATION : + in  $d$ <sup>16</sup>

Similarity classes of events represent manners. In the example above a manner of dancing would be *advanced Milongero including decorated Ochos*, which is pure manner. Manner in the sense of *instrument* requires an instrument dimension with, e.g., a nominal scale including *HAMMER, KNIFE, POISON, GUN* in the case of *kill*.

Methods specifying sequences of subevents (which is, what we are interested in in this paper) require a dimension where values are strings of basic events representing sequences of performing an event of a certain type. Indices of strings may be interpreted as time course. We define:

- A method measure function  $\mu_{\text{seq}}: E \rightarrow S$  takes events to strings of names of basic events.

<sup>13</sup>Generalized measure functions can be seen as generalized versions of adjectival measure functions (cf. Kennedy 1999): While adjectival measure functions map individuals to degrees on a single ratio type dimension, generalized measure functions map individuals to vectors with multiple dimensions of arbitrary scale types (including ordinal and nominal scales).

<sup>14</sup> The term "grid" is not to be misunderstood as implying a distance-based notion of similarity.

<sup>15</sup> Tversky's (1977) arguments against similarity being an equivalence relation are shown to be untenable in Umbach & Gust (to appear).

<sup>16</sup> We assume that points  $d$  in attribute spaces correspond to sets of feature-value pairs  $f:v$ , and we write " $f:v$  in  $d$ ".

- Strings are partially ordered by a relation *initial-part-of* such that for strings  $\alpha$  and  $\beta$ ,  $\alpha \leq_{\text{init}} \beta$  iff  $\text{length}(\alpha) \leq \text{length}(\beta)$  and  $\alpha_i = \beta_i$  for index  $i$  from 1 to  $\text{length}(\alpha)$ .
- There is a family of classifiers *prefix\_* $\alpha$  (for strings  $\alpha$ ) making use of the *initial-part-of* relation such that *prefix\_* $\alpha$  ( $\beta$ ) iff  $\alpha \leq_{\text{init}} \beta$ .
- The part-of relation on strings in attribute spaces is reflected by a part-of relation on events,  $e \leq f$  iff  $\mu_{\text{seq}}(e) \leq_{\text{init}} \mu_{\text{seq}}(f)$ .<sup>17</sup>

In the case of *pack a bag* sequences could be as shown in (21). Whether two events mapped to the strings in (a) and (b) count as similar is – as in the case of Tango dancing – a matter of classifiers. If classifiers are such that the two strings cannot be distinguished, then the events count as similar (ignoring other dimensions of events of type *pack-a-bag* for the sake of exposition). In (22) a classifier on strings is shown. In (23) a prefix-classifier is shown. Anticipating the analysis of eventive *wie*-complements in section 5.3, prefix-classifiers are required to build similarity classes reflecting methods of performing an event such that sequences in a method share an initial sequence (reflecting the idea of an event in progress).

- (21) a. [RUNNING-SHOES-IN, 3-PAIRS-OF-SOCKS-IN, HARRY-POTTER1-IN, 2-TSHIRTS-IN, SWEATER-IN]  
 b. [RUNNING-SHOES-IN, 4-PAIRS-OF-SOCKS-IN, HARRY-POTTER3-IN, 2-TSHIRTS-IN, DOWN-JACKET-IN]

(22) *3-4\_pairs\_of\_socks\_in* ( $s$ ) iff  $\exists s_i$  in  $s$ .  $s_i=3\text{-PAIRS-OF-SOCKS-IN}$  or  $s_i=4\text{-PAIRS-OF-SOCKS-IN}$ <sup>18</sup>

(23) *prefix\_running\_shoes\_in* ( $s$ ) iff [*running-shoes-in*]  $\leq_{\text{init}}$   $s$ .

In concluding, it is important to note that the notion of similarity in this framework is qualitative (property-based) unlike that in Gärdenfors' (2000) conceptual spaces which is quantitative (distance-based). Even more importantly, unlike Gärdenfors' conceptual spaces, multi-dimensional attribute spaces in our framework are integrated into referential semantics by means of generalized measure functions. These functions map referents (individuals or events) to points in attribute spaces, just like measure functions in degree semantics map individuals to degrees. Similarity in this system is a relation between referents which is defined by means of indistinguishability of corresponding points in attribute spaces.

## 5 The analysis

### 5.1 Two base positions of *wie* in syntax

The analysis of *wie*-complements requires, like that of complements in general, considering internal aspects as well as restrictions imposed by the matrix verb. Taking the internal perspective, the primary issue is the base position of the *wh*-word, which will be argued to be different for manner and eventive

<sup>17</sup> It is an interesting open question how tight this reflection has to be in terms of temporal development (Louise McNally, p.c.)

<sup>18</sup> Recall that *3-PAIRS-OF-SOCKS-IN* and *4-PAIRS-OF-SOCKS-IN* are names of basic events.

readings of *wie*-complements. On the external perspective, the difference between interrogative complements and free relative clauses must be accounted for.

Recall that we use the term *manner* in a broad sense covering *pure manner*, *instrument* and *method*.<sup>19</sup> *Pure manner* is typically given by an adverb and *instrument* is typically given as a prepositional phrase (24a, b). *Method* in German are typically given by *indem*-clauses (Behrens & Fabricius-Hansen 2002) and in English by *by*-gerunds (24c,d). It is important to note that a method may consist of a single more concrete instance of the verbal predicate, but it may also include a sequence of subevents, cmp. (c) and (d). All of these manner variants can be asked for by 'wie' and may thus be targeted by manner *wie* complements.

- (24) a. Sie tanzte wild. /  
She danced frantically.  
b. Sie öffnete die Dose mit einem Messer. /  
She opened the can with a knife  
c. Sie löste das Problem durch Aufnehmen eines Kredits / indem sie einen Kredit aufnahm.  
She solved the problem by taking a loan.  
d. Sie fuhr nach Metz, indem sie erst nach Dijon, dann von Dijon nach Nancy und schließlich von Nancy nach Metz fuhr. /  
She drove to Metz by first going to Dijon, then from Dijon to Nancy and finally from Nancy to Metz.

We follow the standard account of adverbial modifiers in German (Frey 2003, Maienborn 2003, Schäfer 2013) in assuming that the base position of manner modifiers is adjacent to the verb. Since *wie* is a wh-word it is moved to the front of the clause, cf. (25). The base position of manner *wie* can directly be observed in clarification question, (25c):

- (25) a. (Anna sah/fragte), wie<sub>M</sub> Berta tanzte.  
'Anna saw/asked how Berta danced.'  
b. [wie<sub>i</sub> Berta tanzte t<sub>i</sub>]  
c. Berta hat WIE getanzt?  
LIT: 'Berta danced HOW?'

If *wie* is combined with a gradable adverb, it acts as a degree modifier and the adverb is fronted together with the wh-word. We follow Schäfer (2013) in assuming that the degree phrase *wie schnell* has been moved from the original manner position adjacent to the verb, (26a). This entails that in (26a) the manner position is occupied, even though by a trace. Therefore, if a gradable adjective overtly occurs in the manner base position, as in (26b), the wh-word in front cannot result from movement out of the manner base position. This explains why the *wie*-complement in (26b) does not have a manner reading: If the manner position is overtly occupied, *wie* cannot represent manner – *wie*-complements with a gradable adjective in front of the verb must be eventive ones. Thus adding gradable adverbs provides a reliable way to decide between the two readings.

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<sup>19</sup> Schäfer (2013) provides a more fine-grained classification of manner adverbs distinguishing between (his) *pure manner*, *agent-oriented manner*, *method-oriented manner* and *degree*. For the purpose of our paper the simpler classification is sufficient.

- (26) a. Anna sah, [wie schnell]<sub>i</sub> Berta die Möhren t<sub>i</sub> putzte.  
'Anna saw how quickly Berta prepared the carrots.'
- b. Anna sah, wie<sub>E</sub> Berta die Möhren schnell putzte.  
'Anna saw Berta quickly preparing the carrots.'

Saebo (2015) considers English *how* questions distinguishing between *manner* (our *pure manner*) and *method*, taking up an observation by Jaworski (2009) that these questions can be interpreted in different ways. Answering the question in (27) by (a) indicates manner, while (b) and (c) indicate a method/instrument interpretation.

- (27) How did Judith kill Holofernes? [Jaworski 2009, p. 134]
- a. With a mixture of revulsion and determination.
- b. With a mixture of seduction and cunning.
- c. With a mixture of bile and snake venom.

Saebo argues that manners are adjuncts providing restrictions of verbal predicates while methods are arguments of abstract verbal predicates realizing the action. He postulates that there are in general two types of verbal predicates, abstract ones equipped with an argument slot for a realizing method, and concrete ones without such a slot. This account makes strong predictions – abstract predicates should always occur with a method specification, and *by*-gerunds combine only with abstract predicates – and it has to resort to coercion when *by*-gerunds are chained. In view of these problems we will adhere to the common idea that manners, including methods, are adjuncts.<sup>20</sup>

From the perspective of the matrix clause, the primary issue is the type of the embedded clause –are *wie*-complements interrogatives or a free relative clause? As shown in Section 2, *wie*-complements may be embedded by verbs like *fragen* and *wissen* ('ask', 'know') indicating an interrogative interpretation, (28a). Interrogative *wie*-complements can only have manner readings, which are excluded, however, by gradable adverbs in the manner base position. This is why (28b) is ungrammatical. When embedded under perception verbs, cognitive verbs and report verbs, *wie*-complements are free relative clauses (e.g. Caponigro 2004, Hinterwimmer 2013) and may have either a manner reading or an eventive reading, (28c).<sup>21</sup>

<sup>20</sup> The idea of abstract predicates goes back to the notion of 'criterion predicates' discussed by Kearns (2003) and Saebo (2008).

<sup>21</sup> In earlier versions of this paper we contemplated the idea that manner *wie*-complements are interrogatives while eventive *wie*-complements are free relative clauses. Manner *wie*-complements embedded under perception, cognitive, report verbs would then be interpreted as answers to the question what the subject saw/ remembered/ reported. Evidence for this interrogatives would be multiple questions, see (a).

- (a) Anna sah, wie und wo Berta ihre Tasche packte.  
'Anna saw how and where Berta packed her bag.'

There are, however, manner cases that do not allow an interrogative interpretation. The complement in (b) has clearly a manner reading, but nevertheless Anna is not pleased by true answers to the question of how Berta solved the problem, but instead by her way of problem solving.

- (b) Es freut Anna, wie Berta das Problem gelöst hat.  
'Anna is pleased by (the way) how Berta solved the problem.'

We then considered to postulate that manner *wie*-complements embedded under perception, cognitive and report verbs may be either interrogative clauses or free relative clause. However, in order to avoid further complications, we decided for the solution given above.

- (28) a. Anna fragte / wusste / bedauerte, *wie<sub>M</sub>* Berta ihre Tasche packte.  
'Anna asked / knew / regretted how Berta packed her bag.'
- b. \*Anna fragte, *wie<sub>M</sub>* Berta schnell ihre Tasche packte.  
'Anna asked how Berta quickly packed her bag.'
- c. Anna sah / erinnerte sich / erzählte, *wie<sub>M</sub>* / *wie<sub>E</sub>* Berta ihre Tasche packte.  
'Anna saw / remembered / reported how Berta packed her bag.'

We thus follow Legate (2010) in assuming that eventive *wie*-complements are free relative clauses and denote DPs. Since they do not express manner, the *wh*-word cannot be base-generated in the manner position next to the verb. We follow Legate again in assuming that *wie* in eventive readings is base-generated in its surface position, i.e. above VP. We deviate from Legate's proposal only with respect to the function of *wie<sub>E</sub>*: While according to Legate it is a specifier of CP, we consider it as a complementizer, that is, to play the role of *that* in *that*-complements. This is different from the case of manner where, as commonly agreed, the *wh*-word is moved from its base position into the specifier of CP.

Summing up, we will assume the syntactic structures shown (greatly simplified) below. The one in (29) is that of interrogative (manner) *wie*-complements. (30) and (31) represent free relative clauses. The manner free relative and the eventive one differ in two respects: First, in the manner structure *wie* is a specifier of CP whereas in the eventive structure it is a complementizer thereby reflecting the different roles in the clause. Secondly, and more importantly, in the manner structure *wie* is attached below VP whereas in the eventive structure it is attached above VP. From a semantics point of view, this is evidence that manner *wie* modifies an event type whereas eventive *wie* modifies an event token. This idea will be at the core of the semantic analysis in the next sections.

(29) manner interrogative

- a. (Anna fragte,) *wie<sub>M</sub>* Berta die Tasche packte.  
b. [<sub>CP</sub> *wie<sub>M</sub>*<sub>i</sub> [<sub>C</sub> Q [<sub>VP</sub> Berta die-Tasche-packen t<sub>i</sub>]]]

(30) manner free relative

- a. (Anna sah) *wie<sub>M</sub>* Berta die Tasche packte.  
b. [<sub>DP</sub> ∅ [<sub>CP</sub> *wie<sub>M</sub>*<sub>i</sub> [<sub>C</sub> ∅ [<sub>VP</sub> Berta die-Tasche-packen t<sub>i</sub>]]]]]

(31) eventive free relative

- a. (Anna sah) *wie<sub>E</sub>* Berta die Tasche packte.  
b. [<sub>DP</sub> ∅ [<sub>CP</sub> ∅ [<sub>C</sub> *wie<sub>E</sub>* [<sub>VP</sub> Berta die-Tasche-packen ]]]]]]

## 5.2 The meaning of manner *wie* complements

One building block of the analysis of *wie*-complements in this paper is the interpretation of manner readings. Manner interrogatives as well as manner free relatives have received little attention in the literature, and there is no agreement about the denotation of manner question words – do they denote properties of events, or rather particulars related to an event by a MANNER relation? If so, what sort of entities are manner particulars – event kinds? or tropes? – and is there a single MANNER relation or are

there multiple ones corresponding to different aspects? (see, e.g., Moltmann 2007, Pinon 2008, Schäfer 2013, and also Landman & Morzycki 2003).

We hypothesize that manners (including *pure manner*, *instrument* and *method*) are basically properties of events, although we set aside issues of intensionality and assume that they combine intersectively with verbal predicates. We do not, however, adopt the view that the *wh*-word *wie* ranges over a domain of manners, in the way *who* ranges over a domain of persons. Instead we interpret the expression *wie* as denoting a similarity relation creating sets of similarity events. Instead of postulating manner particulars we think of manners as sets, or rather, subsets of similar events of a given event type (similar with respect to a given set of features), which are ontologically innocuous.

Before going into the analysis of manner *wie*-complements, let us see what the interpretation would look like if we would consider manners as particulars related to the event by a MANNER relation. Take the sentence in (32). The free relative interpretation is shown in (a), the interrogative one in (b).

(32) manner free relative / interrogative based on manner primitive

(Anna sah/fragte)  $wie_M$  Berta die Tasche packte.

a.  $[_{DP} \emptyset [_{CP} wie_{M_i} [_{C'} \emptyset [_{VP} Berta\ die-Tasche-packen\ t_{-i}]]]]$   
 $= \lambda m. \exists e. bag-pack(e) \ \& \ ag(e, berta) \ \& \ MANNER(e, m)$

b.  $[_{CP} wie_{M_i} [_{C'} Q [_{VP} Berta\ die\ Tasche\ packen\ t_{-i}]]]$   
 $= \lambda p. \exists m \exists e. bag-pack(e) \ \& \ ag(e, berta) \ \& \ p=MANNER(e, m)$

The interpretations in (32) appear insufficient for two reasons: First, the status of manner objects is unclear. Secondly, and more importantly, analyses based on a manner primitive cannot – as far as we can see – be extended to account for eventive *wie* (see also the concluding section). Using manner particulars would thus predict that the manner reading and the eventive reading of *wie*-complements are unrelated, which would be a poor result.

We propose the similarity-based interpretation in (33) and (34). It is important to note, however, that the similarity-based interpretations do not deviate from standard semantic assumptions on free relatives and interrogative clauses. They are just more detailed spelling out the making of manner objects which would otherwise be primitive units. As in the case of equatives (section 4), *wie* denotes a similarity relation,  $\lambda e.\lambda e'. SIM(e, e', \mathcal{F})$ . Variables *m* represent sets of events similar to Berta's bag-packing. Note that in (33) and in (34) the similarity constraint is a modifier of the event type, thereby accounting for the fact that the base position of *wie* is next to the verb.

(33) (Anna sah)  $wie_M$  Berta die Tasche packte.

a.  $[[ [_{VP} Berta\ die-Tasche-packen\ t_{-i} ] ]]$   
 $= \lambda m \lambda e. bag-pack(e) \ \& \ ag(e, berta) \ \& \ m = \{e' | sim(e', e, \mathcal{F})\}$

b.  $[[ [_{CP} wie_{M_i} [_{C'} \emptyset [_{VP} Berta\ die-Tasche-packen\ t_{-i}]] ] ]]$   
 $= \lambda m. \exists e. bag-pack(e) \ \& \ ag(e, berta) \ \& \ m = \{e' | sim(e', e, \mathcal{F})\}$

c.  $[[ [_{DP} \emptyset [_{CP} wie_{M_i} [_{C'} \emptyset [_{VP} Berta\ die-Tasche-packen\ t_{-i}]]]] ] ]]$   
 $= \lambda m. \exists e. bag-pack(e) \ \& \ ag(e, x) \ \& \ m = \{e' | sim(e', e, \mathcal{F})\}$

Remark: The representation parameter  $\mathcal{F}$  including features of similarity is given by the context;

- (34) (Anna fragte)  $wie_M$  Berta die Tasche packte.
- a.  $[[ [_{VP} \text{Berta die-Tasche-packen } t_i ] ]]$   
 $= \lambda m \lambda e. \text{bag-pack}(e) \ \& \ \text{ag}(e, \text{berta}) \ \& \ m = \{e' \mid \text{sim}(e', e, \mathcal{F})\}$
- b.  $[[ [_{CP} \text{wie}_{M_i} [_{C'} Q [_{VP} \text{Berta die-Tasche-packen } t_i]] ]]$   
 $= \lambda m. \exists e. \text{bag-pack}(e) \ \& \ \text{ag}(e, \text{berta}) \ \& \ m = \{e' \mid \text{sim}(e', e, \mathcal{F})\}$
- c.  $[[ \text{INT}_{[CP} \text{wie}_{M_i} [_{C'} Q [_{VP} \text{Berta die-Tasche-packen } t_i]] ]]$   
 $= \lambda p. \exists e \exists m. (p \leftrightarrow \text{manner}(e, m) \ \& \ \text{bag-pack}(e) \ \& \ \text{ag}(e, \text{berta}))$   
 where  $\text{manner}(e, m) := m \in M(e) \ \& \ M(e) = \{m \mid \exists \mathcal{F}. m = \{e' \mid \text{sim}(e', e, \mathcal{F})\}\}$

Remarks:

- we assume that the interrogative interpretation in (c) is triggered by the embedding verb;
- $M(e)$  is the solution space, i.e. the set of different manners to do something, analogous to *PERSON* in the interpretation of *who*-interrogatives;<sup>22</sup> since individual manners are sets, the solution space is a set of sets;
- $M(e)$  is generated over the event of Berta's bag-packing – answers should provide manners of performing this event;
- $m \in M(e)$  entails  $e \in m$
- $M(e)$  varies over representations  $\mathcal{F}$  – answers should provide different manners;

This view provides a simple solution to the otherwise ontologically charged question of what a manner is – it is a set of similar events. The manner reading of *wie*-complements is thus interpreted by similarity sets of events where the *pure manner* and *instrument* and *method* varieties of manner differ in the relevant features of comparison. When occurring as a free relative clause, a manner *wie*-complement denotes one such similarity set. When occurring as an interrogative clause, it denotes the set of propositions varying along possible similarity sets.

### 5.3 The meaning of eventive *wie*-complements

The core issue in this paper are eventive *wie*-complements – what is their semantics and how do they differ from manner *wie*-complements? Our hypothesis in this paper is that eventive *wie*-complements denote events in progress. Starting from the commonly accepted idea that events in progress are associated with a set of possible continuations, we will suggest an analysis such that events in progress correspond to similarity classes built from an initial event – the event that already happened – plus possible continuations similar to a normal course of events. According to this analysis, events in progress constitute manner similarity classes which are particular in three respects: First, these classes are methods, that is, they contain sequences of subevents to realize an event of the given type. Secondly, the sequences are similar to the normal course of events. Finally, all sequences share a common initial sequence that has already been realized.

<sup>22</sup>  $[[\text{who Peter loves}]] = \lambda p. \exists x \in \text{PERSON}. p \leftrightarrow \exists e. \text{love}(e) \ \& \ \text{ag}(e, \text{peter}) \ \& \ \text{theme}(e, x)$

We will first provide evidence that eventive *wie*-complements do in fact denote events in progress, then discuss the perspective-based account of imperfectivity in Bonomi (1997) and finally suggest a semantics for eventive *wie*-complements.

### 5.3.1 Eventive *wie*-complements denote events in progress

The characterization of eventive *wie*-complements (*wie<sub>E</sub>*-complements) is mostly negative: They don't express a manner of performing an event, they cannot be used as embedded questions and, syntactically, the *wh*-word has not been moved. Moreover, they are not equivalent to *dass* ('that') complements, since they cannot be embedded under *glauben* ('believe') and, unlike *dass*-complements, they entail direct perception when embedded under perception verbs.<sup>23</sup>

The only positive characterization found in the literature is the commonly agreed on intuition that *wie<sub>E</sub>*-complements induce a process perspective – they describe a process or scene. From this observation, Falkenberg (1989) draws the conclusion that they are analogous to English progressives and shows that they allow for the so-called *imperfective paradox* – (35a) does not entail that the crossing of the river event was completed while (35b) does. He furthermore points out that *wie<sub>E</sub>*-complements can contain "*dabei sein*" constructions ('be in the process of doing s.th.') as in (36a) and also the *Rheinische Verlaufsform*, which is a substandard German progressives, (36b).

- (35) a. Anna sah, *wie<sub>E</sub>* Berta den Fluss überquerte.  
 b. Anna sah, *dass* Berta den Fluss überquerte.  
 LIT: 'Anna saw how Berta was crossing / that Berta crossed the river.'
- (36) a. Anna sah, *wie* Berta dabei war, den Fluss zu überqueren.  
 b. Anna sah, *wie* Berta den Fluss am überqueren war.  
 LIT: 'Anna saw HOW Berta was crossing the river.'

We follow Falkenberg in assuming that *wie<sub>E</sub>*-complements are analogous to English progressives, that is, they are imperfective in the sense of viewpoint aspect: the situation is presented from the inside, as an ongoing event. In English, one way of marking clauses as imperfective is by using the progressive (for details see Deo to appear). In German, imperfectivity is mostly unmarked. Possible markers are particles like *gerade* 'just' and "*dabei sein*" constructions, and also the (substandard) *Rheinische Verlaufsform*, see (36). If *wie<sub>E</sub>*-complements are marked for imperfectivity, they should conformed to the well-known constraints concerning lexical aspect, i.e. license activities and accomplishments but not states and achievements.

States are in fact excluded in *wie<sub>E</sub>*-complements, see (37a) (= 21 in Vater 1975). This is independent of whether they express stage level or individual level predicates (37a, b). Positions verbs like *stand*, *sit* *lie*, though clearly stative, may in rare contexts occur in English progressives, (38) (= 10a in Deo to

<sup>23</sup>Eventive *wie*-complements pattern with bare infinitives in requiring direct perception:

*Anna sah wie<sub>E</sub> Berta ihre Tasche packte.* ('Anna saw HOW Berta packed her bag.')

entails that Anna actually saw Berta packing her bag – mere evidence, e.g. cloth scattered across the room, would not suffice. Another characteristic that eventive *wie*-complements share with bare infinitives is epistemic neutrality: If Anna saw Berta closing her bag, then what Berta did was close her bag, even if Anna thought that Berta was merely tying her shoes, see (Barwise 1989).

appear). In *wie<sub>E</sub>*-complements, position verbs are hardly acceptable, (39a). The sentences improve, however, when adding an activity conjunct, (39b, c). This effect is reminiscent of the pseudo-coordination form of progressives in Norwegian in which a position verb is combined with an activity.<sup>24</sup> Without going into details, we will consider this effect as support for the claim that *wie<sub>E</sub>*-complements reject statives.

- (37) a. \*Ich sah, wie<sub>E</sub> Hans krank war.  
'I saw Hans being sick.'
- b. \*Anna hörte/erzählte wie<sub>E</sub> Berta *Die Glocke* von Schiller auswendig konnte.  
'Anna heard/reported Berta knowing Schillers poem *Die Glocke* by heart.'
- (38) The socks are lying under the bed.
- (39) a. ?? Anna sah, wie<sub>E</sub> Berta in der Küche saß.  
LIT: 'Anna saw HOW Berta sat in the kitchen.'
- b. Anna sah, wie<sub>E</sub> Berta in der Küche saß und heulte.  
LIT: 'Anna saw HOW Berta sat in the kitchen and cried.'
- c. Dann stürmten sie raus und sahen, wie<sub>E</sub> Ganon am Boden lag und sich wand wie ein Wurm.<sup>25</sup>  
LIT: 'Then they rushed outside and saw HOW Ganon lay on the ground and squirmed like a worm.'

Contrary to expectation achievements are not excluded in *wie<sub>E</sub>*-complements, see (40a,b). But then they have either an accomplishment-like reading or a "slow-motion" reading. The two readings have been observed by Rothstein (2004) for English achievement verbs occurring in the progressive.<sup>26</sup>

- (40) a. Anna sah/erzählte, wie Berta das andere Ufer (schließlich doch) erreichte.  
LIT: 'Anna saw/reported HOW Berta (finally) reached the other side of the river.'

<sup>24</sup> See Tonne (2006); her example (1a) is '*Bama satt og leste*.' (lit: the children sat and read) which means that the children were reading but does not entail that they were sitting.

<sup>25</sup> From the termpaper 'Event-Lesart in *wie*-Komplementen mit Zustandsverben' by Chiara Aigner and Judith Linden, winter semester 2016, university of Cologne. The authors did a corpus search on position verbs in eventive *wie*-complements (in DEWAC, HU Berlin). They found few genuine *wie<sub>E</sub>*-complements but a number of examples of the form in (a) which may be considered as temporal *wie*-clauses.

(a) Plötzlich sieht der den Teufel, wie er auf seinem Thron sitzt und vor Kälte bibbert.

LIT: 'Suddenly he sees the devil HOW he is sitting on his jittering from cold.'

<sup>26</sup> In Rothstein (2004) progressive achievements are discussed distinguishing between accomplishment-like readings available for many but not all achievement verbs and "slow-motion" readings which are always available. The former add a short preparatory phase to the instantaneous event expressed by the achievement, while the latter make the instantaneous event appear as being stretched over time. Rothstein furthermore observes that the former pattern with accomplishments in not entailing the completed event thereby licensing the imperfective paradox, while the latter pattern with activities since they do entail the completed event and block the imperfective paradox, see (a) and (b) below (= 8b, p.39 and 48a, p. 57, Rothstein 2004). She therefore suggests an interpretation such that in the case of accomplishment-like readings the progressive triggers a type shifting operation resulting in an accomplishment being derived from the achievement, and in the case of slow-motion readings the progressive triggers a type shift resulting in an activity.

(a) The plane was landing when it exploded in midair (so it didn't land).

(b) #Mary is spotting her arch enemy at the party but she hasn't yet spotted her.

- b. Anna sah/erzählte, wie Berta ihren alten Schulfreund wiedererkannte.  
LIT: 'Anna saw/reported HOW Berta recognized her old schoolmate.'

### 5.3.2 The semantics of eventive *wie* complements

The semantics of imperfective sentences, and in particular the English progressive, has been discussed at length in the literature; see, e.g., Dowty (1979), Landman (1992), Bonomi (1997), Portner (1998) and, recently, Fiorin and Delfitto (2017); for an overview see Deo (to appear). One of the basic ideas is that imperfective sentences have a modal impact: The sentence *Mary is building a house* is true at an interval iff under normal circumstances there would be a larger interval where *Mary build a house* is true (see Landman 1992). The intuition that circumstances should be normal is frequently encoded with the help of *inertia worlds* which are worlds that are identical to the actual world up to reference time and where from there on nothing unexpected occurs.

In this paper, we will take the approach in Bonomi (1997) as a basis. In this approach the modal impact of imperfectivity is encoded with the help of *natural courses of events* which are courses of events in which the ongoing event follows its natural course. Courses of events are ordered sets of subevents, and what counts as natural depends on the context.

"The idea is that our perception of an event involves a bunch of possible developments of that event. My going to the blackboard and taking a piece of chalk can be considered as part of a number of alternative events, as putting the room in order, writing some instructions, proving a theorem, and so on. [...] Since the same event *e* can be 'embedded' into several possible continuations, the context is a determining factor in selecting the relevant ones. If *e* is considered in connection with a given set of concomitant facts, then its possible extensions are events of a certain type. But if another set of concomitant facts is selected as the relevant background, then the type of the global event which is considered in progress will be different."

(Bonomi 1997, p. 174)

The notion of *natural courses of events* is implemented in Bonomi's approach with the help of a *stereotypical frame* which is a function from events and contexts yielding sets of natural courses of events. Truth conditions for the progressive are defined such that an event *e* is an *event in progress of type V* iff there is a stereotypical frame such that each natural course of events licensed by this frame contains an event which is of type *V* and includes the event in progress.<sup>27</sup> For example,

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<sup>27</sup> In detail:

- A *course of events* *H* is a set of eventualities *E* plus a partial order on *E*, *part-of*;
- A *context* *C<sub>H</sub>* is a set of concomitant facts;
- A *stereotypical frame* is a function *F* from eventualities and contexts such that *F(e, C<sub>H</sub>)* is a *natural course of events*, where a course of events *H'* is natural if, given that all concomitant facts are realized, there is an event *f* of the appropriate event type in *H'* such that *e* is part of *f*.

An event *e* is an *eventuality of type V in progress* (relative to a given course of events *H* and time interval *t*) iff there is a stereotypical frame *F* (with a set of concomitant facts *C<sub>H</sub>*) such that each natural course of events licensed by this frame contains an event *f* of type *V*, *V(f)*, with *e* part of *f*, *e* ≤ *f*:

$$[[\text{Prog}(e, V)]]_{H, t} = 1 \text{ iff } \exists F \exists C_H \forall H' [H' \in F(e, C_H) \rightarrow \exists f [t \subset \tau(f) \ \& \ f \in H' \ \& \ f:V \ \& \ e \leq f]]$$

"... *Leo is going to Metz* is true iff there is an event whose characteristics, with respect to the some features of the world and a given stereotypical constraint, force the perception of *e* as *part* of a process of Leo's going to Metz, whatever [other] developments may originate from *e*.

(Notice that this is compatible with the existence of various ways of achieving the task: although the situation is at this point completely definite because Leo has decided to go to Metz, has all the necessary means to do that, etc., there can still be different chains of events leading to an event of Leo's getting to Metz. He might take a toll road or a freeway, stop at X rather than Y, and so on. This is why we have to refer to a plurality of courses of events, even though the type of the event which is going on is already definite. At the given time *i* there can be lots of different events of the type *Go-to-Metz (Leo)* which are extensions of the given event of type *Go-to-Dijon (Leo)*)." (Bonomi 1997, p. 193/194)

The imperfective paradox is explained in Bonomi's system as a case in which the actual course of events does not belong to the natural courses of events selected by the relevant stereotypical frame (p. 198).

The basic idea of our interpretation of eventive *wie* complements rests on two observations: First, sets of courses of events correspond to methods – sets of sequences of subevents performing an event of a certain type. Secondly, the truth conditions for an event to be in progress specify the existence of a particular method, namely one where the sequences constitute natural continuations of the event in progress. Now it is important to recall that methods are spelt out with the help of similarity (see Section 4). The method required to make an event in progress true is given as a class of sequences of subevents sharing the event in progress as an initial part while conforming to relevant naturalness conditions. The role of *wie* in eventive *wie*-complements is to create these similarity classes.

The interpretation of eventive *wie*-complements is based on the free relative clause structure argued for in Section 5.1. As in the case of manner *wie*-complements (section 5.2) *wie* denotes a similarity relation,  $\lambda e.\lambda e'. \text{SIM}(e, e', \mathcal{F})$  and variables *m* represent sets of similar events. Different from manner *wie*-complements, the similarity constraint is not a modifier of the event type but instead is attached above VP adding conditions that account for the progressive character of the *wie<sub>E</sub>*-complement: There has to be a class of events of the type given by the verb which are continuations of the event in progress and are similar to a prototypical performance of such an event by Berta – that is, continuations must not substantially deviate from what is expected in the relevant context (thereby accounting for Bonomi's naturalness and Dowty's inertia condition).

(41) (Anna sah) *wie<sub>E</sub>* Berta die Tasche packte.

a. [[ [<sub>VP</sub> Berta die-Tasche-packen ] ] ]  
=  $\lambda f. \text{bag-pack}(f) \ \& \ \text{ag}(f, \text{berta})$

b. [[ [<sub>CP</sub>  $\emptyset$  [<sub>C'</sub> *wie<sub>E</sub>* [<sub>VP</sub> Berta die-Tasche-packen]] ] ] ]  
=  $\exists e. \text{ag}(e, \text{berta}) \ \& \ \exists f. \tau(e) \subset \tau(f) \ \& \ \text{bag-pack}(f) \ \& \ \text{ag}(f, \text{berta}) \ \& \ \exists m. m = \{f' \mid \text{sim}(f', f, \mathcal{F})\} \ \& \ \forall f''. f'' \in m \rightarrow e \leq f''$

c. [[ [<sub>DP</sub>  $\emptyset$  [<sub>CP</sub>  $\emptyset$  [<sub>C'</sub> *wie<sub>E</sub>* [<sub>VP</sub> Berta die-Tasche-packen]] ] ] ] ] ]  
=  $\lambda e. \text{ag}(e, \text{berta}) \ \& \ \tau(e) \subset \tau(f) \ \& \ \exists f. \text{bag-pack}(f) \ \& \ \text{ag}(f, \text{berta}) \ \& \ \exists m. m = \{f' \mid \text{sim}(f', f, \mathcal{F})\} \ \& \ \forall f''. f'' \in m \rightarrow e \leq f''$

Remarks:

- The event type is given by the verb as 'bag-pack';
- the progressive marking by *wie* indicates that the ongoing event need not be of this type;
- the event *f* represents a prototypical or default realization of bag-packing by Berta;
- the variable *e* represents the ongoing event *e* and has referential status;
- variable *m* represents events similar to *f* (and of the same verbal type);
- all events in *m* must be continuations of the ongoing event *e*;
- *m* provides additional (non-restrictive) information on *e* by postulating the existence of *m*.

Comparing the interpretation of eventive *wie*-complements in (41) to that of manner *wie*-complements, see (33), the difference in meaning is inherently connected to the difference in syntax. We follow Carlson (2003) assuming that the lexical projection of a major phrase contains only type information while token information is made available only with the addition of higher functional projections. This entails that below VP there is only event type information and the event itself (as a referential object) is only available above the VP level.

In the manner reading of *wie*-complements the *wh*-word is base-generated below VP and thus has access to the event type only. The similarity class created by *wie* functions as an intersective modifier, and this is what we expect from a manner modifier. In contrast, in the eventive reading the *wh*-word is base-generated above VP and can thus only be attached to the event token. The similarity class created by *wie* provides information about the token event, and this is what happens when postulating possible continuations.

The imperfective paradox is explained in the same way as in Bonomi's system: Suppose Anna saw Leo driving to Metz (maybe she saw him driving with his GPS set towards Metz), but he never arrived in Metz. In that case the event in progress *e* is part of an event *g* but not of the expected continuation *f*, and thus the condition that all elements of the similarity class must be continuations of *e* would be violated.

## 6 Conclusion

The core issue in this paper is directed at the semantics of eventive *wie*-complements and their difference when compared to manner *wie*-complements. This includes a number of questions the most puzzling of which is: Why use a manner word to express an event in progress?

The answer is given in this paper in two steps. First, we argued that the *wh*-word *wie* should not be considered as ranging over primitive manner objects, but instead be interpreted as expressing similarity thereby creating similarity classes which represent manners. This view provides a simple solution to the otherwise ontologically charged question of what a manner is – it is a set of similar events.

More importantly, this view makes it possible to see the common core of the two types of *wie*-complements: They both involve manners in the sense of similarity classes. But while in the case of manner complements the similarity class restricts the event type, in the case of eventive complements it just adds information about the event token. The former is unsurprising: restrict the event type is what we expect manner to do. The latter requires thinking of the modal impact of imperfectivity in an extensional way, namely in terms of sets of possible continuations of the event in progress. Similarity of continuations corresponds to similarity of inertia worlds. From this perspective, the conditions imposed by imperfectivity constitute a similarity class of sequences of subevents sharing the same initial sequence, i.e. the event in progress. And from this perspective the question of why use a manner word

to express an event in progress can be answered as follows: The wh-word *wie* expresses similarity, and both the manner reading and the eventive reading of *wie*-complements are based on similarity classes.

This analysis explains why *wie*-complements have a manner as well as an eventive reading without postulating two homophonous versions of the wh-word. It also accounts for the different syntactic base positions of the wh-word – adjacent to the verb as opposed to above VP. Finally, it accounts for the finding that all matrix verbs that license free relative manner readings also license eventive readings – the 'manner' denoted by free relative manner readings is just the type level counterpart of the token event denoted by eventive readings. And it accounts for the fact that it is sometimes hard to distinguish the two readings.

This analysis, moreover, opens the door to a uniform interpretation of the wh-word *wie* based on similarity across syntactic constructions including equative comparison (see section 4), temporal *wie*-clauses and overt questions. On the other hand, there is the question of what parts of the analysis of *wie*-complements presented here can be seen as largely theory agnostic and what parts require adhering to the similarity framework? If manner is seen as a primitive manner object, the connection between the two readings is obscured. One may think of manners as sets of events described by some mechanism different from similarity, which would also allow for adding the constraint of sharing the same initial sequence. That would provide another way of capturing the common core of the two readings. But then, similarity is a basic cognitive mechanism of category building included in linguistic interpretation without extra costs.

The puzzle for future work is this: A non-manner use of manner wh-words is found in a broad variety of European and non-European languages. Is there a systematic relation across languages between manner wh-words and non-manner uses thereof?

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