

Non-Manner ‘how’-Complements in English and in German¹

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Abstract. This paper compares the lexical and selectional semantics of non-interrogative, non-manner *how*-complements in English and German. It argues that English has two types of such complements: *how*-complements that are licensed by perception, memory, and fiction verbs and allow paraphrase by a DP of the form ‘*the event in which* [TP]’ (see Umbach et al., submitted), and *how*-complements that are licensed by presuppositional and ‘say’-verbs and allow paraphrase by a DP of the form ‘*the fact that* [TP]’ (see Legate, 2010). The paper shows that German only has the first type of non-manner *how*-complement. It provides a characterization of these types of complements in terms of their observed entailment behavior.

Keywords: Non-manner *how*-clauses, free relatives, factivity, presuppositionality, experiential attitudes, event semantics.

1. Introduction

In the complements of cognitive verbs like *see* and *remember*, embedded *how*-clauses famously have a manner-reading. On this reading, these clauses describe the particular manner, instrument, or method in which a given event (in (1a): Berta’s packing) is performed (see (1b)). As a result, (1a) is intuitively equivalent to (1b) on this reading (cf. Sæbø, 2016):

- (1) a. Anna remembers [how Berta was packing her bag]
b. Anna remembers [*the manner / way in which* Berta was packing her bag]

Recently, Legate (2010) (see Nye, 2013) and Umbach et al. (submitted) have argued for English respectively for German that *how*-complements (German *wie*-complements) also have a non-manner reading (hereafter, ‘*how_M*’ resp. ‘*wie_M*’). This reading is evidenced by the reports in (2a) (Legate’s ex. (1)) and (3a) (Umbach et al.’s ex. (18b)), whose complements resist a meaning-preserving paraphrase through a DP of the form *the manner / way in which* [TP] (see the non-equivalence of (2a) and (3a) with (2b) and (3b), respectively):

- (2) a. They told me [how_M the tooth fairy doesn’t really exist]
(≡ They told me [*the fact that* the tooth fairy doesn’t really exist])
≠ b. #They told me [*in which way* the tooth fairy doesn’t really exist]
- (3) a. Die Architektin kann sich noch gut daran erinnern, [wie_M sie damals in jede Ecke des Hauses gekrabbelt ist]
[The architect vividly remembers (*the event of* her) crawling into every corner of the house]
≠ b. Die Architektin kann sich noch gut daran erinnern, [*auf welche Art und Weise* sie damals in jede Ecke des Hauses gekrabbelt ist]
[The architect vividly remembers *the particular manner in which* she crawled into every corner of the house]

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The above notwithstanding, Legate and Umbach et al. provide mutually incompatible characterizations of non-manner *how*-clauses. Specifically, their characterizations diverge on which verbs license (English resp. German) *how*_M-complements, whether *how*_M-complements allow for negation and stative content, and whether *how*_M is restricted to colloquial language register. In evidence of this divergence, the German counterpart of Legate's English sentence (2a), i.e. (4), is semantically deviant:

- (4) #Sie erzählten mir, [wie_M die Zahnfee nicht wirklich existiert]

This paper resolves the seeming incompatibility of (Legate, 2010) and (Umbach et al., submitted). In particular, it argues that English *how*_M is ambiguous between an Umbach-style eventive use and a Legate-style factive use. The non-availability of factive *how*_M in German explains Umbach et al.'s surprise about the Legate data.

The paper is organized as follows: to sharpen readers' intuitions about non-manner *how*-complements, I first identify some assumptions about these complements that are shared by Legate and Umbach et al. (in Sect. 2). I then show that Legate's and Umbach et al.'s characterization of non-manner *how*-complements involve different uses of *how*_M (in Sect. 3). To this aim, I first contrast the lexical and selectional properties of Legate- and Umbach-style *how*_M-complements (in Sect. 3.1 resp. 3.2) and identify a series of diagnostic tests that help distinguish between these complements (in Sect. 3.3). I then point out differences in the entailment behavior of Legate- and Umbach-style *how*_M-complements that corroborate this distinction (in Sect. 4). The paper closes with a summary of my results and with pointers to future work.

2. Consensus about non-manner 'how'-clauses

Despite their different characterization of *how*_M-complements, Legate (2010) and Umbach et al. (submitted) agree on several key properties of these complements. These include (i) the non-interrogativity of *how*_M-complements, (ii) the non-equivalence of *how*_M-complements with *that*-clause complements, and (iii) the syntactic status of *how*_M-complements as DPs:

The non-interrogativity of *how*_M-complements (see (i)) is evidenced by the fact that (1a) (on its non-manner reading) and (2a) do not allow accenting of *how* (see the deviance of (5a), (6a)) and that they do not allow follow-up by a manner clarification question (see (5b), (6b); Umbach et al., submitted).

- (5) a. #Anna remembers [HOW_M Berta was packing her bag]
 b. #... and HOW_M was Berta packing her bag?
- (6) a. #They told me [HOW_M the tooth fairy doesn't really exist]
 b. #... and HOW_M does the tooth fairy not really exist?

The non-interrogative status of *how*_M-complements is further evidenced by the fact that these complements do not allow coordination with a *wh*-interrogative of any type, including *how*_M itself (see (7a), (7b); Umbach et al., submitted):

- (7) a. Anna remembers [how_M Berta was packing her bag], #[who was helping her], and #[what she was packing]
 b. They told me [how_M the tooth fairy doesn't really exist], #[who is helping her], #[what presents she brings], and #[how_M she does this]

A second point of agreement between Legate (2010) and Umbach et al. (submitted) lies in the

non-equivalence of *how*_M-complements with *that*-clause CPs (see (ii)). This is particularly apparent in the complements of non-factive verbs (e.g. *explain*), where the two complements exhibit a different cancellation behavior: in contrast to non-factively embedded *that*-clauses (see (8a)), non-factively embedded *how*_M-complements cannot be consistently negated (see (8b)). This matches the cancellation behavior of non-factively embedded DPs of the form ‘*the fact that* [TP]’ (see (8c)). My example below is inspired by Kastner (2015: ex. (10)):

- (8) a. I explained [that the building collapsed] (but it didn’t really)
 ≠ b. I explained [*how*_M the building collapsed] (#but it didn’t really)
 (b. ≡) c. I explained [*the fact* that the building collapsed] (#but it didn’t really)

A third point of consensus about non-manner *how*-complements regards their syntactic status (see (iii)): Legate and Umbach et al. both assume that *how*_M-complements are similar in structure to free relative clauses, especially to manner free relatives: like the latter (see Fig. 1), *how*_M-complements are DPs that are headed by a silent determiner, $\emptyset$, that takes a *how*-clause as its complement (see Fig. 2). The only difference between these two *how*-clause DPs lies in the internal structure of the embedded CP – especially in the base position of *how*: while *how* moves from a TP-internal position in manner *how*-clauses, thus leaving a trace (see Caponigro, 2003, 2004; cf. Groos and van Riemsdijk, 1981), it is base-generated in its surface position in *how*_M-clauses (see Legate, 2010: pp. 130–131; cf. Umbach et al., submitted, pp. 10–11):

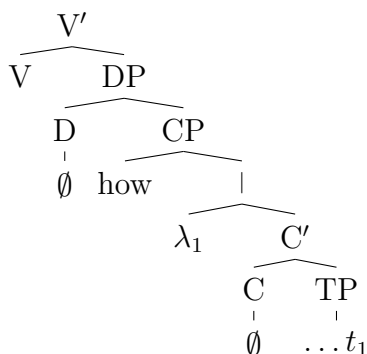


Figure 1: *how*_M-complements.

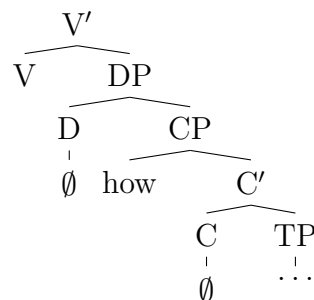


Figure 2: *how*_M-complements.

The ‘free relative’-status of *how*_M-complements explains their DP-like distribution behavior (see Legate, 2010). This behavior includes the ability of Legate- and Umbach-style² *how*_M-clause DPs to serve as the complement of a preposition (see (9)–(10)), to be coordinated with a (content or non-content) DP (see (11)–(12)), and to occur in the PP of CP/PP-neutral predicates (see (13)–(14); see Legate, 2010: pp. 122–124):

- (9) a. They told me about [_{DP}the tooth fairy(’s non-existence)]
 b. They told me about [_{DP}*how*_M the tooth fairy doesn’t really exist]
 c. *They told me about [_{CP}that the tooth fairy doesn’t really exist]
 (10) a. She imagined about [_{DP}her marrying the beast]
 b. She imagined about [_{DP}*how*_M she would be marrying the beast]

²Since Umbach’s main example sentence, i.e. the German counterpart of (1a), is ambiguous between a Legate- and an Umbach-style reading (see Sect. 3.3), I instead use the sentence *She imagined [how_M she would be marrying the beast from the tale of ‘The Beauty and the Beast’]* (i.e. my corpus example from (47a)).

- c. *She imagined about [_{CP}that she would be marrying the beast]
- (11) a. They told me about [[_{DP}the tooth fairy] and [_{DPhow_M} it doesn't really exist]]
b. They told me about [[_{DPhow_M} the tooth fairy doesn't really exist] and [the fact that many children are unwilling to accept this]]
- (12) She imagined (about)/dreamt of [[_{Dpa} a beast] and [_{DPhow_M} she would be marrying it]]
- (13) a. I fretted about [_{DP}the tooth fairy's non-existence]
b. I fretted about [_{DPhow_M} the tooth fairy doesn't exist]
c. *I fretted about [_{CP}that the tooth fairy doesn't exist]
- (14) a. She dreamt of [_{Dpa} a beast (marrying her)]
b. She dreamt of [_{DPhow_M} she would be marrying a beast]
c. *She dreamt of [_{CP}that she would be marrying a beast]

The DP-like behavior of Legate- and Umbach-style *how_M*-complements is further evidenced by the observation that these complements cannot appear in positions that are not assigned case (see Legate, 2010: p. 124):

- (15) a. *It was conceded [_{DP}the tooth fairy's non-existence]
b. *It was conceded [_{DPhow_M} the tooth fairy doesn't exist]
c. It was conceded [_{CP}that the tooth fairy doesn't exist]
- (16) a. *It was conceded [_{Dpa} a beast (marrying her)]
b. *It was conceded [_{DPhow_M} she would be marrying the beast]
c. It was conceded [_{CP}that she would be marrying the beast]

3. Legate- vs. Umbach-style 'how_M'

The above consensus notwithstanding, Legate's and Umbach et al.'s characterizations of non-manner *how*-complements strongly differ in several respects. These differences are described below:

3.1. Legate-style factive 'how_M'-complements

Legate (2010) describes her studied type of non-manner *how*-complements as "a construction in English [...] whereby a declarative embedded clause is introduced by *how* rather than *that*" (*ibid.*, p. 121). Legate associates this construction with colloquial language register (in her case: informal English). This association is supported by the presence of contractions in her examples (e.g. the use of *doesn't* in (2a)) and by the source of the majority of these examples (viz. online blogs and forums). A representative subset of her example sentences is given below:

- (17) a. They told me [how_M the tooth fairy doesn't really exist] (i.e. (2a))
b. [he] whispered [how_M we would be together forever] (Legate's ex. (24j))
c. Kenneth admitted [how_M there are times when he struggles to keep control of his anger] (ex. (24a))
d. He explained [how_M, like Wanda, he tries very hard not to counter rudeness with rudeness] (ex. (24a))
- (18) a. Remember [How_M Whites Were Too Racist to Vote Obama]? (ex. (24d))

- b. Ever noticed [how_M you always have your computer turned on] when you realise you need to clean the mouse (ex. (24e))
- c. I hate [how_M she claims to be a New Yorker] (ex. (24f))
- d. And Red can't hide from me [how_M he likes it, too] (ex. (24c))

Legate's paper focuses almost exclusively on syntactic issues: the paper aims to show that *how_M*-complements are syntactically DPs, rather than CPs (see above). The CP-status of these complements may be wrongly assumed from the observation that some³ of these complements (incl. all *how_M*-complements in (18)) are semantically equivalent to *that*-clauses (see e.g. (19)):

- (19) a. Ever noticed [how_M you always have your computer turned on] when you realise you need to clean the mouse (see (18b))
 ≡ b. Ever noticed [*that* you always have your computer turned on] when you realise you need to clean the mouse

As a result of its syntactic focus, Legate's paper largely refrains from giving a semantic characterization of the examined construction. However, Legate's examples allow for some interesting conclusions about the lexical and selectional semantics of her studied type of *how_M*-complements. Most of these conclusions are obtained from an investigation of the matrix verbs that license these complements. In particular, all *how_M*-clause DPs in (Legate, 2010) occur in the complements of presuppositional verbs (e.g. *admit*, *remember*; Kastner, 2015; see Cattell, 1978; Hegarty, 1990) or of verbs of saying (e.g. *tell*; Levin, 1993: pp. 209–210; see Gropen et al., 1989).

Presuppositional verbs are verbs which assume that the proposition that is denoted by the CP in their complement is part of the common ground (see Kastner, 2015: p. 160; cf. Honcoop, 1998: p. 167). They include factive verbs (e.g. the matrix verbs in (18)) as a proper subclass. Examples of presuppositional and 'say'-verbs are given in (20) and (21). There, verbs that occur in Legate's original examples are marked with a superscript asterisk ('*').⁴ Factive verbs are marked with a superscript dagger ('†'):

- (20) **Presuppositional verbs:** accept, admit*, agree, approve^{†,*}, concede*, confess[†], confirm, explain*, find out^{†,*}, forgive^{†,*}, hide^{†,*}, know[†], notice^{†,*}, observe^{†,*}, realize[†], regret[†], remember^{†,*}, verify[†], ...

- (21) **Verbs of saying:** claim, convey, declare, mention, note, proclaim, recount, remark, report, say, state, tell*, whisper*, promise*, ...

The presuppositionality of the matrix verbs in (17c/d) and (18) is evidenced by the observation that these verbs do not allow their complement's consistent retraction from the common ground (see e.g. (25); cf. Kastner, 2015: p. 159):

- (22) Kenneth admitted [how_M there are times when he struggles to keep control of his anger]. #But no one had ever claimed that this was the case. (see (17c))

³These include factive verbs (e.g. the matrix verbs in (18)), and exclude non-factive presuppositional verbs (see (17c/d)) and verbs of saying (see (17a/b)).

⁴To avoid an overly broad empirical domain, I exclude Legate's examples of *how_M*-embedding prepositional verbs (e.g. *start in on*, *cringe at*) and non-verbal predicates (e.g. *embarrassed of*, *outraged by*).

The factivity of the matrix verbs in (18) is evidenced by the observation that the *that*-clause complements of these verbs cannot be consistently negated (see e.g. the negation of the complement in the *that*-clause variant of (18c), in (23); *vis-à-vis* the negation of the complement in the *that*-clause variant of (2a), in (24)):

(23) I hate [that she claims to be a New Yorker]. #But then, she never claimed that

(24) They told me [that the tooth fairy doesn't really exist], ✓ but they were lying

This differs from the complements of the matrix verbs in (17), for which this is well possible:

(25) They told me [that the tooth fairy doesn't really exist], but they were lying

Arguably, Legate-style *how_M*-complements do not serve as complements of presuppositional verbs like *deny*. To exclude such constructions (e.g. (26b); cf. Legate, 2010: fn. 13), I assume that Legate-style *how_M*-complements are only licensed by a proper subclass of presuppositional verbs that are compatible with a presupposition of the truth of the CP. In what follows, I will call this subclass *positive presuppositional verbs*.

- (26) a. Mary denied [that she ate the cookies]
b. *Mary denied [how_M she ate the cookies]

Admittedly, Legate (2010) does not include examples for all presuppositional and 'say'-verbs from the above list. To support my claim that Legate-style *how_M*-complements are licensed by positive presuppositional verbs and 'say' verbs *in general*, I provide real examples for the above verbs that are not included in (Legate, 2010) (in (27)–(29)). With the exception of (27e)⁵ (which adds a *remember*-example to Legate's examples), these examples are all taken from the enTenTen15 corpus (see Jakubíček et al., 2013).

(27) **Examples with factive verbs:**

- a. One of Lou's men even confessed [how_M he once had dreams to serve in ministry]
- b. Everybody knows [how_M the former ISI chief had doled out money from the secret funds]
- c. It makes you realize [how_M the rest of the animal kingdom regards us with tremendous fear]
- d. She regrets [how_M society measures people in terms of male success patterns]
- e. Jack remembered [how_M beavers were sometimes killed by the very tree they were cutting down]

(28) **Examples with non-factive presuppositional verbs:**

- a. We need to accept [how_M the right of return will be resolved through monetary compensation]
- b. I agree [how_M the government anti-trust actions are dubious from several points of view]
- c. McGraw-Hill's CEO confirmed [how_M the new Tablet gadget from Apple will be based on apple iphone OS]

⁵This sentence is taken from the Corpus of Contemporary American English (see Davies, 2009).

- d. You should always verify [*how_M* the City Code and Florida Building Code apply specifically to your property]

(29) **Examples with verbs of saying:**

- a. Many patients even claimed [*how_M* the natural ways are cheaper and far more efficient than traditional medical treatment]
- b. I hope my words have conveyed [*how_M* the possibilities are truly endless]
- c. high level officials [...] declared [*how_M* the governor of Plateau State was to blame for unrest in his state]
- d. In my last post on the sector I mentioned [*how_M* the big run was probably over]
- e. Mr. Bathily noted [*how_M* the influx of refugees to the Lake Chad Basin region has over-stretched Government capacities]
- f. Isha remarked [*how_M* the donations were made possible due to her connections with GWLN]

Note that the examples in (27) to (29) do not have an acceptable meaning-preserving German translation. For the sentences in (27), this is shown below:

- (30) a. #Einer von Lous' Männern gestand sogar, [*wie_M* er einst davon geträumt hatte, dem kirchlichen Dienst beizutreten]
- b. #Jeder weiß, [*wie_M* der frühere ISI-Chef Gelder aus den geheimen Fonds verteilt hat]
- c. #Es macht dir klar, [*wie_M* der Rest des Tierreichs uns mit enormer Angst betrachtet]
- d. #Sie bedauert, [*wie_M* die Gesellschaft Menschen anhand männlicher Erfolgsmuster misst]
- e. #Jack erinnerte sich, [*wie_M* Biber manchmal von dem Baum getötet werden, den sie fällen]

The use of the embedded occurrences of *how_M* in (27) to (29) is supported by the observation that these occurrences fail Umbach et al.'s diagnostic criteria for manner-readings (see Umbach et al., submitted, pp. 4–5). These include the admissible accenting of *how_M* (see (5a), (6a)), the paraphrasability by '*the manner / way in which* [TP]' – and the possible continuation with a sentence that specifies the manner or method (see (5b), (6b)) –, and the possibility of conjoining the *how_M*-complement with a *wh*-interrogative of any type (see (7)). Legate-style *how*-complements fail these tests, as is shown for (27d) in (31) to (33):

- (31) a. #She regrets [HOW society measures people in terms of male success patterns]
- b. #... and HOW does society measure people in terms of male success patterns?
- (32) a. #She regrets [*the way in which* society measures people in terms of male success patterns] (redundant)
- b. #... namely in terms of male success patterns (redundant)
- (33) She regrets [how society measures people in terms of male success patterns], #[who does the measuring], #[what they measure], and #[how_M the measuring proceeds]

Note that – since they can occur in the complements of non-factive presuppositional verbs – Legate-style *how_M*-complements are not equivalent to *that*-clauses (*pace* Huddleston and Pullum, 2002: p. 954), but to overt definite presuppositionals of the form '*the fact that* [TP]' (see

(8)). The above provides the semantic counterpart to Legate’s syntactic support for the claim that “*how* is not a simple alternate to *that*” (Legate, 2010: 122). In virtue of their equivalence to DPs of the form ‘*the fact that* [TP]’, I will hereafter refer to Legate-style *how_M*-complements as *factive how_M*-complements. Reflecting the non-factive behavior of Umbach-style *how_M*-complements (see Sect. 3.2), I will describe the latter (in German and in English) as *eventive how_M*-complements. The relevant uses of *how_M* will be labelled ‘*how_F*’ (for factive *how_M*) respectively ‘*how_E*’ (for eventive *how_M*).

3.2. Umbach-style eventive ‘*how_M*’-complements

I have suggested in the introduction to this paper that (the English counterparts of) Umbach-style *how_M*-complements are different from Legate-style, factive *how_M*-complements. The difference between these complements is evidenced by the observation that *how_F*-complements fail Umbach et al.’s positive tests for a specific [= eventive] kind of non-manner reading. These include the possibility of continuing sentences containing such complements with a sentence that adds another event (see (34a)) and of allowing paraphrase by a DP of the form ‘*a (specific) event in which* [TP]’ (see (34b); Umbach et al., submitted, p. 4):

- (34) a. Anna erinnert sich, [wie_E Berta ihre Tasche packte] ... und das Haus durch die Hintertür verließ
[Anna remembers [how_E Berta was packing her bag] ... and left the house through the back door]
- b. (i) Anna remembers [how_E Berta was packing her bag]
(ii) Anna remembers [*a (specific) event in which* Berta was packing her bag]

How_F-complements do not pass these tests, as is shown for (27d) in (35):

- (35) a. She regrets [how_F society measures people in terms of male success patterns] ...
#and [the event of ...]
- b. #She regrets [*a (specific) event (/process/situation/scene) in which* society measures people in terms of male success patterns]

The possibility of paraphrasing eventive *how_M*-complements by an explicitly event-denoting DP suggests that reports with *how_E*-complements are *direct* in the sense of (Barwise, 1981; Barwise and Perry, 1983). In particular, perception reports with eventive *how_M*-complements constitute a subclass of Barwise’s direct perception reports with bare infinitival or gerundive complements. I will return to the directness of *how_E*-clause reports in Section 3.3 (when I present further diagnostic tests for *how_E* vis-à-vis *how_F*) and in Section 5 (when I contrast the entailment properties of *how_F*-, *how_E*-, and *that*-clause complements).

The ability of *how_E*-complements to be paraphrased by an explicitly event-denoting DP suggests that these complements induce imperfectivity (see Falkenberg, 1989: pp. 37–38; cf. Umbach et al., submitted, pp. 24–25). The imperfective nature of *how_E*-clauses is suggested by the fact that the English translation of Umbach’s example (34a) can⁶ use progressive aspect and

⁶Contrary to what is suggested in (Umbach et al., submitted), the majority of occurrences of English eventive *how_M*-complements in the enTenTen15 Corpus does not have progressive aspect. I attribute this observation to the fact that the predicates in these complements denote activities or accomplishments, which already induce a process-perspective.

that *how_E*-complements are roughly equivalent⁷ to English gerundive small clauses (see (36)):

- (36) a. Anna remembers [*how_E* Berta was packing her bag] (! but see (64))
 ≈ b. Anna remembers [Berta packing her bag]

Since imperfectivity is typically unmarked in German, the process-perspective is only covert in the German version of (1a) (in (37); see (34)). However, the imperfectivity of the event that is denoted by the *how_E*-complement can be made explicit by using an infinitival construction of the form *dabei sein, ... zu ...* [*to be in the process of doing sth.*] (in (37a); see Falkenberg, 1989) or by using a regional variant of German, called the *Rheinische Verlaufsform* (in (37b); see Umbach et al., submitted, pp. 24–25). Both constructions use the infinitival form, which is usually taken to induce imperfectivity (see Ehrich, 1991).

- (37) Anna erinnert sich, [*wie_E* Berta ihre Tasche packte]
 a. Anna erinnert sich, [*wie_E* Berta *dabei war*, ihre Tasche *zu* packen]
 b. Anna erinnert sich, [*wie_E* Berta ihre Tasche *am* Packen *war*]

The imperfective nature of *how_E*-complements is further supported by the observation that these complements allow for the imperfective paradox (see Falkenberg, 1989: pp. 37–38; cf. Dowty, 1977). As a result of this paradox, the eventive reading of (1a) (in (38a)) does not entail (38b). The non-validity of this entailment is evidenced by the observation that (38a) allows for a consistent continuation with a sentence that denies the completion of the event (in (39)):

- (38) a. Anna remembers [(*how_E*) Berta (was) packing her bag] (i.e. (1a))
 ≠ b. Anna remembers [that Berta packed her bag]
 (39) Anna remembers [*how_E* Berta was packing her bag (when Anna came to apologize)].
 ✓ Upon Anna's apology, Berta changed her mind, stopped packing, and stayed

In virtue of their imperfectivity, eventive *how_M*-clauses (in English and in German) license activities (see (38a)) and accomplishments (see (34a)), but not states (see the deviance of (40) and (41); cf. Umbach et al., submitted, ex. (47a/b)):

- (40) #Ich sah, [*wie_E* Hans krank war]
 [#I saw *how_E* Hans was (being) sick]
 (41) #Anna hörte / erzählte, [*wie_E* Berta *Die Glocke* von Schiller auswendig konnte]
 [#Anna heard / reported *how_E* Berta knew Schiller's poem *Die Glocke* by heart]

In contrast, Legate-style *how_F*-complements allow states, as is illustrated by (2a). In fact, the majority of *how_F*-complements (see e.g. (27c)–(27e)) denote statives or habituals. The relation between *how_F*-complements and statives is a topic for future research.

In virtue of their progress-character, eventive – but not factive – *how_M*-clauses further block negated content (see Umbach et al., submitted, p. 11). This behavior is evidenced by the deviance of (42) and by the acceptability of (2a):

- (42) #Anna remembers [*how_E* Berta was not packing her bag]
 (only admissible reading: Anna remembers Berta doing a whole lot of other things while avoiding to pack her bag)

⁷The (subtle) semantic difference between gerundive- and *how_E*-clause complements will be the topic of Sect. 4.1.

As one might expect, the lexical difference between the predicates in eventive and factive *how_M*-complements is also reflected in the matrix verbs that license these complements. In contrast to the licensors for Legate-style factive *how_M*-complements, licensors for eventive *how_M*-complements include verbs that are neither presuppositional- nor ‘say’-verbs. Verbs of this class include representational counterfactual attitude verbs (e.g. *imagine*). An extended version of Umbach et al.’s list of *how_E*-licensors is given in (43) (see Umbach et al., submitted, p. 7).

To show the difference between licensors for factive and eventive *how*-complements, I deviate from Umbach et al.’s classification of *how_E*-licensors (see Umbach et al., submitted, p. 7). In particular, I split Umbach’s class of cognitive verbs into (factive) attention/memory verbs and (non-factive, non-presuppositional) fiction verbs (see Giannakidou and Mari, 2020). To capture the commonality between verbs from the above classes and perception verbs (see Sect. 3.3), I will describe these verbs as *experiential attitude verbs* (see Stephenson, 2011). The latter are verbs that denote an agent’s personal (real or counterfactual) experience of an event, situation, or scene (see Stephenson, 2010; cf. Bernecker, 2010; Tulving, 1972).

Below, verbs that are included in Umbach et al.’s original list are marked with an asterisk (analogously to (20)–(21)). Their German versions (as provided by Umbach et al.) are given in brackets:

(43) **Experiential attitude verbs:**

Perception verbs: see* [sehen], hear* [hören], feel* [fühlen], experience* [erleben], ...

Attention/memory verbs: remember* [sich erinnern], think of* [daran denken], forget* [vergessen], notice* [(be-)merken], observe* [beobachten], ...

Fiction verbs: imagine* [sich vorstellen], dream (of) [träumen (von)],

(44) **Report verbs:** report* [berichten], recount [erzählen, schildern], describe* [beschreiben]

Some enTenTen15 examples with the above matrix verbs and eventive *how_M*-complements are given in (45) to (48). To show that *how_F*-complements are not the only type of English non-manner *how*-complements, I focus on English examples.

(45) **Examples with perception verbs:**

- a. He saw [*how_E* the couple were trying to force the tearful infant girl to walk]
- b. Keeping his eyes shut, Sam heard [*how_E* Dean got back into his bed]
- c. I felt [*how_E* the blood left my face]
- d. Steve experienced [*how_E* a kind, loving counselor could provide such great comfort]

(46) **Examples with attention/memory verbs:**

- a. this just made me remember [*how_E* Richard went windsurfing with a model of Pamela Anderson on his back]
- b. He thought of [*how_E* his mother had wiped away his tears after his father’s death]
- c. No one in Timbuktu has forgotten [*how_E* the Moroccans conquered the city, plundered the libraries and dragged off the best scholars to Fes]
- d. My son [...] noticed [*how_E* I’ve been ducking working outside for a couple of months]
- e. In the joint U of I/Germany study, researchers observed [*how_E* water molecules dance with ubiquitin, one of the body’s most prevalent proteins]

(47) **Examples with fiction verbs:**

- a. She imagined [how_E she would be marrying the beast from the tale of *The Beauty and the Beast*]
- b. In the confines of his room at Hotel Lala, he dreamt of [how_E his father died]

(48) **Examples with report verbs:**

- a. Speer later reported [how_E he was travelling with Hitler in the Leader's private train on 7 November 1942]
- b. She recounted [how_E the Scots-Irish left for the South after being shunned in New England]
- c. Some detainees [...] described [how_E, on the evening of 23 August, about 160 detainees began to flee the metal hangar they were being held in]

In contrast to the corpus examples from (27) to (29), the above examples all have acceptable German counterparts (as is shown below for (45)):

- (49)
- a. Er sah, [wie_E das Paar versuchte, das weinende Mädchen zum Laufen zu zwingen]
 - b. Sam hielt seine Augen geschlossen und hörte, [wie_E Dean wieder ins Bett ging]
 - c. Ich fühlte, [wie_E das Blut mein Gesicht verließ]
 - d. Steve erlebte, [wie_E ein netter, gütiger Berater so großen Trost spenden konnte]

The different lexical and selectional properties of Legate- and Umbach-style *how_M*-complements are summarized in Table 1:

Legate-style <i>how_F</i> ('factive')	Umbach-style <i>how_E</i> ('eventive')
• licensed by presuppositional/'say'-verbs • equivalent to '<i>the fact that</i> [TP]' • allow for negation & stative content • are informal in register	• licensed by perception/memory/fiction verbs • equiv. to '<i>a (specific) event in which</i> [TP]' • induce imperfectivity & do not license states • are unmarked w.r.t. register

Table 1: Properties of *how_F*- vs. *how_E*-complements.

The inclusion of perception, attention/memory, and report verbs in the class of presuppositional verbs (see Barwise and Perry, 1983; Kastner, 2015; Giannakidou and Mari, 2020) leads us to expect that these verbs also license *how_F*-complements. The latter is indeed the case. Examples of perception verbs with these complements are given in ((50)):

- (50)
- a. In Soma City, [...] we saw [how_F the tsunami had flattened the land]
 - b. A trial heard [how_F former nurse Webster, 54, tried to become a millionaire by murdering his wives in order to claim large insurance pay-outs]
 - c. I felt [how_F such events could never have been organized by me years ago]
 - d. participants experienced [how_F(?) Augmented Reality-enhanced applications may improve processes at work]

However, different perception verbs seem to have a preference for different types of *how_M*-complements. In particular, while *see* and *feel* prefer eventive *how_M*-complements, *hear* prefers factive *how_M*-complements. *Experience* even seems to have a very strong preference for eventive *how_M*-complements (see the questionable factive reading of the complement in (50d)). In

contrast to *see*, *feel* and *experience* further have a strong preference for *de se*-readings (see Anand, 2011; Ninan, 2007; cf. Lewis, 1979).

3.3. Diagnostics for eventive ‘how_M’-complements

To distinguish eventive from factive *how_M* in the complements of verbs that license both uses of *how_M*, we use Stephenson’s (2010) diagnostic tests for reports of ‘vivid’ [= experiential] attitudes. The latter are event-directed attitudes that require the attitudinal agent’s personal experience of the target event or scene (Stephenson, 2010). Tests for these attitudes include (i) the possibility of modifying the matrix verb in reports of these attitudes by an ‘experiential’ modifier like *vividly* or *in perfect detail* and (ii) the entailment of these reports to sentences that relate the agent’s direct (real or counterfactual) experience of the event that is described by the complement of these reports. For factive occurrences of *see*, the underlying phenomenon of diagnostic (ii) is called *direct perception* in Barwise (1981) (see Barwise and Perry, 1983).

Reports with eventive *how_M*-complements pass these tests, as is shown for a variant of (46a) (see (51)) in (52) and (53):

- (51) Bill remembered [how_E Richard went windsurfing with a model of Pamela Anderson on his back]
- (52) Bill *vividly* remembered / remembered *in perfect detail* [how_E Richard went windsurfing with a model of Pamela Anderson on his back]
- (53) a. Bill remembered [how_E Richard went windsurfing with a model of Pamela Anderson on his back]
 ⇒ b. Bill has seen [= visually experienced] Richard going windsurfing with a model of Pamela Anderson on his back

Since reports with *how_F*-complements are typically not used to describe personally experienced events (see above), they fail the above tests, as is shown for (27e) in (54) and (55):

- (54) #Jack *vividly* remembered / remembered *in perfect detail* [how_F beavers were sometimes killed by the very tree they were cutting down]
- (55) a. Jack remembered [how_F beavers were sometimes killed by the very tree they were cutting down]
 ≠ b. Jack has seen [= visually experienced] a beaver being killed by the very tree it was cutting down

By inverting Kastner’s finding from (8), we can complement the above tests for *how_E*-complements with another – negative – diagnostic for these complements, viz. the impossibility (in some situations) of preserving the meaning of this report by substituting its complement with a DP of the form ‘*the fact that* [TP]’. *How_E*-clause reports fail this test, as is shown for (51) in (56):

- (56) a. Bill remembered [how_E Richard went windsurfing ...]
 ≠ b. Bill remembered [*the fact that* Richard went windsurfing ...]

The non-equivalence of the reports in (56a) and (56b) is due to the fact that one can remember the (real-world) fact that Richard went windsurfing without remembering the particular event

of Richard going windsurfing (i.e. (56b) $\nRightarrow$ (56a)). This is the case since memory of facts about the real world requires neither memory of the particular space or point in time at which this fact is located (e.g. at Venice Beach, on 20 April, 2020, at 3:30 p.m. PST) nor memory of other facts about the event of which this fact is true (esp. of other agents in this event and their properties; e.g. that Richard was wearing his Hawaiian-print wetsuit and that Penny came surfing along).

Reports with *how_F*-complements pass this last test, as is illustrated for (27e) in (57):

- (57) a. Jack remembered [how_F beavers were sometimes killed by the very tree they were cutting down]
 $\equiv$ b. Jack remembered [*the fact that* beavers were sometimes killed by the very tree they were cutting down]

4. Entailment properties of factive and eventive ‘how_M’-complements

I have already stated in Section 3.3 that – due to the proper inclusion of facts in events – reports with factive *how_M*-complements do not license entailments to the eventive reading of these complements (see (56); i.e. B $\nRightarrow$ A in (58)). My observation about the different assertoric strength of *that*- and *how_F*-complements (see the cancellability of factively embedded *that*-, but not of *how_F*-clauses; in (8)) further suggests that *that*-clause attitude reports are assertorily *weaker* than reports with *how_F*-complements. This suggestion is corroborated by the intuition that the *that*-clause report in (59) does not entail the *how_F*-complemented report in (59). The observed non-entailment is in line with Nye’s intuition that “CHCs [...] contribute something additional [to the interpretation of factive *that*-clauses]” (Nye, 2013: p. 122).

To semantically distinguish eventive and factive uses of *how_M*-complements, I also consider the inverse direction of the above entailments. These include the entailment from reports with eventive- to reports with factive *how_M*-complements (see A $\Rightarrow$ B in (58)) and from reports with *how_F*- to reports with *that*-clause complements (see B $\Rightarrow$ C in (59)). Below, these entailments are illustrated on different variants of the memory report in (1a). In (58-A), the progressive form of the embedded verb makes explicit the imperfective nature of *how_E*-complements (see (37)–(41)). To obtain a minimal pair of *remember*-reports, (58-B) uses the progressive form of the verb in its complement:⁸

- (58) A: Anna remembers [how_E Berta was packing her bag]
 $(\equiv$ Anna remembers [*a (specific) event in which* Berta was packing her bag])

 $\nRightarrow$ B: Anna remembers [how_F Berta was packing her bag]
 $(\equiv$ Anna remembers [*the fact that* Berta was packing her bag])

(59) B: Anna remembers [how_F Berta packed her bag]
 $(\equiv$ Anna remembers [*the fact that* Berta packed her bag])

 $\nRightarrow$ C: Anna remembers [that Berta packed her bag]

I start with an investigation of the semantic relation between A and B (i.e. the entailment from the first to the second line in (58)).

⁸This form is not very natural (although it is judged ‘acceptable’ by native speakers). My use of this form is motivated by my focus on the entailment behavior of reports with eventive and factive *how_M*-complements, rather than on entailment differences due to aspect.

4.1. Epistemic positiveness of ‘how_M’-complements

I have mentioned in Section 3.2 that *how_E*-complements are roughly equivalent to English⁹ gerundive small clauses. Support for this equivalence comes from the eventive nature of these two types of complements (see (52)) and from the experientiality-requirement of these complements (see (53)). Support for their non-equivalence – and the reason for its classification as a *rough* equivalence – comes from the epistemic neutrality of gerundive complements (see Barwise, 1981; Barwise and Perry, 1983; cf. Dretske, 1969) and the epistemic positiveness of *how_E*-complements (see Umbach et al., submitted; *pace* Falkenberg, 1989).

The epistemic neutrality of gerundive complements is reflected in the possibility of cancelling the entailment from gerundive small clause- to *that*-clause reports (see (60)). This cancellability is supported by the possibility of continuing gerundive attitude reports with a *that*-clause report that describes a positive attitude towards the (implicit or explicit) *negation* of the content of the complement gerundive small clause (see (61a), *vis-à-vis* (61b)). The example in (61) is taken from Barwise (1981: 374).

- (60) a. Ralph saw [a spy hiding a letter under a rock]
 $\nRightarrow$ b. Ralph saw [*that* a spy was hiding a letter under a rock]
- (61) a. Ralph saw [a spy hiding a letter under a rock], ✓ but thought [that she was tying her shoe]
 (*More generally*: Ralph saw [a spy hiding a letter under a rock], ✓ but did not see [*that* the/a spy was hiding a letter under a rock])
 b. Ralph saw [that a spy was hiding a letter under a rock], #but thought [that she was tying her shoe]

In contrast to gerundive complements – but like *that*-clause complements –, *how_E*-complements *block* the continuation with a *that*-clause report that describes a positive attitude towards the negation of the content of the *how_E*-complement (see (62)):

- (62) Ralph saw [*how_E* a spy was hiding a letter under a rock], #but thought [that she was tying her shoe]

How_E-clause reports thus force an entailment to their *that*-clause variants (see (63)):

- (63) a. Ralph saw [*how_E* a spy was hiding a letter under a rock]
 $\Rightarrow$ b. Ralph saw [*that* a spy was hiding a letter under a rock]

As a result of their epistemic positiveness (*vis-à-vis* the epistemic neutrality of gerundive small clauses), *how_E*-clause reports entail their ‘gerundive’-variants, but not *vice versa* (see (64)):

- (64) a. Anna remembers [*how_E* Berta was packing her bag]
 $\nRightarrow$ b. Anna remembers [Berta packing her bag]

As their paraphrasability with ‘*the fact that* [TP]’ correctly suggests, observations like the ones above also hold for *how_F*-complements. The epistemic positiveness of Legate’s tooth-fairy example is evidenced by (65):

⁹Since German *erinnern* rejects gerundive complements, this equivalence cannot be expressed for German.

- (65) They told me [how_F the tooth fairy doesn't really exist], #but they didn't tell me [that the tooth fairy doesn't really exist]

The above supports the validity of (66) and, attendantly, the validity of $B \Rightarrow C$ in (59).

- (66) a. They told me [how_F the tooth fairy doesn't really exist]
 $\Rightarrow$ b. They told me [that the tooth fairy doesn't really exist]

I will provide a summary of the entailment properties of *how_E*-, *how_F*-, and *that*-clause complements below (in Sect. 5: Table 2). However, before I do so, I briefly turn to another semantic property of these reports, viz. referential opacity/transparency (see Quine, 1956). Since opacity is today one of the best-investigated properties of attitude reports, it is imperative that we also consider the opacity behavior of the different types of complements. We will see that – contrary to what is suggested by Barwise (1981) (see Falkenberg, 1989) – transparency patterns with direct witnessing, rather than with epistemic positiveness.

4.2. Referential transparency of eventive 'how_M'-complements

The epistemic positiveness of eventive and factive *how_M*-complements suggests that these complements are referentially opaque [= non-transparent] in the sense that they block the truth-preserving substitution of co-referential or truth-conditionally equivalent expressions (see Quine, 1956). However, as it turns out, this is only the case for *how_F*- and for *that*-complements (see e.g. (67), (68)):

- (67) a. They told me [how_F the tooth fairy doesn't really exist]
 $\nRightarrow$ b. They told me [how_F the chupacabra doesn't really exist]
- (68) a. They told me [that the tooth fairy doesn't really exist]
 $\nRightarrow$ b. They told me [that the chupacabra doesn't really exist]

In particular, if *how_F*- and *that*-clause complements were referentially transparent, they would allow the substitution of *the tooth fairy* by *the chupacabra*, since the set of tooth fairies and the set of chupacabras coincide at the world of evaluation (i.e. they are both $\emptyset$).

Unlike the above, *how_E*-complements are referentially transparent. For example, the transparency of (1a) is shown below:

- (69) a. Anna remembers [how_E Berta was packing her bag]
 b. Assumption: The bag which Berta was packing was a black leather duffle bag
 $\Rightarrow$ c. Anna remembers [how_E Berta was packing the black leather duffle bag]

Arguably, the validity of the above inference relies on the identification of the sets of Berta-packed bags and of black leather duffle bags at Anna's remembered mental scene (rather than at the originally perceived visual scene). In particular, in cases where Anna's memory does not (or no longer) include the above identity-information,¹⁰ the inference does not seem valid.

¹⁰This is due to the fact that – in contrast to event-perception – event-memory is often partial [= informationally incomplete]: over the course of time, we lose (or 'forget') information about the perceived visual event/scene that is the source of the memory (see Liefke and Werning, 2018).

5. Conclusion

I have shown in this paper that English has two kinds of non-manner *how*-complements, viz. DPs that are licensed by perception, memory, fiction, and report verbs and denote (actual or other-worldly) *events* and DPs that are licensed by presuppositional and ‘say’-verbs and denote actual/real-world *facts*. These DPs correspond to Umbach-style and Legate-style *how*_M-clauses, respectively. Umbach and Legate’s focus on different kinds of non-manner *how*-clause DPs – and the non-availability of factive *how*_M-clause DPs in German – explains Umbach et al.’s surprise about the Legate data.

I close this section with a summary of the lexical, selectional, and entailment properties of *how*_E-, *how*_F-, and *that*-clause complements that are most relevant for the formal semantic modelling of non-manner *how*-clause reports, and with pointers to future work:

Relevant semantic properties of the above kind include (i) the identity/ontological status of the object that serves as the denotation of the complement, (ii) the possibility (resp. non-possibility) of paraphrasing the complement by a *that*-clause, (iii) the (in-)directness of these reports (in the sense of Barwise, 1981), and (iv) the epistemic positiveness (resp. neutrality) of these reports. In particular, *how*_E-clause reports are direct and epistemically positive, but do not allow their complement’s truth-preserving paraphrase by a *that*-clause (see the first column in Table 2). They differ from *how*_F-clause reports in their directness. *That*-clause reports share the non-directness and epistemic positiveness of *how*_F-clause reports. Since referential transparency (see Sect. 4.2) and the denotation of an event or process (see Sect. 3.2) show the same pattern as personal experiencing, I do not list them as separate characterizing properties in Table 2.

	‘HOW’ _E -CLAUSE	‘HOW’ _F -CLAUSE	‘THAT’-CLAUSE
(i) DENOTATION	event	fact	proposition
(ii) ‘THAT’-PARAPHRASE ?	✗	✗	✓
(iii) DIRECT WITNESSING ?	✓	✗	✗
(iv) EPISTEM. POSITIVE ?	✓	✓	✓

Table 2: Semantic properties of *how*_E-, *how*_F-, and *that*-clause complements.

Future work will provide a compositional semantics for *how*_E-, *how*_F-, and *that*-clause reports that captures their above-described behavior. I believe that such semantics will yield insights into the interaction of attitude verbs and their complements, and will answer Umbach et al.’s questions about the reason behind the use of *how* for the introduction of non-manner entities (see also Legate, 2010) and about the emergence of different non-manner readings of *how*.

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