

Two Types of English Non-Manner *How*-Clauses

Kristina Liefke

Institute for Linguistics, Goethe University Frankfurt, Germany

Summary. I show that English has two types of non-interrogative, non-manner subordinate *how*-clauses: clauses that are licensed by perception/memory/fiction verbs and allow paraphrase by a DP of the form *the event in which* [_{TP}] (cf. Umbach et al., submitted) and clauses that are licensed by factive/*say*-verbs and allow paraphrase by a DP of the form *the fact that* [_{TP}] (see Legate, 2010; Nye, 2013). I provide a compositional semantics for reports containing these two types of *how*-clauses that captures their entailment behavior.

1. Introduction. In the complements of perception and memory verbs (e.g. *see*, *remember*), embedded *how*-clauses typically have a manner-reading (hereafter, ‘*how_M*’). On this reading, these clauses describe the particular manner or method in which a given event (in (1a): Berta’s packing) is/was performed (see (1b)):

- (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) (cf. Nye, 2013) and Umbach et al. (submitted) have argued (for English resp. German) that non-interrogative embedded *how*- [German *wie*-]clauses also have a non-manner reading (hereafter, ‘*how_M*’). However, Legate and Umbach provide mutually incompatible characterizations of this reading. Specifically, their characterizations diverge on which verbs license (English resp. German) *how_M*-clauses, whether *how_M*-clauses allow for negation and stative content, and whether *how_M* is restricted to colloquial language register. As a result of this divergence, the German counterpart of Legate’s English sentence (2a), i.e. (2b), is semantically deviant (see Umbach et al., submitted).

- (2) a. They told me [how_M the tooth fairy doesn’t really exist]
b. #Sie erzählten mir, wie_M die Zahnfee nicht wirklich existiert

This paper resolves the conflict between (Legate, 2010) and (Umbach et al., submitted). In particular, it provides empirical evidence for the assumption that English non-manner *how* is ambiguous between an Umbach-style eventive use, i.e. *how_E* (which is licensed by perception/memory/fiction verbs, introduces a process, and is unmarked w.r.t. register), and a Legate-style propositional use, *how_P* (which is licensed by factive/*say*-verbs, allows for negation and stative content, and is informal in register). The non-availability of *how_P* in German explains Umbach et al.’s surprise about the Legate data.

2. Diagnostics for *how_E* (*vis-à-vis how_P*). To distinguish *how_E*- from *how_P*-clauses, we use Stephenson’s (2010) tests for reports of ‘vivid’ [= event-directed] attitudes. These tests include (i) the substitutability of the complement in these reports by a DP of the form *a/the event in which* [_{TP}], (ii) the modifiability of the matrix verb in these reports by an ‘experiential’ modifier like *vividly* or *in perfect detail*, and (iii) the entailment of these reports to sentences that relate the agent’s direct (mental or perceptual) witnessing of the event described by the reports’ complement. Reports with embedded *how_E*-clauses pass these tests, as is shown for the *how_E*-reading of (1a) in (3)–(5):

- (3) Anna remembers [*a (specific) event in which* Berta was packing her bag]
(4) Anna *vividly* remembers/remembers *in perfect detail* [how Berta was packing ...]
(5) a. Anna remembers [how_E Berta was packing her bag]
⇒ b. Anna has seen [= perceptually witnessed] Berta packing her bag

Since reports with embedded *how_P*-clauses are typically not used to describe directly witnessed events, they fail the above tests, as is shown for (6) in (7)–(9):

- (6) Ralph remembers [how_P Berta never returned]

- (7) #Ralph remembers [*a (specific) event in which* Berta never returned]
- (8) #Ralph *vividly* remembers/
remembers *in perfect detail* [how_P Berta never returned]
- (9) a. Ralph remembers [how_P Berta never returned]
≠ b. Ralph has seen [= perceptually witnessed] Berta never returning

3. A compositional semantics for *how_E*- and *how_P*-clauses. To provide the ‘right’ semantics for eventive and propositional uses of embedded *how*-clauses, we consider the intuitive entailment behavior of reports containing these clauses. For (1a), this behavior is exemplified in (I) and (II).¹ We then attempt to model this behavior. To obtain a minimal pair of *remember*-reports, (I) uses the progressive form of the complement in B:

- (I) A: Anna remembers [how_E Berta was packing her bag]
≠ ≠ B: Anna remembers [how_P Berta was packing her bag]
- (II) B: Anna remembers [how_P Berta packed her bag]
≠ ⇒ C: Anna remembers [that Berta packed her bag]

To capture the entailments in (I) and (II), we assume that eventive and propositional *how*-clauses have the same syntax (see Legate, 2010 [for *how_P*] and Umbach et al., submitted [for *how_E*]), but a different semantics (due to the semantic difference between *how_E* and *how_P*). In particular, *how_E* is interpreted as interrogative manner *how* (i.e. as *how_M*; in (10), where ‘M(anner)’ denotes a similarity class of events). In contrast, *how_P* is interpreted as a factive complementizer (i.e. as Kratzer’s (2006) *that_F*; in (11), where Π is a function from propositions to the set of their minimal exemplifiers [= facts]):

- (10) $\llbracket \text{how}_E \rrbracket \equiv \llbracket \text{wie}_E \rrbracket \equiv \llbracket \text{the event in which} \rrbracket = \lambda q^{(s,t)} \lambda p [(\forall j^s. p_j \rightarrow q_j) \wedge (\exists M. p = M)]$
- (11) $\llbracket \text{how}_P \rrbracket \equiv \llbracket \text{the (actual) fact that} \rrbracket = \lambda p^{(s,t)}: \underline{p}_i. [\Pi(p)]$ [no German counterpart]

Given the above, the *how_(E)*-clause in A denotes a manner (!); the *how_(P)*-clause in B denotes a (singleton) set of facts.

To account for ‘C ≠ B’, we further assume that *remember* (in English and in German) is polysemous between a ‘vivid’ reading, *remember_{EVENT}* (on which it denotes a relation to a (propositionally coded) event; see (12a)), and a propositional reading, *remember_{PROP}* (on which it denotes a relation to a classical proposition; see (12b)). The polysemy of *remember* is supported by Tulving’s (1972) distinction between episodic [\approx event-] and semantic [\approx propositional] memory. In (12a), C_i is a subset selection function that chooses a singleton (here: a representation of the remembered event) from a set of qualitatively identical events in dependence on the evaluation situation/event i .

- (12) a. $\llbracket \text{remember}_{\text{EVENT}} \rrbracket^i = \lambda p \lambda z [\text{remember}_i(z, C_i(p))] \quad [\text{■} : \text{an event in } i]$
b. $\llbracket \text{remember}_{\text{PROP}} \rrbracket^i = \lambda p \lambda z [\text{remember}_i(z, p)] \quad [\text{■} : \text{a proposition}]$

To capture the entailments in (I) (see (14)) and (II) (see (13)), we then only need to assume that *remember_{EVENT}* selects for *how_E* (in English and German) and *how_P* (in English), while *remember_{PROP}* selects for *that_F* (in English and in German). In virtue of this assumption, the complements in A, B, and C denote (a representation of) an event [= a maximally specific manner] (see (14a)), (a type- $\langle s, t \rangle$ representation of) an individual fact (see (13a), (14b)), and a (non-singleton) set of facts (see (13b)), respectively.

In (13)–(14), ‘ $t_j \prec t_i$ ’ asserts that the time of the event j precedes the evaluation time (thus capturing past tense). ‘ $j \preceq k$ ’ describes the event k as a natural continuation of the event j (thus capturing progressive aspect; see Landman, 1992). In (14a), the silent deter-

¹We follow Falkenberg (1989) in assuming that *how_E*-complements are epistemically neutral (in the sense of Dretske, 1969). In virtue of this assumption, *how_E*-complements are equivalent to English gerund complements (here: to the complement in *Anna remembers Berta packing her bag*).

miner denotes a choice function, f_i , that yields propositions from questions [= sets of propositions] (see (10)). E is a situation/event-relative existence predicate.

- (13) a. $\llbracket \text{A. remembers}_{\text{EVENT}} [\text{DP}\emptyset [\text{CP}\text{how}_P [\text{C}'\emptyset [\text{TP}\text{PAST} [\text{Berta}] [\lambda_1 [\text{PERF} [\text{pack } t_1]]]]]]]]]]^i$
 $= \text{remember}_i(\text{anna}, \mathbf{C}_i(\mathbf{\Pi}(\lambda j. t_j \prec t_i \wedge \text{pack}_j(\text{berta}))))$ [] : a fact in i
- $\not\Rightarrow$ b. $\text{remember}_i(\text{anna}, \mathbf{\Pi}(\lambda j. t_j \prec t_i \wedge \text{pack}_j(\text{berta})))$ [] : a set of facts
 $= \llbracket \text{Anna remembers}_{\text{PROP}} [\text{CP}\text{that} [\text{C}'\emptyset [\text{TP}\text{PAST} [\text{Berta}] [\lambda_1 [\text{PERF} [\text{pack } t_1]]]]]]]]^i$
- (14) a. $\llbracket \text{A. remembers}_{\text{EVENT}} [\text{DP}\emptyset [\text{CP}\text{how}_E [\text{C}'\emptyset [\text{TP}\text{PAST} [\text{Berta}] [\lambda_1 [\text{PROG} [\text{pack } t_1]]]]]]]]]]^i$
 $= \text{remember}_i(\text{anna}, \mathbf{C}_i(\mathbf{f}_i(\lambda p[(\forall k. p_k \rightarrow (t_k \prec t_i \wedge (\exists j. (E_j(\text{berta}) \wedge j \preceq k) \wedge \text{pack}_k(\text{berta})))) \wedge (\exists \mathbf{M}. \mathbf{p} = \mathbf{M}))))))$ [] : an event in i
- $\not\Leftarrow$ b. $\text{remember}_i(\text{anna}, \mathbf{C}_i(\mathbf{\Pi}(\lambda k. t_k \prec t_i \wedge (\exists j. (E_j(\text{berta}) \wedge j \preceq k) \wedge \text{pack}_k(\text{berta}))))))$ [] : a fact in i
 $= \llbracket \text{A. remembers}_{\text{EVENT}} [\text{DP}\emptyset [\text{CP}\text{how}_P [\text{C}'\emptyset [\text{TP}\text{PAST} [\text{Berta}] [\lambda_1 [\text{PROG} [\text{pack } t_1]]]]]]]]]]^i$

The validity of ‘B \Rightarrow C’ (see (13a \Rightarrow b)) is due to the fact that memory of a (spatio-temporally anchored) fact about the real world entails – but is not entailed by – memory of the associated (spatio-temporally non-anchored) proposition about this world (i.e. $C_i(\mathbf{\Pi}(\lambda j. \dots)) \subseteq \mathbf{\Pi}(\lambda j. \dots)$). The non-validity of ‘A \Rightarrow B’ and ‘B \Rightarrow A’ (see (14)) is due to the fact that memory of a particular fact about an event does not entail memory of the full relevant event (i.e. $C_i(\mathbf{\Pi}(\lambda j. \dots)) \not\subseteq C_i(f_i(\lambda p. \dots))$) and that memory of an event does not entail awareness of all true facts about this event (i.e. $C_i(f_i(\lambda p. \dots)) \not\subseteq C_i(\mathbf{\Pi}(\lambda j. \dots))$).

4. Conclusion. The different denotations of how_E -, how_P -, and that_F -complements answer the question why some languages allow for propositional and eventive uses of *how*. This answer is suggested by Table 1: how_E makes it possible to express relations to events in languages (e.g. German) where *remember* does not license gerund complements. The introduction of how_P can be explained by its filling of an otherwise unoccupied combinatorial position b/w objects (e.g. events; see C_i) that are spatio-temporally located in a particular world, and objects (e.g. propositions; see $\mathbf{\Pi}$) that are informationally minimal.

	FACTS (use of $\mathbf{\Pi}$)	EVENTS (no use of $\mathbf{\Pi}$)
SINGLETONS (C_i)	how_P -clause	[gerund] how_E -clause
SETS (without C_i)	that_F -clause	non-factive that -clause

TABLE 1

References.

- Dretske, F. I. (1969). *Seeing and Knowing*. London: Routledge and Kegan Paul.
- Falkenberg, G. (1989). Einige Bemerkungen zu perzeptiven Verben. In G. Falkenberg (Ed.), *Wissen, Wahrnehmen, Glauben*, pp. 27–46. Tübingen: Niemeyer.
- Kratzer, A. (2006). Decomposing attitude verbs. <https://tinyurl.com/qlcr6ek>.
- Landman, F. (1992). The progressive. *Natural Language Semantics*, 1–32.
- Legate, J. A. (2010). On how *how* is used instead of *that*. *Natural Language and Linguistic Theory* 28(1), 121–134.
- Nye, R. (2013). *How Complement Clauses Distribute: Complementiser how and the case against clause-type*. Ph. D. thesis, Ghent University.
- Stephenson, T. (2010). Vivid attitudes: Centered situations in the semantics of *remember* and *imagine*. In *Proceedings of SALT XX*, pp. 147–160.
- Tulving, E. (1972). Episodic and semantic memory. In E. Tulving and W. Donaldson (Eds.), *Organization of Memory*, pp. 381–402. New York: Academic Press.
- Umbach, C., S. Hinterwimmer, and H. Gust (submitted). German *wie*-complements: Manners, methods and events in progress. <https://tinyurl.com/wxm5lp5>.