

# Bare Plurals, Naked Relatives, and Their Kin

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## *Towards a Unified Semantics of German wh-Constructions*

Dietmar Zaefferer\*

### 1. INTRODUCTION

#### *1.1. Terminological clarification*

Free relative clauses - or naked relatives, as I will call them for reasons that will become clear later - are members of a family of related, but distinct constructions, which are often referred to by the name of wh-constructions, because they are marked in English by the presence of wh-words like *who* or *where*. The term can be carried over to any language with interrogative words and can be conceived of as denoting the family of construction types that have the interrogative words and their homonyms as common denominator. Therefore, if there are no homonyms, the wh-constructions are just the constituent interrogatives. Most languages, however, do have homonyms and so e.g. both in English and in German, the headless or free relative constructions are also in the family of wh-constructions (although, in this sense, in German the noun-headed relatives are not).

#### *1.2. Philosophical confusion*

According to Eike von Savigny ([9]), the interrogative/relative homonymy can even lead to philosophical confusion. He points out that in his "Treatise Concerning Human Understanding", John Locke uses a sentence with a wh-construction that sounds irrefutable as evidence for the position he advocates (i.e. the certainty of interior perception; [6]vol.II:269):

(1) ... *it being impossible but that he should perceive what he perceives...*

A closer inspection, however, shows that it is unassailable only in its free relative reading, which is, in fact, tautological and therefore not very helpful for Locke's point. The other, interrogative, reading, however, the one Locke needs for his argument, is far from being

obvious. In order to point out the critical semantic difference, I restate the relevant portion of (1) and give a (tentative) logical representation for each reading:

(2) *John perceives what he perceives.*

(2a)  $\forall x[\text{perceive}'(j,x) \rightarrow \text{perceive}'(j,x)]$  (free relative reading)

(2b)  $\forall x[\text{perceive}'(j, \text{whether}'[\text{perceive}'(j,x)])]$  (interrogative reading)

(2a) shows the irrefutability of the free relative reading: Whenever John perceives something, he perceives it. True, but uninteresting. The interrogative reading is built on the assumption that a wh-interrogative is but a generalization of a whether-interrogative. It says that for any object  $x$ , John perceives whether or not he perceives  $x$ . And it entails that if John perceives  $x$ , he also perceives whether he perceives  $x$ . That is an interesting claim (note its implicit recursiveness), but far from being unassailable.

### 1.3. *The relative/interrogative distinction in German*

The Locke example was the one through which I got first interested in the free relative/interrogative distinction and it was easy to see that the same distinction holds for German as well. To illustrate this, I will use a somewhat trickier example. Its perplexing appearance is due to the fact that the two readings are truthconditionally independent, which makes it possible to construct examples where a sentence expression is consistently conjoined with its negative counterpart as in (3):

(3) *Eva weiss, was Max wissen will, aber was er wissen will, weiss sie nicht.*

(*Eva knows what Max wants to know, but she does not know what he wants to know.*)

This sounds mind-boggling at first, but a moment's reflection shows that it is possible to give it a sensible interpretation. If the first occurrence of *was Max wissen will* is read as a plain interrogative, and the second one as a relative one, then (3) means something like *Eva knows the issue Max is interested in, but she doesn't know the answer* and it is easy to think of circumstances which would make (3) true: Suppose that (a) Eva doesn't know whether she is happy, (b) the only thing Max wants to know is whether Eva is happy, and (c) Eva knows about Max' wish. It's of course awkward but possible to express this, abstracting from the concrete instantiation, as (3).

This gives a clear indication of what the two readings of *was Max wissen will* mean: As a plain interrogative, it means roughly a collection of propositions that are denoted by the sentences that can be obtained from the open sentence **Max will  $x$  wissen** by proper instantiation for  $x$ , as a relative, it means a collection of propositions  $x$  which satisfy this open sentence. A sketch of a logical representation of the discussed reading of (3) would therefore be (3a):

(3a)  $\forall x[\text{wiss}'(e, \text{whether}[\text{wiss-woll}'(m, x)]) \ \&$

$\neg \forall x[\text{wiss}'\text{-woll}'(m, x) \rightarrow \text{wiss}'(e, x)]$

## 2. BARE AND DRESSED, RELATIVES AND PLURALS

### 2.1. *The end of a nice analysis*

Our short discussion of the interrogative/relative ambiguity of some wh-constructions involved a generalizing analysis of the meaning of free relatives which has the nice property of giving an straightforward account of inferences likes the following:

(4) *Eva weiss, was Max wissen will.* [relative reading]

(*Eva knows what Max wants to know.* )

(5) *Max will wissen, ob es regnet.*

(*Max wants to know whether it is raining.*)

Therefore:

(6) *Eva weiss, ob es regnet.*

(*Eva knows whether it is raining.*)

This analysis, however, happens to coincide with the one which is most naturally given for universally quantified relatives like *alles, was Max wissen will (everything Max wants to know)*, which in inferences like the one above, behave exactly alike. If their semantic behaviour could be shown to be identical, the synonymy assumption expressed in the identical analyses would be valid. Unfortunately, there are at least three kinds of counterexamples to this assumption. The first kind was brought to my attention by Irene Heim (p.c.), and has to do with the so-called adverbs of quantification (cf. Lewis[4]).

#### 2.1.1 *Counterevidence A: Adverbs of quantification*

These examples show that explicitly universally quantified relatives (u-relatives for short) cannot be freely interchanged with free relatives in the presence of adverbs of quantification.

(7) *Was Eva am Strand findet, ist meistens wertlos.*

(*What Eva finds at the beach is mostly worthless.*)

(8) *\*Alles, was Eva am Strand findet, ist meistens wertlos.*

(*\*Everything that Eva finds at the beach is mostly worthless.*)

What is going on here? An intuitive way of describing it is the following: The implicit generalization felt in the free relative can be overridden by the explicit *most* quantifier, whereas the explicit universal quantification of the u-relative clashes with the *most* quantification of the adverb, yielding a semantically anomalous sentence.

(If *meistens* is read as a temporal adverb, (8) is perfectly normal, but that reading has a quite different meaning (suggesting that Eva finds, say, Christmas trees, which are worthless except once a year) and should not distract us.)

People with the PTQ-truth definition (cf. Montague[7]) in mind might come up with the following proposal for a fix: Let free relatives be represented as free variables, with the same variable being free in the rest of the sentence. If no adverb of quantification intervenes, then the whole sentence is true (according to the PTQ definition) if it is true for all variable assignments, i.e. if the u-quantified counterpart is true as well. Adverbs of quantification, however, bind the free variable, yielding something like (7a) as meaning representation for (7), and cannot find anything to bind in case (8).

(7a) MOST  $x[am\text{-}Strand\text{-}find'(e,x) : wertlos'(x)]$

This looks nice, but it still doesn't work, since it would always assign widest scope to the implicit universal quantifier of the free relative, and this is in clear contradiction with data like the following, where the narrow scope reading is the preferred one, or even the only one:

(9) *Ein Polizist verhaftete, wen er im Hause antraf.*

(*A policeman arrested whoever he met in the house.*)

So what we need is some kind of device which delimits the scope of the critical variable, but does not specify any kind of quantification until an adverb of quantification is met, which then determines the kind of quantification, or else universal quantification is filled in as a default. But before we try to spell this out, it might be useful to have a look at some more counterevidence to the synonymy assumption.

### 2.1.2 Counterevidence B: Degree particles

A second class of counterexamples was brought to my attention by Bertold Brecht (posthumous communication), who wrote the fine line (10):

(10) *Nur wer im Wohlstand lebt, lebt angenehm.*

*(Only he who lives in wealth, lives a pleasant life.)*

Again, substituting a u-relative for the free relative results in a semantically anomalous sentence:

(11) *\*Nur jeder der im Wohlstand lebt, lebt angenehm.*

*(\*Only everybody who lives in wealth, lives a pleasant life.)*

(There are acceptable readings for (11) where the focus of *nur* is only on some part of the NP, but these shall be ignored here.)

Basically the same holds for other degree particles like *gerade*, *sogar*, *auch*, although the degree of deviance of the u-relative counterpart may be smaller.

(12) *Gerade/Sogar/Auch (? alles) was ich nicht wissen soll, möchte ich wissen.*

*(I want to know precisely/even/also (? everything that/what) I am not supposed to know)*

Interestingly enough, adding a *nur* (*only*) to a free relative does not simply add the inverse implication to the original one, but seems to replace it. Cf. (13) - (16):

(13) *Max hat Geld.*

*(Max has money.)*

(14) *Wer Geld hat, hat Macht.*

*(He who has money has power.)*

(15) *Nur wer Geld hat, hat Macht.*

*(Only he who has money has power.)*

(16) *Max hat Macht.*

*(Max has power.)*

(16) can be inferred from (13) only with the help of (14), not with (15). This is some more evidence for the volatility of the generalizing power of free relatives.

### 2.1.3 Counterevidence C: Logical particles

The third group of counterexamples against the free relative/u-relative synonymy assumption behaves in a way which is complementary to the ones in the groups A and B. Adding logical particles like *nicht* or *fast* to a relative NP works fine, if it is a u-relative, but is out with free relatives:

(17) *Nicht/Fast jeder, der wagt, gewinnt.*

(*Not/Almost everybody who dares wins.*)

(18) \**Nicht/\*Fast wer wagt, gewinnt.*

(\**Not/\*Almost who dares wins.*)

(As before, special stress can change the picture: The first variant of (18) can be made acceptable if it is given contrastive stress and if it is followed by a correcting statement like "... but who pays".)

Again, if free relatives would contain a hidden universal quantifier, one would expect it to be modifiable in the usual ways. But it isn't. So the conclusion to be drawn from these data is simply that free relatives do not contain any hidden quantifier and that they derive their generalizing meaning from a different source.

### 2.2 Bare and naked

At least one property of free relatives, namely the presence of a strong feeling of quantificational power in the absence of any explicit quantifier reminds one strongly of another construction type which was not properly understood for a long time, namely the so-called bare plurals (cf. Carlson[1]). Unlike their equally undressed clausal relatives (henceforth naked relatives), they come in two varieties, an existential and a generalizing one. (19) illustrates the former, (20) the latter:

(19) *Diebe haben unser Auto ausgeräumt.*

(*Thieves have emptied our car.*)



(20) *Diebe sind ehrlos.*

*(Thieves are dishonorable.)*

The existential variant seems to have no relative clause counterpart, at least (22) is not a paraphrase of (19), given (21):

(21) *Wer stiehlt, ist ein Dieb, und umgekehrt.*

*(He who steals is a thief, and vice versa.)*

(22) *Wer stiehlt, hat unser Auto ausgeräumt.*

*(He who steals has emptied our car.)*

But (20) does have relative clause counterparts, e.g. (23), and (23) is a paraphrase of (20), given (21):

(23) *Wer stiehlt, ist ehrlos.*

*(He who steals is dishonorable.)*

Another difference between bare plurals and naked relatives is that only the latter admit of a definite reading. Cf. (24), where a- and b-variant stand in a paraphrase relation, and (25), where this is not the case:

(24a/b) *(Was/Das, was) Hans gestern gesagt hat, stimmt nicht.*

*(What Hans said yesterday is not correct.)*

(25a/b) *(Äußerungen/Die Äußerungen), die Hans gestern gemacht hat,  
stimmen nicht.*

*((Remarks/The remarks) that Hans made yesterday are not correct.)*

Having stated the fundamental differences between bare plurals (henceforth BP's) and naked relatives (henceforth NR's), we can now proceed to a step-by-step check of the similarities between the two.

The first parallel: Adverbs of quantification are fine with bare, but not with universally quantified plurals (cf. examples (7) and (8) above):

(26) *Fundsachen sind meistens wertlos.*

*(Things found are mostly worthless.)*

(27) *\*Alle Fundsachen sind meistens wertlos.*

*(\*All things found are mostly worthless.)*

The second parallel: BP's, but not u-quantified plurals go with grade particles (cf. (10) and (11) above):

(28) *Nur Reiche leben angenehm.*

*(Only rich people live a pleasant life.)*

(29) *\*Nur alle Reichen leben angenehm.*

*(\*Only all rich people live a pleasant life.)*

Third parallel: The same logical particles which can operate on universal quantifiers, but not on NR's (cf above (17) and (18)), are impossible with BP's:

(30) *Nicht/Fast alle Seeleute sind abergläubisch.*

*(Not/Almost all sailors are superstitious.)*

(31) *\*Nicht/\*Fast Seeleute sind abergläubisch.*

*(\*Not/\*Almost sailors are superstitious.)*

(Note that the same qualifications concerning the intended reading of the starred examples hold as above.)

Fourth parallel (and the last one I want to mention here): The generalizing flavor of both of them makes them especially apt for prototypical, legal, and proverbial usage:

(32) *Echte Bayern trinken Bier.*

*(True Bavarians drink beer.)*

(33) *Wer ein echter Bayer ist, trinkt Bier.*

*(Whoever is a true Bavarian drinks beer.)*

(34) *Falschparker werden abgeschleppt.*

*(Illegally parked cars get towed.)*

(35) *Wer falsch parkt, wird abgeschleppt.*

*(Whoever parks his car illegally gets towed.)*

(36) *Lügen haben kurze Beine.*

*(Lies have short legs.)*

(37) *Wer einmal lügt, dem glaubt man nicht, und wenn er auch  
die Wahrheit spricht.*

*(Whoever once tells a lie will not be believed, even if he tells  
the truth.)*

So one desideratum for a semantics of (German) NR's is that it account for these similarities with, and differences from BP's. Another desideratum is of course, and this takes us back to the introductory remarks, that it assign them their proper place in the family of related constructions.

### 3. TOWARDS A UNIFIED SEMANTIC ANALYSIS OF GERMAN wh-CONSTRUCTIONS

#### 3.1. Six types of German *wh*-constructions

What does the family of German *wh*-constructions (in my strict sense) look like? I claim that contrary to what one might guess from the previous examples and from the literature, it contains not just two members, interrogative and naked relative clauses (remember that fully dressed, i.e. noun-headed relatives are, unlike most of their English counterparts, not literally *wh*-constructions, since they contain no *wh*-words, the relative pronoun having in these cases a form which starts with a *d*), but some more, apparently even six. According to the size and the category of the *wh*-construction, I distinguish 3 groups:

- Lexical *wh*-constructions, where *wh*-word and *wh*-construction coincide,
- Phrasal *wh*-constructions, where the *wh*-word precedes a clause to form a phrase of the same category as the *wh*-word (which may be, but need not be the category clause), and
- Clausal *wh*-constructions, where the *wh*-word precedes a clause to form a clause, regardless of the category of the *wh*-word.

**Naked relatives** are phrasal constructions; in the *wer*-cases considered so far, they form personal terms (i.e. noun phrases with the feature [+ person]), but there are other cases as well, e.g. local adverbials such as in (38):

(38) *Fritz lebt wo sich Hasen und Füchse gute Nacht sagen.*

(*Fritz lives where hares and foxes say good night to one another.*)

**Embedded interrogatives** are clausal *wh*-constructions, no matter if the *wh*-word is an NP or an adverbial or what have you, cf. (39):

(39a/b) *Eva verschweigt Max, wen sie liebt / wo sie lebt.*

(*Eva conceals from Max who she loves / where she lives.*)

So far, so obvious. The inclusion of the following four types, however, may deserve some comment.

The least surprising one may be that of the **pseudo-clefts**, since they can be considered as a special case of free relatives (cf. [3]). (40) is an illustration:

(40) *Was Max am meisten verblüffte, war Evas Frechheit.*

*(What surprised Max the most was Eva's insolence.)*

The question is: What is it that makes them special?

Second, with lexical wh-constructions, there can be only one type, since here, the construction consists simply in the wh-word itself. This construction type is not very much used in written German, but quite frequently in the colloquial language. Its meaning is much the same as that of indefinites like *jemand*, *etwas*, etc., but unlike the latter, its representatives cannot be stressed and have to occur after the finite verb in verb-second sentences. I therefore call them **weak indefinites**. Here is an example:

(41) *Da singt wer.*

*(There is somebody singing.)*

Third and fourth, the category of clausal wh-constructions contains, alongside with the interrogative clauses, two little known construction types: **wh-exclamatories** as in (42), and the antecedents of what has been called irrelevance conditionals, which I will call **no-matter-conditionals**, illustrated by (43):

(42) *Es ist unglaublich, wie frech Eva ist.*

*(It is incredible how insolent Eva is.)*

(43) *Was du auch sagst, ich werde meine Entscheidung nicht ändern.*

*(Whatever you say, I will not change my decision.)*

The wh-exclamatories (cf. [11]) look pretty much like wh-interrogatives (and thus have given rise to some confusion among grammarians), but unlike them, they fit into argument places where also *daß*-clauses (declarative clauses) fit, but no *ob*-clauses (interrogative clauses):

(44) *Es ist unglaublich, daß/\*ob Eva so frech ist.*

*(It is incredible that/\*whether Eva is so insolent.)*

More importantly, their semantics differs considerably from that of interrogatives. More on that below.

No-matter-conditionals are almost ignored in the literature, there seems to be no established term for them, and that is why I have dubbed my own term. One property sets their antecedents apart from all the other constructions considered so far: they cannot be

confounded with the latter, since they are obligatorily marked with an *auch* or an *immer* in the clause, or with an *egal* or *gleich* preceding it (cf. English *-ever, no matter*):

- (45) *Egal, wo du hingehst / Wo immer du hingehst / \*Wo du hingehst,*  
*ich werde dich finden.*  
 (No matter where you go /wherever you go / \*where you go,  
 I will find you.)

Semantically, they seem to be conditionals, but since their antecedent in general does not impose any real restrictions, the pragmatic effect is mostly just the opposite: Instead of relativizing the truth of the consequent to a given condition, they emphasize the unrestricted validity of the consequent.

Next, I will present an overview of which wh-words occur in what function.

### 3.2. A synopsis of German wh-constructions

Table 1 gives an answer to the question: Which German wh-words occur in which wh-constructions? The following abbreviations are used in the table:

Heads of the columns: IC: Interrogative clause, NCA: no-matter-conditional antecedent, EC: Exclamatory clause, PCA: Pseudo-cleft argument, WI: Weak indefinite. Heads of the rows: the *was* and *wie* are subcategorized according to the category which they represent: *was*<sub>NP</sub>, *was*<sub>DC</sub>, *was*<sub>IC</sub>, and *was*<sub>P</sub> mean the NP, declarative clause, interrogative clause, and infinitive phrase *was*, respectively; *wie*<sub>INSTR</sub> means the instrumental *wie* as in *Wie öffnet man diese Türe?* (*How does one open this door?*), *wie*<sub>MODE</sub> the modal *wie* as in *Wie singt Eva?* (*How does Eva sing?*), and *wie*<sub>SPEC</sub> the preadjectival/preadverbial specifier *wie* as in *Wie groß ist Max?* (*How tall is Max?*)).

A plus sign means that grammatical examples can be found, it does not imply that they are often used. Question marks are placed where only questionable examples can be given, minus signs say that all examples are out. The entry in row 9, column d. indicates that although there are no relative temporal phrases with *wann*, the closely related *wenn* is possible in this construction.

Table 1

	Clausal			Phrasal		Lexical
	IC	NCA	EC	NR	PCA	WI
	a.	b.	c.	d.	e.	f.
1. <i>wer (who)</i>	+	+	+	+	+	+
2. <i>was<sub>NP</sub> (what)</i>	+	+	+	+	+	+
3. <i>was<sub>DC</sub> (what)</i>	+	+	+	+	+	+
4. <i>was<sub>IC</sub> (what)</i>	+	+	+	+	+	+
5. <i>was<sub>IP</sub> (what)</i>	+	+	+	+	+	+
6. <i>wo (where)</i>	+	+	+	+	+	+
7. <i>woher (whence)</i>	+	+	+	+	+	+
8. <i>wohin (whither)</i>	+	+	+	+	+	+
9. <i>wann (when)</i>	+	+	+	( <i>wenn</i> ) ?		–
10. <i>seit wann (since when)</i>	+	+	+	–	?	–
11. <i>bis wann (until when)</i>	+	+	+	–	?	–
12. <i>warum (why)</i>	+	+	+	–	–	–
13. <i>weswegen (why)</i>	+	+	+	+	+	–
14. <i>wieso (why)</i>	+	+	+	–	–	–
15. <i>wozu (for what)</i>	+	+	+	–	+	–
16. <i>wie<sub>INSTR</sub> (how)</i>	+	+	+	+	?	–
17. <i>wie<sub>MODE</sub> (how)</i>	+	+	+	+	+	–

18. <i>wie</i> <sub>SPEC</sub> ( <i>how</i> )	+	+	+	-	-	-
19. <i>was für</i> ( <i>what kind of</i> )	+	+	+	-	-	-
20. <i>welch</i> ( <i>what</i> )	-	+	+	-	-	-
21. <i>welcher</i> ( <i>which</i> )	+	+	+	-	-	-
22. <i>wieviel</i> ( <i>how much/many</i> )	+	+	+	+	-	-

Several interesting things can be learned from this overview. First, the no-matter-conditional and the exclamatory clause constructions seem to be very general, being the only ones in which all 22 listed *wh*-words occur. Second, there seems to be a clear cut between the first 8 words and the rest, since only these occur in all six functions. Especially the weak indefinite is possible only as argument or in local function, not in temporal, causal, final, modal, or determiner function (its stressable *irgend*-counterparts, however, do occur in some of these functions: *irgendwann*, *irgendwie*, *irgendwelche*). The same holds tendentially for the phrasal constructions (rows d and e); where they occur, they are mostly better with a resumptive pronoun (*Weswegen Max unzufrieden ist, (deswegen/?Ø) kündigt er auch* (*Why Max is discontented, (therefore/?Ø) he gives notice*); *Wie man sich bettet, (so/?Ø) liegt man* (*How one lies down, (so/?Ø) one lies*). Third, our grouping of the six types into three groups seems to be justified. Let us now have a look at the semantics of each construction in turn.

### 3.3. Lexical *wh*-constructions

The weak indefinite pronouns *wer*, *was*, *wo*, *woher*, *wohin* behave semantically exactly like their stressable counterparts *jemand/irgendwer/irgendjemand*, *etwas/irgendetwas/irgendwas*, *irgendwo*, *irgendwoher*, *irgendwohin*, i.e. they correspond, according to one's preferences to a (restricted) existential quantifier or to an unfamiliar item introducer. I indicate the semantics in the former style and with a Situation Semantics inspired notation, whose syntax mimics SOV-languages: first the arguments, then the predicate, followed by the polarity. Interpretations, i.e. truth conditions, are relative to a given situation *s*, so "in *s*: *o*" is to be read as "the state of affairs *o* holds in *s*".

(46) *Da singt wer.*

(*There is somebody singing.*)



(46a) in s:  $\exists x[\langle x, \text{person}'; 1 \rangle \& \langle x, \text{sing}'; 1 \rangle]$

Multiple weak indefinites are impossible since they cannot occur several times in themselves, but weak indefinites can of course cooccur in one clause and pose no special problem for the analysis (neglecting tense again):

(47) *Da hat wer was gesagt.*

(*Somebody has said something.*)

(47a) in s:  $\exists x, y[\langle x, \text{person}'; 1 \rangle \& \langle y, \text{person}'; 0 \rangle \& \langle x, y, \text{sag}'; 1 \rangle]$

### 3.4. Phrasal wh-constructions

#### 3.4.0 Overview

Phrasal wh-constructions consist of a wh-word followed by a clause where an expression of the same category (and case) as the wh-word is missing. The whole thing has again the same category (but not necessarily case). E.g. in *Eva zerbrochen hat* (*Eva has broken*), a non-personal NP in the accusative case is missing, so *was Eva zerbrochen hat* (*what Eva has broken*) is the corresponding wh-phrase, and *Max repariert, was Eva zerbrochen hat* (*Max is fixing what Eva has broken*) as well as *Was Eva zerbrochen hat, war nicht leicht zu reparieren* (*What Eva has broken was not easy to fix*) are sentences containing that phrase in an accusative and a nominative position, respectively.

Since *was* can be both accusative and nominative, the case marking does not interfere with the grammatical function of the wh-phrase in the main clause. The situation is different with the personal *wer* (nominative) vs. *wen* (accusative). Here often a left dislocation construction is used to avoid a bad feeling about the 'wrong' case marking, cf. (48), where internal and external case (case of the slot in the embedded clause and case of the wh-phrase in the matrix clause) coincide, with (49), where there is a difference:

(48) *Wer Max berät, findet ihn sympatisch.*

(*Whoever counsels Max, likes him.*)

(49) *Wen Max berät, (der) findet ihn sympatisch.*

(*Whoever Max counsels, (he) likes him.*)

What is the meaning of a wh-phrase, what does it denote? I claim that it denotes the maximal entity which satisfies both the open sentence of the wh-phrase and the restriction implicit in the wh-word. So, *wen Eva kennt* denotes the person(s) Eva knows and *was Eva*

*kennt* denotes the non-person(s) she knows, *wo Paul wohnt* denotes the location(s) of Paul's home and *wohin dieses Flugzeug fliegt* denotes the destination(s) of this airplane. As can be seen from the examples, wh-phrases do not care about semantic number: They are syntactically *singularia tantum*, but that does not say anything about the cardinality of what they denote.

So one desideratum for a formal representation is that it be able to express this lack of specificity with respect to the cardinality of the denotatum. We could do this with a sets-only domain, treating individuals as singletons, but for reasons which are nicely explained in part 3.1 of Link[5], I prefer the lattice-theoretical approach, and I represent the denotation of *wen Eva kennt* (*whom Eva knows*) as  $\Sigma x[\langle x, \text{person}; 1 \rangle \ \& \ \langle e, x, \text{kenn}; 1 \rangle]$ , i.e. the sum of individuals that are both persons and known by Eva.

Since wh-phrases can also function as declarative clauses, interrogative clauses, infinitive phrases, temporals and locatives/directionals, we have to extend Link's semi-lattices to these cases as well. Here, some interesting questions arise: If we decide to let wh-phrases in clausal positions denote sums of states of affairs, where does the difference between declaratives and interrogatives go? And wouldn't the most natural interpretation of a join semi-lattice of states of affairs be their adjunction? But if Max wants to know just whether it is cold and whether it is raining, *what Max wants to know* doesn't denote the state of affairs that it is cold or it is raining. So there are several reasons, which I don't want to discuss here, supporting the assumption that the meanings of the *daß* and *ob*, which introduce the standard embedded declaratives and interrogatives, can be best represented by two related but different functions that take the state of affairs denoted by the clause as argument and build a new object from which regular sums can be built. The functions are *fact* and *issue*, they 'objectify' states of affairs and are characterized by the following constraints and definition:

For any situations  $s, s'$ , and state of affairs  $\sigma$ :

(A) in  $s$ :  $\langle \text{fact}(\sigma), s', \text{holds-in}; 1 \rangle$  iff in  $s'$   $\sigma$

(B) in  $s$ :  $\langle \text{non-fact}(\sigma), s', \text{holds-in}; 1 \rangle$  iff in  $s'$   $\text{opp}(\sigma)$ , where  $\text{opp}(\sigma)$  is like  $\sigma$  except for the inverted polarity.

(C)  $\text{issue}(\sigma) := \text{fact}(\sigma) + \text{non-fact}(\sigma)$

(The plus-sign is used for the join-operator.)

We thus get the following representations for a declarative and an interrogative clause, respectively:

(50) *Daß es regnet, steht fest.*

*(That it is raining is a fact.)*

(50a) in  $s$ :  $\langle \text{fact}(\langle \text{regn}';1 \rangle), \text{feststeh}';1 \rangle$

or, equivalently<sup>1</sup>:

(50b) in  $s$ :  $\langle \forall x[x = \text{fact}(\langle \text{regn}';1 \rangle)], \text{feststeh}';1 \rangle$

(Here, of course, the sum-formation is redundant and emphasizes only the parallelism with the following case.)

(51) *Ob es regnet, ist fraglich.*

*(Whether it is raining is debatable.)*

(51a) in  $s$ :  $\langle \text{issue}(\langle \text{regn}';1 \rangle), \text{fraglich}';1 \rangle$

This amounts, given the definition (C), to (51b) or, equivalently, (51c):

(51b) in  $s$ :  $\langle [\text{fact}(\langle \text{regn}';1 \rangle) + \text{non-fact}(\langle \text{regn}';1 \rangle)], \text{fraglich}';1 \rangle$

(51c) in  $s$ :  $\langle \forall x[x = \text{fact}(\langle \text{regn}';1 \rangle)] \vee [\text{non-fact}(\langle \text{regn}';1 \rangle)] \rangle, \text{feststeh}';1 \rangle$

Issues are of course inconsistent, i.e. the conjunction of their parts cannot hold in any real situation, but that does not do any harm, on the contrary, it seems to be exactly what is required in the argument position of interrogative embedding predicates, since independent of the polarity of the relevant state of affairs, these predicates are always implicitly also about its opposite. More on interrogatives below.

To come back to our NR's, we can say now that they denote sums in general: Sums of persons in the case of personal terms, sums of other objects in the case of impersonal terms, sums of locations and times with locatives and temporals, and sums of facts and issues with declaratives and interrogatives.<sup>2</sup>

Multiple lexical wh-constructions are not possible for syntactic reasons, but multiple phrasal wh-constructions are syntactically possible (cooccurrence of several wh-words relating to or in the same clause), they just don't occur, and here is something to be explained.

### 3.4.1. *Naked relatives*

With these general remarks about the semantics of wh-phrases, the analysis of naked relatives is already completed, what follows are examples which show what is to be expected from the analysis (ignoring tense):

(52) *Wer da singt, ist musikalisch.*

*(Whoever is singing there is musical.)*

(52a) in  $s$ :  $\langle \Sigma x[\langle x, person';1 \rangle \& \langle x, sing';1 \rangle], musikalisch';1 \rangle$

(53) *Was Eva gekauft hat, ist teuer.*

*(What Eva bought is expensive.)*

(53a) in  $s$ :  $\langle \Sigma x[\langle x, person';0 \rangle \& \langle e, x, kauf';1 \rangle], teuer';1 \rangle$

(Note that it does not follow that if Eva bought, among other things, matches, matches are expensive, if we decide to let expensive be a non-distributive predicate<sup>3</sup>, or even an antipersistent one<sup>4</sup> as we probably should.)

Since NRs are just special members of the same category as the slot in their (internal) clause, they are expected to cooccur in the same (external) clause and in one another, and so they do:

(54) *Wer 'in' sein will, sagt, was alle sagen.*

*(Whoever wants to be 'in' says what everybody says.)*

(55) *Wo wer tut, was er will, nicht zurechtgewiesen wird, herrscht Chaos.*

*(Wherever whoever does whatever he wants is not reproved, chaos rules.)*

### 3.4.2. Pseudo-cleft sentence subjects

According to Halvorsen ([3], p.1), a pseudo-cleft sentence is "a specificational copular construction with a free, or headless, relative clause as subject". (He distinguishes specificational copular constructions such as *The murderer is the gardener* from predicational copular constructions such as *The murderer is vegetarian*.) If this assumption is correct, the ambiguity in (56) is due solely to the predicate, and we need not worry about a special treatment of pseudo-cleft sentence subjects, since we can assign them exactly the same representation as all other NRs.

(56) *Was Max gefällt, ist Unsinn.*

*(What Max likes is nonsense.)*

In the pseudo-cleft reading, (56) means that Max likes nonsense, in the other reading, it means that Max likes something, and that happens to be nonsense. The trouble is that the predicate noun cannot be the source of the ambiguity either, leaving the copula as its only possible remaining source, and many linguists are reluctant to accept this option. There are,

however, independent arguments for such an assumption (cf. Doron[2]), and we will accept it for our purposes, writing  $\langle a,r;1 \rangle$  for the state of affairs where  $a$  exemplifies  $r$ , and  $\langle a,r,eq;1 \rangle$  (defined as  $\langle a,r,=;1 \rangle$ ) for the state of affairs where  $a$  is identical with  $r$ . So we get:

(57) *Wer da singt, ist Eva und Max.*

(*Who is singing is Eva and Max.*)

(57a) in  $s$ :  $\langle \Sigma x[\langle x, person';1 \rangle \& \langle x, sing';1 \rangle], e + m, eq;1 \rangle$

There is a problem with number agreement in German here, which I don't want to go into here, instead I want to point out how nicely our sum analysis of NRs fits in with conjoined predicate nominals.

### 3.5. Clausal *wh*-constructions

Since the difference between lexical and phrasal *wh*-constructions is obvious, and the assumed differences among the latter disappeared, the main task for the analysis seems to account for the differences both between these two and the *wh*-clauses, and for those among the latter.

#### 3.5.1. Interrogative *wh*-clauses

Embedded interrogative *wh*-clauses should be related adequately to *ob*-interrogatives for which an analysis has already been presented above (3.4.0), since they fit into the same slots as these and are semantically related. *Ob*-clauses have been analyzed as denoting issues, i.e. sums of the objects denoted by the corresponding *daß*-clause and its negative counterpart:

(58) *Eva weiß nicht, daß jemand singt.*

(*Eva does not know that someone is singing.*)

(58a) in  $s$ :  $\langle e, fact(\exists x[\langle x, person';1 \rangle \& \langle x, sing';1 \rangle]), wiss';0 \rangle$

(59) *Eva weiß nicht, ob jemand singt.*

(*Eva does not know whether someone is singing.*)

(59a) in  $s$ :  $\langle e, issue(\exists x[\langle x, person';1 \rangle \& \langle x, sing';1 \rangle]), wiss';0 \rangle$

Since embedded *wh*-interrogatives can be (in fact, should be, cf. [10]) considered as generalized *ob*-interrogatives, it is now almost obvious how to represent their meaning:

(60) *Wer singt, weiß Eva nicht.*

(*Eva does not know who is singing.*)

(60a) in  $s$ :  $\langle e, \Sigma y \exists x [ \langle x, \text{person}' ; 1 \rangle$

$\& [y = \text{issue}(\langle x, \text{sing}' ; 1 \rangle)] ], \text{wiss}' ; 0 \rangle$

An analogous representation of multiple wh-interrogatives poses no problem:

(61) *Wer wen wann womit bestochen hat, ist noch völlig offen.*

(*Who bribed whom when with what is still completely open.*)

Independent interrogatives should be treated analogously, I will not go into the details here and only mention that the relevant notion which should be provided by any account of their meaning, that of a complete direct answer (cf. Zaefferer[10], p.73ff.), or most informative answer (cf. Peters[8], p.241), can be easily defined as any maximal consistent conjunction of the states of affairs that are determined by the denotation of the sentence, i.e. one that holds in a situation  $s$  iff  $s$  decides all and only the issues in that denotation, where ' $s$  decides an issue  $x$ ' means 'one part of  $x$  holds in  $s$ '.

These conjunctions correspond to the situations that in Peters' account are in the range of the relation denoted by the interrogative. Informative answers are then those which state at least one member of such a conjunction, i.e. determine a situation which decides at least one of the issues in question. The presupposition of a question is the conjunction of all states of affairs that are entailed by all members of the given set of states of affairs.

This rules out the often assumed existential presupposition of wh-interrogatives, correctly, in my view, since it should be treated rather as an implicature (cf.[10], p.78f.), which can be derived from the fact that in general it doesn't make much sense to ask a wh-question (no matter what its polarity) without expecting at least one of the issues to be decided as factual.

Biased questions on the other hand are those where at least one of the issues (no matter what its polarity) is expected to be decided as non-factual, yielding the expected answers *It is not raining* for *Is it (really) raining?* and *It is raining* for *Is it (really) not raining?*

Rhetorical questions are on this account nothing else than strongly biased questions, i.e. questions where it is implicated that all issues (no matter what their polarity) are decided as non-factual, yielding *Nobody knows this book* as implicature of *Who knows this book?* and *Everybody knows this book* as implicature of *Who doesn't know this book?*

### 3.5.2. Exclamatory wh-clauses

The situation seems to be quite similar with embedded wh-exclamatories, with three major differences: First, as noted before, they are interchangeable with *daß*-clauses, but not with *ob*-clauses. Second, the informational content is very weak, being not more than the fact that *x* has *P*, where *x* are those that have *P*. Third, the embedding sentence does typically not entail one with a semantically weaker wh-exclamatory. Thus, (62) below, taken together with the assumption that Max is among the singers, does not entail (63), although the parallel inference with interrogatives seems to hold, since it could be that it is the composition of the group of singers, which makes its singing amazing, or the membership of somebody else than Max. (For a somewhat more detailed argumentation see Zaefferer[11].) It seems to me that these three properties have to be accounted for in two different places.

The first two can be captured by assuming that wh-exclamatories are but generalized *daß*-exclamatories just as wh-interrogatives are but generalized *ob*-interrogatives (as we did already in 1.2 above) and that the generalization does not run over the total sum of facts that have the required property, but only those that in addition to that hold in *s*. I represent that by an indexed sum building operator  $\Sigma_s$ , which is defined as follows:  $\Sigma_s y[\Phi] := \Sigma y[\langle y, s, \text{holds-in}; 1 \rangle \& \Phi]$ . This yields the following representation:

(62) *Wer da singt, (das) ist erstaunlich.*

*(Who is singing is amazing.)*

(The pronoun in parenthesis serves to rule out the NR reading.)

(62a) in *s*:  $\langle \Sigma_s y \exists x[\langle x, \text{person}'; 1 \rangle \& [y = \text{fact}(\langle x, \text{sing}'; 1 \rangle)], \text{erstaunlich}'; 1 \rangle$

(63) *Daß Max da singt, ist erstaunlich.*

*(That Max is singing is amazing.)*

(63a) in *s*:  $\langle \text{fact}(\langle m, \text{sing}'; 1 \rangle), \text{erstaunlich}'; 1 \rangle$

The second property can be captured by the assumption that wh-exclamatory embedding predicates (at least all I know of) are non-distributive, just like *expensive* in the example (53) above. So we get the inference from (62) to (63) just in case Max is the only singer. This assumption is supported by the fact that the same non-distributivity can be observed when wh-exclamatory embedding predicates occur with plural NPs: *The achievements of the working group are amazing* can be true even if no single achievement of the group, taken by itself, is amazing.

The following example shows that multiple wh-exclamatories are possible and pose no problem for the proposed analysis:

(64) *Max wundert sich darüber, wer wo wohnt.*

(*Max is astonished at who lives where.*)

(64a) in  $s: \langle m, \sum_y \exists x, l [ \langle x, \text{person}'; 1 \rangle \& \langle l, \text{location}'; 1 \rangle \&$

$[y = \text{fact}(\langle x, l, \text{wohn}'; 1 \rangle)]], \text{sich-wunder-über}'; 1 \rangle$

Independent exclamatories, except maybe for degree exclamatories such as *Ist das aber leicht!* (*Boy, is that easy!*), can be treated analogously if one assumes that here a fitting attitude expressing predicate (which is also non-distributive) takes the place of the superordinate clause.

### 3.5.3. Antecedents of no-matter-conditionals

These are the one the analysis of which I am most unsure about. They share a lot of properties with both interrogatives and antecedents of regular conditionals, but differ from both of them in interesting ways. Whereas interrogatives come in three varieties, yes-no, alternative, and wh-interrogatives, (*ob Eva kommt* (*whether Eva comes*), *ob Max oder Eva kommt* (*whether Max or Eva comes*), *wer kommt* (*who comes*)), no-matter-conditionals lack the last option - (65) and (66) are o.k., (67) is not:

(65) *Wer auch kommt, ich gehe.*

(*Whoever comes, I go.*)

(66) *Ob Max kommt oder nicht/Ob Max kommt oder Eva, ich gehe.*

(*Whether Max comes or not/Whether Max comes or Eva, I go.*)

(67) \**Ob Max kommt, ich gehe.*

(\**Whether Max comes, I go.*)

Note furthermore that the wh-variety seems to need a generalizing particle in order to qualify as a no-matter-conditional antecedent:

(68) *Wann du auch kommst/Wann immer du kommst?Wann du kommst, du bist willkommen.*

(*No matter when you come/Whenever you come?When you come,you are welcome.*)



The most notable difference from regular conditionals consists in the word order of the consequent, indicating that in the latter, the antecedent forms a single clause with the consequent, whereas in their no-matter-counterparts, the antecedents are only paratactically adjoined to the consequent (they are both syntactically and semantically dispensable, as it were). So they behave syntactically exactly like the antecedents of illocutionary conditionals, cf. (69)/(70) for an illustration of the illocutionary/regular conditional distinction:

(69) *Wenn du das Buch suchst, es liegt (\*dann) dort drüben.*

*(If you are looking for the book, (\*then) it is over there.)*

(70) *Wenn du das Buch suchst, (dann) liegt es dort drüben.*

*(If you are looking for the book, (then) it is over there.)*

The difference between (69) and (70) seems to be most straightforwardly accounted for by the assumption that (69) is a conditional assertion, whereas (70) asserts a conditional, i.e. (70) encodes only one illocution, whereas (69) consists of two illocutions, one of expressing a condition and one of asserting. From this analysis one might expect that the consequent can also be a nondeclarative sentence, and indeed, this is the case:

(71) *Wenn du Tschechisch kannst, was heißt 'hovno'?*

*(If you know Czech, what does 'hovno' mean?)*

Here, it doesn't make much sense to assume that the antecedent is under the scope of the question operator.

This suggests an analysis also of no-matter-conditionals as expressing conditional assertions, but since the truth of the (semantically weak) antecedent is generally taken for granted, its effect is an emphasized assertion instead of a relativized one. The antecedent has the internal structure of an interrogative, but it is not in the scope of a question operator, it is linked instead by the two-place *cond* operator to the assertion that is its consequent (to remain consistent, we write the operator last, the antecedent next to it, and the consequent first):

(72) *Wer da auch singt, Eva hört nicht zu.*

*(Whoever is singing, Eva does not listen.)*

(72a) in *s*:  $\langle \langle e, \text{zuhör}'; 0 \rangle, \text{assert}; 1 \rangle,$

$\Sigma y \exists x [ \langle x, \text{person}'; 1 \rangle \& [ y = \text{issue}(\langle x, \text{sing}'; 1 \rangle) ] ], \text{cond}; 1 \rangle$

This represents the state of affairs where it is asserted that Eva does not listen, on the condition of a sum of issues about somebody singing. But what does it mean for a state of affairs  $\sigma$  to be conditional on a sum of issues? It means, I suggest, that any argument of any issue in that sum involves  $\sigma$ :

in  $s$ :  $\langle \sigma, \Sigma_y[\Phi], \text{cond}; 1 \rangle$  iff

in  $s$ :  $\langle \sigma, \tau, \text{involved-by}; 1 \rangle$  for any state of affairs  $\tau$  such that  $\text{issue}(\tau)$  is part of  $\Sigma_y[\Phi]$ .

Thus, the intuition that (73) follows from (72), provided Max and Fritz are persons, is formally captured.

(73) *Ob Max singt oder Fritz, Eva hört nicht zu.*

(*Whether Max is singing or Fritz, Eva does not listen.*)

Unfortunately, this would also make the inference from (72a) to the formal counterpart of (74) formally valid (provided Max is a person), which is of course inadequate.

(74) *\*Ob Max singt, Eva hört nicht zu.*

(*\*Whether Max is singing, Eva does not listen.*)

But if we assume that a no-matter-conditional (by contrast to a regular one) requires an alternative, i.e. an at least two-part sum of issues as antecedent, we can rule this out and explain the fact that the yes-no interrogatives do not have a no-matter-conditional antecedent counterpart. This assumption is supported by the fact that in German, no-matter-conditional antecedents are expressible by prefixing the predicate *egal* (equally) to a *wh-* or *ob-*clause, a predicate that is inherently relational, i.e. at least two-place. Hence (74) is out, since there is nothing to which Max's singing is compared, but (75) is fine:

(75) *Ob Max singt oder nicht, Eva hört nicht zu.*

(*Whether Max is singing or not, Eva does not listen.*)

This seems to be an at least plausible explanation for an otherwise totally mysterious lack of parallelism. I will conclude this section with an example that shows the possibility of multiple *wh-*antecedents of no-matter-conditionals, and hence shows one more property shared with interrogatives:

(80) *Wer auch von wem womit bestochen wurde, ich glaube nicht mehr  
an die Integrität unserer Regierung.*

*(Whoever has been bribed by whom with what, I don't believe anymore  
in the integrity of our government.)*

### 3.6. *What relates naked relatives to their kin?*

Looking back at our analysis of the semantics of German wh-constructions, we are able now to identify both the ties that hold the family together and the specific features that characterize its members. In all six cases, there is a clause and at least one wh-word marking at least one slot in it which is the position of a major constituent. The clause with the slot(s) in it can be thought of as denoting a condition. The question is: What does the wh-construction denote?

In the first case, that of the weak indefinite, it denotes simply an indeterminate individual, and the whole clause denotes the state of affairs where the condition holds of an indeterminate individual.

In the second case, that of the naked relatives, it denotes a determinate individual, namely the individual which is the sum of all the (indeterminate) individuals of which the condition holds.

The third case, that of the pseudo-cleft subjects, is internally exactly like the second case, it was suggested, and that means that all the differences that can be found are explainable in terms of the special role they have, namely as arguments of equational sentences.

Case number four, the exclamatories, is different. Here, not the sum of those individuals is built that meet the condition, but the sum of factual instantiations of meeting the condition, i.e. of factual states of affairs, or, more precisely, the sum of fact objects corresponding to these states of affairs.

Cases five and six, interrogatives and wh-antecedents of no-matter-conditionals, are similar to the exclamatories in that they denote sums of instantiations of meeting the condition, i.e. of states of affairs, but here, the states of affairs need not be factual and the sum contains issues, i.e. each fact object corresponding to an instantiation of meeting the condition comes paired with its negative counterpart. Again, as with cases two and three, the internal structure seems to be identical, so it seems justified to assume that differences can be shown to be derivable from differences in the role they play in the larger structures they are a part of.

At the end of paragraph 3.4.0 it was claimed that the contrast between phrasal and clausal wh-constructions with respect to the possibility of multiple non-conjoined wh-words

occurring at the same level of embedding (absent in both of the phrasal types, present in all three of the clausal types) is something which is to be explained. The family picture just outlined seems to provide a nice explanation:

According to this picture, phrasal wh-constructions denote the sum of individuals of which the condition holds. This can be a one-place condition only, since many-place conditions would determine several sums, which could not be denoted by a single constituent without being integrated into a larger whole. That is why *Wer wen liebt, der neckt sich* (*Whoever loves whom, teases himself*) is out, while *Was sich liebt, das neckt sich* (*Lovers tease each other*) is in.

Clausal wh-constructions, on the other hand, denote basically sums of states of affairs, in this picture, and here, it does not matter whether these states of affairs come from instantiations into one-place or many-place conditions, yielding one definite sum in any case.

## Notes

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1. For purposes of readability, I use infix notation without explicit polarity and with square brackets for identities that do not translate a surface copula.

2. I intentionally do not talk about infinitive phrase NRs here, since this would be a longer side issue.

3. Distributive predicates (in Link's sense) are true of all atoms in a sum, if they are true of a sum.

4. Anti-persistent predicates (in Peters' sense) are true of all parts (subsums) of a sum, if they are true of a sum.

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