Bilingual Lexicography and Transfer Dictionaries for Machine Translation — Treating Structural Differences Between French and German

Ulrich Heid

The following article[1] addresses fundamental questions concerning bilingual lexicography which have been under discussion recently: the distinction between source and target language, between user language and foreign language, and the differentiation of linguistic skills in text production and text reception.

These distinctions have consequences for the lexicographical description of data and the presentation of contrastive knowledge in a dictionary.

After these general considerations we will show to what extent dictionaries for 'human' users and transfer dictionaries for machine translation are similarly constructed in regard to data description, especially if one reflects seriously upon the consequences flowing from the distinctions mentioned above.

One of the tasks of the transfer dictionary is to describe, based on lexeme input, mappings of partial structures in the source language into partial structures in the target language. The significance of contrastive data description for this activity will be illustrated through proposals for German-French dictionary entries, which should permit translation in cases where German structures cannot be isomorphically translated into French.

1 Some Fundamental Questions of Bilingual Lexicography and their Consequences for Dictionary Construction

1.1 Basic Distinctions and Dictionary Types

We will first briefly review three pairs of opposites from the discussion about new approaches in bilingual lexicography.[2]

The basic distinctions are:

☐   source language vs. target language
☐   well-known language vs. less well-known language (user language[3] vs. foreign language)
☐   language production vs. language reception.

The first oppositional pair defines bilingual processes as *directed* activities, the second oppositional pair holds that users of bilingual dictionaries do not have a command of both languages involved to the same degree, and the third pair incorporates the common distinction between fundamental linguistic skills.

Through the work of Ščerba the first two oppositional pairs have been developed into sophisticated models[4] and used to define dictionary types; and the distinction within the activity of translating has been maintained, e.g. "active" vs. "passive" dictionaries (or: „Hinübersetzungwörterbuch" vs. „Herübersetzungs- wörterbuch").[5]

1.2 Consequences of the Distinctions for Dictionary Construction

The differentiations in linguistic activities reviewed above (e. g. translation, reading comprehension, etc.), in linguistic orientation and level of competence of the user, have what can be reduced to two types of consequences for the construction of dictionaries. One type concerns the method of describing linguistic data, and the other the didactic side of lexicography, that is, how linguistic knowledge is presented in the dictionary.

Consequences for data description. Kromann has demonstrated the significance of the distinction between 'active' and 'passive' dictionaries for lexicographical data description: the active dictionary must consider user language "through the spectacles"[6] of the target language. This description of a 'directional' bilingual dictionary for translating into the foreign language amounts to a requirement for specific language-pair equivalence conditions where the differentiations in the target language comprise the criteria for the classificatory divisions in the source language. This means of course that two bilingual dictionaries with the same source language but different target languages will not necessarily have the same differentiations (e.g. source-language versions); likewise, it is unlikely that an 'active' dictionary would share all differentiations with a monolingual 'definition' dictionary in the source language.

Consequences for the presentation of bilingual knowledge in the dictionary. The distinction between well-known and less well-known languages (mother tongue or users language [Al 1983] vs. foreign language) rests on assumptions about the prior knowledge of the users of a dictionary in both languages. Based on the principle that in the less well-known language meaning must be found (e.g. looked up) through the form of the entry (e.g. the word), requirements have been formulated for the division of information between microstructure and macrostructure.[7] As an example: The assumption that knowledge about possible collocations belongs to knowledge about a language as a norm[8] results in the requirement that an 'active' dictionary must provide (extensively through lists) the collocations of the foreign language, to show that they can be formed and that they are customary.[9] A 'passive' dictionary, where the same foreign language is the initial language, however, possibly need not provide the same collocations of the foreign language, as they are obvious and interpretable, or because they can be isomorphically translated into the user language.

From a metalexicographical viewpoint generally, and specifically in the context of discussion about the principles of bilingual lexicography, it seems useful to make the conceptual distinction between 'data description' and 'presentation'.

The comparison of bilingual dictionaries for 'human' users with those for machine translation should demonstrate that both have commonalities in the area of 'data description', differences, however, in the area of 'presentation'.

2 Tansfer Dictionaries for Machine Translation System

2.1 Transfer-Based Machine Translation

In transfer-based machine translation the translation process is divided into three parts: analysis, transfer and generation (sometimes called synthesis). The fundamental assumption behind this is that it is possible to schematize or map the natural language input into abstract representations which can then correspond to abstract representations from equivalent expressions in another natural language.

The task of the parser component therefore is to derive the abstract representations from the natural language input using grammatical rules. Inversely the generation component must be able to produce natural language utterances from abstract representations as input. The transfer component serves to map the abstract representations created by the parser into representations of equivalent utterances in the target language. This component therefore has knowledge about the equivalence at the level of lexical units *(lexical transfer)* and equivalence of syntactic (partial) structures *(structural transfer)*.

2.2 Dictionary Entries for Analysis and Generation Based on Lexical-Functional Grammar (LFG)[10]

In unification-based grammars, of which lexical-functional grammar is an example, dictionary entries are generally conceived of as pairs formed of a lexical unit or word form and a set of descriptions in the form of feature-value pairs.

Such dictionary entries can be considered as partial functional structures (f-structures); it follows that lexical transfer is the mapping of dictionary entries into each other and structural transfer the mapping of more extensive partial f-structures; the representations and mapping mechanisms used in both cases are the same.[11]

Dictionary entries of lexeme verbs obtain, besides the usual agreement features (e.g. case, number, gender, etc.), predicate entries. Predicate-argument structures are attached to verbs, adjectives and substantives. These structures are designed to supply information about the logical place relation of the predicates and about the syntactic functions which are required for the realisation of the arguments subcategorized by the verb.[12]

As in descriptions based on valency grammar, information about the subcategorized syntactic functions of the verb is used to recognize and to create correct sentence descriptions (in LFG terminology: complete and coherent: all subcategorized functions are present and only these). The dictionary entries therefore provide the possibility of describing the syntactic behaviour of lexemes:

☐ the number of arguments
☐ the syntactic functions by which the arguments are realised
☐ relations between syntactic functions (e.g. control (subject of infinitive complements, etc.))
☐ the syntactic form that the realisation of an argument can take.

Expansions of the lexical information, currently under discussion, concern the mapping relation between thematic roles and syntactic functions;[13] in view of certain transfer problems, information about the semantic type (entity vs. proposition), and perhaps semantically motivated predicate classes (cf. semantic features) could be useful.[14]

This kind of dictionary information permits, with the aid of syntax rules in the format of LFG, the mapping of clauses into f-structures (i.e. analysis) and inversely the generation of clauses from f-structure representations.[15]

2.3 Dictionary Entries for the Transfer of F-Structures into other F-Structures

2.3.1 Characteristics

Above we defined in general terms the task of transfer as the mapping of functional structures of a source language utterance into functional structures of equivalent utterances in the target language.[16]

To the extent that dictionary entries in LFG can be viewed as partial f-structures, we can describe generally the task of the transfer dictionary as the mapping from (lexically determined) partial f-structures into each other.

Entries in the transfer dictionary are therefore assignments of partial f-structures of the source language to partial f-structures of equivalents in the target language. Procedurally, they could be viewed as rules which have a source language conditional (what is the given structure in the initial language?) and a target language execution part (which structure should be constructed in the target language?).[17]

Since f-structures can be depicted as directed acyclic graphs (or "dags" for short), we can conceive of such mapping rules as mappings of dags into dags.[18]

From a lexicographical perspective we note the following features of transfer dictionary entries:

- ☐ Transfer dictionary entries describe the conditions[19] for the equivalence of one source language and one target language lexeme in a detailed manner and from the perspective of the language pair in question.[20]
- ☐ Transfer dictionary entries are directional, i.e. they describe the translation from the source language into the target language as a directed process.[21]
- ☐ Transfer dictionary entries are explicit in regard to the assignment of partial structures which depend on source language and target language lexemes.[22]

2.3.2 Comparison of Transfer Dictionaries and Bilingual Dictionaries

If we compare the above characteristics with the features of bilingual dictionaries, according to data description and presentation we find the following:

- ☐ The data description in the active dictionary and in the transfer dictionary follow the same principles (describing the source language "through the spectacles of the target language" (Kromann 1988a)). Translation-related

disambiguation and description criteria are the same in the transfer and the active dictionaries.

☐　　　The presentation of contrastive knowledge in dictionaries for "human users" is noticeably different from that necessary for the transfer dictionary, in more than technical aspects.[23] No prior knowledge about one of the languages involved can be assumed with the machine translation system, so that both contrasted languages must be described with equal explicitness.

In summary we can say that the building of active dictionaries and that of transfer dictionaries is largely parallel in terms of data description, very different however in the presentation of contrastive knowledge represented by the description. The contrastive regularities which should form the basis of dictionary excerpts and which the next section of this paper introduces, can therefore be considered as a descriptive approach for translation dictionaries for both man and machine.

3 Structural Differences Between German and French in the Dictionary

The following will address several examples of structural differences between German and French concerning lexeme classes which permit the formulation of contrastive German-French regularities. These include:

☐　　　The translation of German indirect interrogative clauses into French as well as the translation of constructions with object predicate German-French, French-German, both taken as examples of how syntactic properties of the target language equivalents have a guiding function for the transfer.

☐　　　The translation of French a.c.i. constructions by German *daß* ('that') clauses as an illustration of the formulation of interlingual redundancy rules.
We hope to demonstrate:

☐　　　a possible method for handling these and analogous phenomena in the transfer

☐　　　the significance, for the construction of transfer dictionaries, of detailed monolingual and target language oriented language-pair descriptions of syntactic phenomena

☐　　　to what extent this technique of contrastively describing the syntactic properties of lexemes represents an application of the above discussed hypothesis concerning the directional nature of transfer dictionaries.

3.1 The Guiding Function of Syntactic Properties of Target Language Lexemes in the Transfer

Transfer dictionary entries for verbs connect predicate-argument structures of source and target languages. We mentioned above that predicate-argument structures specify the number of arguments and the subcategorized syntactic functions which aid the realisation of the arguments.

112

3.1.1 Simple Cases: Transfer Through Construction of Isomorphic Structures

'Trivial Transfer'. In the simplest case, the equivalent predicates in source and target language not only have the same number of arguments, but also their realisation is carried out through the same syntactic functions:

(1) *lieben* ⟨(SUBJ)(OBJ) ↔ *aimer* ⟨(SUBJ)(OBJ)⟩

(2) *versprechen* ⟨(SUBJ)(OBJ2)(XCOMP)⟩, (XCOMP) (SUBJ) = (SUBJ)
   ↔ *promettre* ⟨(SUBJ)(OBJ2)XCOMP)⟩ (XCOMP)(SUBJ) = (SUBJ)

If we stick to the representation of f-structures as dags, we can call this type of transfer operation the construction of target language partial f-structures which (in terms of the edges and the labels they bear) are isomorphic with the source language structures. Elsewhere we have called this type of transfer operation *'trivial transfer'*.[24]

Identical place relation, different syntactic functions. When the number of subcategorized complements (represented as edges in the f-structure dags) is the same between source and target language, but the syntactic functions, through which the arguments can be realised, differ, then for each pair of equivalents, information must be provided specifying the required transfer of each syntactic function of the source language into a syntactic function in the target language (in this case only the edges are isomorphic, the labels are different[25]); cf.:

(3) *begegnen* ⟨(SUBJ)(OBJ2)⟩ ↔ *rencontrer* ⟨(SUBJ)(OBJ)⟩

(4) *beantworten* ⟨(SUBJ)(OBJ)⟩ ↔ *répondre* ⟨(SUBJ)(à-OBJ)⟩

(5) *überleben* ⟨(SUBJ)(OBJ)⟩ ↔ *survivre* ⟨(SUBJ)(à-OBJ)⟩

(6) *genieen* ⟨(SUBJ)(OBJ)⟩ ↔ *jouir*[26] ⟨(SUBJ)(de-OBJ)⟩

The transfer dictionary entry of *beantworten* would look as follows:

(7)(PRED) = 'beantworten ⟨(SUBJ)(OBJ)⟩'

(TRANS PRED) = 'répondre ⟨(SUBJ)(à-OBJ)⟩'

(SUBJ TRANS) = (TRANS SUBJ)

(OBJ TRANS) = (TRANS à-OBJ)

3.1.2 Differences in Construction as the Trigger for Transfer through Non-Isomorphic Structures: Regularities Based on Subcategorization Information — The Example of Indirect Interrogative Clauses

Indirect interrogative clauses subcategorized by a verb can appear in German as subject, prepositional object or COMP:[27]

(8a) *Wann Sylvie kommt, hängt von der Zugverbindung ab.* (SUBJ)

(8b) When Sylvie comes depends on the train connections.

(9a)*Sylvies Ankunft hängt davon ab, wann ein Zug fährt.* (POBJ)

(9b) Sylvie's arrival depends on when the train comes.

(10a) *Ich weiß nicht, wann Sylvie kommt.* (COMP)

(10b) I don't know when Sylvie is coming.

In French, indirect interrogative clauses are possible only as COMP:[28]

(11a) **Quand Sylvie vient, dépend de l'horaire du train.* (SUBJ)

(11b) When Sylvie comes depends on the train connections.
(12a) *L'arrivée de Sylvie dépend de quand il y a un train. (POBJ)[29]
(12b) Sylvie's arrival depends on when the train comes.
(13a) Je ne sais pas quand Sylvie vient. (COMP)
(13b) I don't know when Sylvie is coming.

Hence for the transfer of German into French the problem arises that there are more possibilities of constructing indirect interrogative clauses in the source language than in the target language. This means that a French substitute construction[30] must be chosen in those cases where a verb complement realised in German as an indirect interrogative clause would be mapped into a subject or prepositional object of a French verb:

(14a) Wie Sylvie das macht, interessiert mich.
(14b) How Sylvie does this, interests me.
(15a) La façon dont Sylvie s'y prend m'intéresse.
(15b) The way Sylvie does this interests me.
(16a) Der Erfolg hängt davon ab, wie man das macht.
(16b) Success depends on how one does this.
(17a) La réussite dépend de la façon dont on s'y prend.
(17b) Success depends on the way one does this.

These examples show how translation-related bilingual regularities (here the selection of paraphrases) can be formulated with the aid of information about subcategorization properties of lexemes.[31]

3.1.3 Regularities Based on Differences in the Realisation of Complements — The Example of Predicatives

The previous section provided examples of the triggering of non-isomorphic transfer based on information about syntactic functions (subject, prepositional object). It is also possible, however, that the syntactic functions of the complements (subcategorized by the source and target language predicate) are identical, yet that there are differences in the respective realisation possibilities.

An example: both festlegen and arrêter subcategorize one subject and a COMP, but with festlegen the dependent clause can be affirmative (daß) or interrogative (ob, w-), while arrêter can only take an affirmative (que). For the translations of:

Man hat festgelegt, wie die Wahlen erfolgen.
It has been determined how the lelections take place.

therefore a relative clause constructed according to the model above is necessary:

On a arrêté la façon dont dont les élections sont effectuées.
The way in which the elections take place has been determined.

Thus the selection of a French substitute construction for German indirect interrogative clauses depends not only on information about subcategorized syntactic functions of the target language lexemes, but also on details of their

realisation. For example, the introduction of a feature describing the sentence mood of the COMP permits to differentiate between indirect interrogative clauses and *que*-clauses.[32]

In a similar way one must be able to differentiate among verbs with object predicatives whether the object predicate can be realised as an adjectival phrase or as a nominal phrase.[33] Where differences in the distribution arise between German and French, substitute constructions must be used in the transfer, for example:

(18) *Elle restera veuve* ↔ *Sie wird Witwe bleiben.*

(19) *Elle restera modeste* ↔ *Sie wird bescheiden bleiben.*[34]

(20) *Ich kenne ihn als den Chef...* ↔ *Je le connais comme le chef...*

(21) *Ich kenne ihn als streng* ↔ **Je le connais comme sévère.*[35]

(22) *On a proclamé Charles empereur* ↔ *Man hat Karl zum Kaiser proklamiert.*

(23) *On a proclamé les hommes égaux* ↔ **Man hat die Menschen zu gleichen proklamiert.*[36]

(24) *Er hat den Stil des Buchs als impressionistisch charakterisiert.* ↔ *Il a caractérisé le style de ce livre d'impressionniste.*

(25) *Er hat das Buch als ein Meisterwerk charakterisiert.* ↔ **Il a caractérisé ce livre de chef-d'oeuvre.*[37]

In this case the transfer dictionary entries must take into account:

☐ which realisation of the object predicate is possible in each language respectively

☐ whether the equivalents, besides the structurally similar construction (e.g. object predicate), also allow a variant to be used as a substitute construction.[38]

3.2 'Interlingual Lexical Rules'

The cases discussed above deal with the subcategorization information which must be entered into the dictionary for individual lexemes of the source and target languages.

In this section we shall use the translation of French a.c.i. constructions into German to show that for certain contrastive phenomena general transfer procedures can be formulated. The procedures are instantiated through individual syntactic information about the relevant lexeme and through general rules for assigning equivalence in individual dictionary entries.

Several French a.c.i. constructions cannot be translated into German isomorphic structures, for example:

(26a) *J'entends Sylvie rentrer.*

(26b) *Ich höre Sylvie heimkommen.*

(27a) *Je la suppose[39] (être) arrivée.*

(27b) **Ich nehme sie heimgekommen (sein) an.*

(27c) *Ich nehme an, daß sie heimgekommen ist.*

The substitute construction selected is a *daß*-clause (analysed as a COMP); during the translation process a lexeme in the target language must be sought (if it is semantically selectable) which subcategorizes a subject and a *daß*-clause.

It is especially interesting that for French-German translation a general rule can be formulated which states:

If in French there appears a verb requiring an a.c.i. construction

and the German equivalent does not permit an a.c.i. construction

then search for a German equivalent which subcategorizes a *daß*-clause, and 'unfold the control structure'.

This general rule can be stated as follows:

$$(28) \; (PRED) = \text{'verb}_F \; \langle (SUBJ)(XCOMP) \rangle (OBJ)\text{'}$$
$$(XCOMP \; SUBJ) = (\uparrow OBJ)$$
$$(XCOMP \; INF) = bare$$
$$(TRANS \; PRED) = \text{'verb}_D \; \langle (SUBJ)(COMP) \rangle \text{'}$$
$$(SUBJ \; TRANS) = (\uparrow TRANS \; SUBJ)$$
$$(XCOMP \; TRANS) = (\uparrow TRANS \; COMP)$$
$$(TRANS \; COMP \; COMPL) = \textit{daß}.$$

This rule leaves X_F and X_D undefined, but assumes that they appear in the relation 'is an equivalent of'. Such equivalence relations, for instance between *supposer* and *annehmen*, must in any case be provided in the transfer dictionary. The equivalence relation between the two different versions (in regard to their syntactic properties) is first established by the application of the general rule to this ordered pair of equivalents. I call such general rules 'interlingual lexical rules'; they express contrastive generalisations. In future work, this concept will be further developed.

4 Summary

The article takes up the differentiations source vs. target language, user vs. foreign language, and linguistic production vs. reception, and claims that the data description necessary for the construction of transfer dictionaries is in principle the same as that underlying active dictionaries (Hausmann: *Hinübersetzungswörterbücher*). This means that the source language must be described in view of differentiations in the target language. Several examples of translation problems resulting from lexeme-specific syntactic properties were used to show how such a language-pair oriented lexical description might appear. This demonstrates the possibility of handling contrastive generalisations for language pairs by means of relatively general descriptive 'interlingual lexical rules' in a framework like LFG, where grammatical functions are supposed to be language-independent. The gaze of the lexicographer 'through the spectacles of the target language' need not turn opaque before the syntactic differences between source and target languages.

Notes

[2] The discussion will not be treated in detail here: cf. vv (1977: 57ff), in great detail Kromann/Riiber/Rosbach (1984) and Kromann/Riiber/Rosbach (1989).

[3] This term is used by Al (1983).

[4] Cf. Mugdan (1988).

[5] These terms come from Hausmann (1977: 58). Kromann speaks of an 'active' and 'passive' dictionary.

[6] Cf. Kromann (1989).

[7] Cf. Al (1983).

[8] Cf. Hausmann (1985).

[9] Cf. Kromann (1988b), who explicitly bases his argument about translation on the criterion of the user's prior knowledge and his information needs. I thank Hans Peder Kromann for giving me a copy of his manuscript.

[10] For a general introduction to LFG, see Bresnan (1982), Sells (1986) and, in German and with special emphasis on French examples, Seelbach (1987). The generalities of the use of unification-based grammars and especially LFG for machine translation are detailed in Rohrer (1986) and Netter/Rohrer (1988: 1—5).

[11] This homogeneous treatment of different types of transfer is both theoretically and practically more satisfying than their division. The lexical transfer is in this case the simplest instance of structural transfer.

[12] Thus e. g. German *schlafen* is one-place, *sagen* two-place, and *geben* three-place in this description:
(a) „schlafen $\langle(\uparrow \text{SUBJ})\rangle$"
(b) „sagen $\langle(\uparrow \text{SUBJ})(\uparrow \text{COMP})\rangle$"
(c) „geben $\langle(\uparrow \text{SUBJ})(\uparrow \text{OBJ})(\uparrow \text{OBJ2})\rangle$"

[13] Cf. for instance Levin (1987). In general on lexical information in LFG.

[14] I argue for these expansions in Heid (1988a).

[15] Note that LFG assumes that grammatical functions are relatively language-independent, and therefore a useful and reasonably abstract level of representation for transfer. F-structures do, however, not contain information about quantification, word order, etc; a transfer procedure based on f-structures can therefore not account for these phenomena. They should be treated by means of a module containing more detailed semantic information.

[16] Here the concept of equivalence is intentionally reduced to roughly that which Koller (1978) calls "denotative equivalence". The further types of equivalence he introduces ("connotative", "textnormative", "pragmatic" and "formal") could not be treated here. For a discussion of some problems of this kind, cf. e.g. Hauenschild (1987).

[17] Note that the vocabulary used here in order to describe transfer dictionary entries ("conditional", "execution part") does not imply procedurality. The transfer dictionary entries should more appropriately be viewed as declarative statements defining an equivalence function between partial f-structures.

[18] Cf. in greater detail Wedekind/Netter/Heid (1988) on the basis of work done at the Centre for the Study of Language and Information, CSLI, by Halvorsen).

[19] The conditions concern the form and subcategorization of the lexeme to be translated and if necessary the expansions it subcategorizes. For example, in order to disambiguate verbal readings in substantive-verb collocations, a statement must be made about the substantives that appear as complements of the verb. For a more detailed discussion concerning the treatment of collocations in a machine translation dictionary, cf. Heid/Raab (1989).

[20] Elsewhere I have called this aspect "translation-based disambiguation" and have tried to show some of the types of linguistic information it requires, cf. Heid (1988a).

[21] This directionality is particularly noticeable in the translation of French 'verbes coussins' into German. In the German translation of a clause such as «*le commutateur se trouvant à droite . . .*» *se trouver* may not even be rendered: „*der Schalter rechts*" (the example comes

from the operating manual for a crane). The dictionary entry for *se trouver* contains the knowledge that in certain constructions (relative clauses, present participles) it need not be translated in German. My thanks to Ursula Kärcher (IMS) for the reference to this construction.

22 In the literature on machine translation a frequently discussed example is the translation of English *"John likes Mary"* into French *"Mary plaît à John"*. In this case the transfer dictionary must indicate that the information from the English subject must be built into the indirect object in French, and that of the English object likewise into the French subject.

23 I deal with the problem of adopting default equivalents, a very common phenomenon in normal bilingual dictionaries, in Heid (1988b: 3.2.3.).

24 See Wedekind/Netter/Heid (1988). In the following, we use the 'TRANS'-attribute as indicating 'TRANSLATION-Of'. It can be understood as a special LFG attribute. An equation like '($\uparrow$ SUBJ TRANS) = ($\downarrow$ TRANS SUBJ)' must be read (grosso modo) as 'the subject f-structure in the source language has a translation which will be, in the translated (= target language) structure, the subject.'

25 Cf. above the example *like* $\leftrightarrow$ *plaire*.

26 In traditional French grammars for German users these equivalents are often specifically listed; cf. Klein/Strohmeyer (1958: 85ff); in bilingual dictionaries such facts, and especially problems in preposition government, are likewise described.

27 Pronominalized like an OBJ, yet not immediately capable of being passivized: *Ob er kommt wurde gefragt, ohne beanwortet zu werden.*

28 Cf. Huot (1981: 128—134). Forming a passive is excluded except when an explicit subject (*il*) is present: Huot (1981: 132) gives the example *il a été demandé quand Jean avait quitté la maison.*

29 cf. however in Italian: *dipende da quando viene.*

30 Relative clauses with relational nouns, whose predicate corresponds to the thematic role of the interrogative pronoun in the source language:
e.g.(a) *wann* → *le moment où* ...
(b) *wie* → *la façon dont* ..., *la manière dont* ...

31 Similar problems arise with the translation of German *ist zu INF* constructions, which in German can be built with almost all verbs, but in French only with verbs that subcategorize (OBJ) or (COMP).

32 Wimmer (1983a) refers to the PETIT ROBERT to show that the lexicographical description of verbs which take *si*-clauses as complements is incomplete. Our sampling indicates that Robert (1985) still is the monolingual dictionary which gives most details in this area; however it is far from being complete.

33 Busse/Dubost (1977/1983) is the only dictionary we know about to make this distinction.

34 Both German and French permit adjectival and nominal phrase.

35 German: AP and NP; French: only NP, substitute construction: *comme un* homme *sévère.*

36 French: AP and NP; German: only NP; substitute construction: *proklamiert, da alle Menschen gleich* sind.

37 German: AP and NP; French: only AP; the substitute construction is problematical: change construction?

38 The example 'object predicate' differs from the example given above for the treatment of indirect interrogative clauses because the substitute construction for the latter (relative clauses) can be formed with semantically relatively general relational nouns, regardless of the pertinent verb's subcategorization. On the other hand, when an object predicate must be translated into a *daß*-clause (COMP), one must verify that the target language verb subcategorizes a COMP at all. Here the selection of the substitute constructions in the target language therefore depends additionally on the subcategorization potential of the verb.

118

[39] The predicate-argument-structure of *supposer* is: *"supposer* ⟨(SUBJ)(XCOMP)⟩ (OBJ)"*. One notes further the (functional) control relation (↑ XCOMP SUBJ) = (↑ OBJ) and the type of the infinitive: (XCOMP INF) = bare.

References

Al, Bernard P.F. 1983. 'Principes d'organisation d'un dictionnaire bilingue' in *Lexique* 2: 159—163.

Bátori, István S. and Heinz Josef Weber (eds.). 1986. *Neue Ansätze in Maschineller Sprachübersetzung: Wissensrepräsentation und Textbezug.* Tübingen: Niemeyer (Sprache und Information).

Bergenholtz, Henning and Joachim Mugdan (eds.). 1985. *Lexikographie und Grammatik: Akten des Essener Kolloquiums zur Grammatik im Wörterbuch* (28.—30.6.1984.). Tübingen: Niemeyer (Lexicographica Series Maior, 3).

Bresnan, Joan (ed.). 1982. *The mental representation of grammatical relations.* Cambridge, Mass./London: The MIT Press.

Busse, Winfried and Jean-Pierre Dubost. 1977/1983. *Französisches Verblexikon. Die Konstruktion der Verben im Französischen.* Stuttgart: Klett-Cotta (2/1983).

Grähs, Lillebill, Gustav Korlén and Bertil Malmberg (eds.). 1978. *Theory and practice of translation.* Nobel Symposium 39 (Stockholm, September 6—10, 1978). Bern/Frankfurt/Las Vegas: Lang.

Hauenschild, Christa. 1987. 'KI-Methoden in der maschinellen Übersetzung?' in Morik 1987: 41—53.

Hausmann, Franz Josef. 1977. *Einführung in die Benutzung der neufranzösischen Wörterbücher.* Tübingen: Niemeyer.

Hausmann, Franz Josef. 1985. 'Kollokationen im deutschen Wörterbuch — Ein Beitrag zur Theorie des lexikographischen Beispiels' in Bergenholtz/Mugdan 1985: 118—129.

Hausmann, Franz Josef, Oskar Reichmann, Herbert Ernst Wiegand, and Ladislav Zgusta (eds.). (forthcoming). *Dictionaries, Dictionnaires, Wörterbücher. Ein internationales Handbuch.* Berlin: de Gruyter.

Heid, Ulrich. 1988a. 'Sprachliche Information im Transferwörterbuch', in *Sprache und Datenverarbeitung 1988* (Sonderheft 'Computational Lexicography').

Heid, Ulrich. 1988b. 'Zweisprachige Wörterbücher für maschinelle Übersetzung. Bemerkungen zum Verhältnis von zweisprachiger Lexikographie und der Erstellung von Transferwörterbüchern', to appear in Hyldgaard-Jensen/Zettersten, 1988.

Heid, Ulrich and Sybille Raab. 1989. 'Collocations in multilingual translation' in: Proceedings of the 4th Meeting of the ACL, European Chapter, Manchester, 1989.

Huot, Hélène. 1981. *Constructions infinitives du français. Le subordonnant de.* Genève: Droz.

Hyldgaard-Jensen, Karl and Arne Zettersten (eds.). (forthcoming) *Symposium on Lexicography 4* (April 1988.). Tübingen: Niemeyer.

Klein, Hans Wilhelm and Friedrich Strohmeyer. 1958. *Französische Sprachlehre.* Stuttgart: Klett.

Koller, Werner. 1978. 'Äquivalenz in kontrastiver Linguistik und Übersetzungswissenschaft' in Grähs/Korlén/Malmberg 69—92.

Kromann, Hans-Peder, Theis Riiber, and Poul Rosbach. 1984. 'Überlegungen zu Grundfragen der zweisprachigen Lexikographie' in *Germanistische Linguistik* 3—4: 159—238.

Kromann, Hans-Peder. 1988. 'Zur funktionalen Beschreibung von Phraseologismen und Kollokationen in zweisprachigen Wörterbüchern' in: Gréciano, Gertrud (ed.) EUROPHRAS, Colloque International de phraséologie contrastive. Strasbourg, 12—15 mai 1988. Strasbourg: Université de Strasbourg.

Kromann, Hans-Peder. 1989. 'Neue Orientierung der zweisprachigen Wörterbücher' in Snell-Hornby/Pöhl.

Kromann, Hans-Peder, Theis Riiber and Poul Rosbach. 'Principles of bilingual lexicography' in Hausmann/Reichmann/Wiegand/Zgusta, forthcoming.

Levin, Lori S. 1987. 'Toward a linking theory of relation changing rules in LFG'. Manuscript. Pittsburgh, Pa.: University of Pittsburgh. 52pp.

Morik, Katharina (ed.). 1987. 'GWAI-87. 11th German Workshop on Artificial Intelligence'. Geseke, September/October 1987, Proceedings. Berlin/Heidelberg: Springer Informatik-Fachberichte, No. 152.

Mugdan, Joachim. 1988. 'Zur Typologie zweisprachiger Wörterbücher'. Vortrag beim 1. Werkstattgespräch 'Zweisprachige Lexikographie Deutsch-Spanisch, Deutsch-Neugriechisch', Münster/Westfalen, Februar 1988, unveröffentlicht.

Netter, Klaus and Christian Rohrer. 1988. 'Syntactic analysis in Lexical Functional Grammar: The example of German prepositional phrases' in TA Informations 1988. Linguistique et Informatique en RFA.

Rohrer, Christian. 1986. 'Maschinelle Übersetzung mit Unifikationsgrammatiken' in Bátori/Weber 1986: 75—100.

Seelbach, Dieter. 1987. *Transformationsgrammatiken und Unifikationsgrammatiken. Eine Einführung in die Generative Linguistik und in Grundlagen der maschinellen Sprachverarbeitung*. Universität Duisburg (Series A, Paper No. 196).

Sells, Peter. 1986. *Lectures on contemporary syntactic theories*. CSLI Lecture Notes.

Snell-Hornby, Mary and Esther Pöhl (eds.). 1989. *Translation and Lexicography.: Papers from the EURALEX Colloquium at Innsbruck, 2—5 July 1987. A Paintbrush* Monograph. Amsterdam: Benjamins.

Wedekind, Jürgen, Klaus Netter, and Ulrich Heid. 1988. *Einige Typen von Transferoperationen auf f-Strukturen*. Saarbrücken: IAI [= IAI Working Papers].

Wimmer, Christine. 1983a. 'Les verbes introducteurs de *si* interrogatif indirect et la description lexicographique' in *Travaux de linguistique et de littérature* 21: 171—214.

Wimmer, Christine. 1983b. 'Syntaxe et interprétation de la structure *V si p* (interrogative indirecte) in *Le Français Moderne* 51: 205—223.