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The Problems of Multi-word Prepositions and Subjunctions

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Introduction

Multi-word prepositions such as Swedish *i mitten av*, *mitt i*, English *in the middle of*, Swedish *på grund av*, English *because of*, Swedish *i överensstämmelse med*, English *in accordance with*, *according to*, Swedish *vad beträffar*, *i fråga om*, English *as to*, are quite common in written and spoken texts, but they are rarely mentioned when the category of prepositions is discussed in traditional or modern linguistics. One reason for this deficiency is probably that they consist of several words and such items cause problems for lexicographers and grammarians. They don't come to mind as easily and tend to be disregarded.

The purpose of this paper is to draw attention to these multi-word prepositions and suggest ways of treating them in formal grammar and automatic translation. A number of multi-word subjunctions will also be treated. Many of the subjunctions can be said to be formally related to prepositions by the addition of *att* in Swedish, *the fact that* in English, e.g. Swedish *tack vare* (preposition), *tack vare att* (subjunction), English *thanks to*, *thanks to the fact that*, Swedish *bortsett från* (preposition), *bortsett från att* (subjunction), English *disregarding*, *disregarding the fact that*, Swedish *trots*, *till trots av* (preposition), *trots att*, *till trots av att*, English *in spite of*, *despite the fact that*.

The expressions illustrated could be analyzed and understood as combinations of the individual words already in the lexicon. A look at the examples mentioned shows that this is possible in some cases, but a clumsy if not impossible approach in others: there is no common free noun *spite* from which *in spite of* can be understood and it would be most difficult to derive the meaning of *as to* from *as* and *to*.

This paper suggests that a number of recurring word sequences of the types illustrated are best treated as multi-word prepositions or subjunctions and included as separate entries (lexemes) in the lexicon.

The paper will discuss the following questions:

Which multi-word prepositions are there in Swedish and English?

Which are their syntactic forms?

Which semantic areas do they belong to?

How can they be treated in a formal grammar?

How can they be treated in automatic translation?

My interest in multi-word prepositions and subjunctions stems from my engagement in automatic translation (see e.g. Sigurd et al. 1990). When working with empirical texts I soon found it necessary to deal with multi-word prepositions and subjunctions and to include them in the lexicons as separate entries although they consist of several words. Word-for-word or analytic translation of multi-word prepositions and subjunctions are generally clumsy, time consuming and even impossible as is indicated by the following list of correspondences: *på grund av (inflationen) – because of, due to (the inflation), trots (inflationen) – in spite of/despite (the inflation), i fråga om, vad gäller (inflationen) – as to/concerning/regarding (the inflation).*

Examples of multi-word prepositions

It is not quite clear which phrases should be regarded as lexical multi-word prepositions and which should be regarded as syntactic prepositional phrases where a noun has a prepositional phrase as a post-attributive. The two solutions are illustrated by the following two formulas for the Swedish phrase *i fråga om mat* and the English phrase *in relation to food*. It is obvious that the analysis is simplified if the whole expression is regarded as a multi-word preposition as in 1b and 2 b.

1a. pp(p(i),np(n(fråga),pp(p(om),np(n(mat))))))

1b. pp(p([i,fråga,om]),np(n(mat)))

2a. pp(p(in),np(n(relation),pp(p(to),np(n(food))))))

2b. pp(p([in,relation,to]),np(n(food)))

One might suggest that an expression should be considered as a multi-word preposition, if it can be substituted by a one-word preposition with roughly the same meaning. This criterion allows one to say that English *in spite of* is a multi-word preposition, as it may be substituted by *despite*. Similarly Swedish *i närheten av* may be substituted by *nära*, and English *in*

the neighbourhood of by *near* (as *close to* can also be substituted by *near* and it is consequently also a preposition).

A second criterion may be that the phrase seems to be a "frozen syntactic phrase" and then characterized by the fact that the head noun cannot be inflected for number, that an article cannot be deleted, added or changed and that occurring prepositions cannot be substituted by other prepositions. This criterion allows one to say that *in spite of* is a multi-word preposition, as it is not possible to say e.g. **in spites of, *in the spite of or *at a spite of*, etc. Similarly Swedish *på grund av* must be regarded as a multi-word preposition just as *because of*. One cannot say e.g. **på grunden av, *på grunderna av, *i en grund för*, nor in English e.g. **because in*.

One may also take as a criterion that the phrase has a unitary "prepositional" meaning, as unitary as the one-word prepositions. The concept "unitary meaning" is, however, not a self-evident concept, in particular if one considers the possibility to analyze word meanings in semantic features. One may take as a further criterion that a phrase should be classified as a multi-word preposition if it corresponds to a one-word preposition in another language, but this criterion leads far and nobody knows which meanings have found one-word prepositional (or post-positional) expressions in some language in the world. A further criterion may be that one-word prepositions are generally unstressed, and this should hold for multi-word prepositions as well.

Sir Randolph Quirk examined several of these criteria carefully and suggested that the difference between multi-word prepositions and syntactic phrases is gradual (Quirk 1968). But, in a formal grammar one has to take stand on this issue and either include a phrase as a multi-word preposition in the lexicon or not. Some expressions may be analyzed in both ways.

The following is a list of expressions which may be considered as multi-word prepositions according to one or several of the criteria mentioned. The list includes Swedish and English equivalents. It is not meant to be exhaustive, but includes common prepositions and prepositions which it has been convenient to include in the automatic translation programs of Swetra. The list also illustrates the broad semantic classes which are common in multi-word prepositions. The middle column includes some Swedish synonyms or near synonyms, mostly shorter ones.

<i>Preposition</i>	<i>Swed. synonym</i>	<i>English equivalent</i>
<i>Local</i>		
i mitten av	mitt i	in the middle of
i centrum av	mitt i	in the center of
i början av	först i	at/in the beginning of
på toppen av	överst på	at the top of
inom ramen av/för	inom	within (the frame-work of)
vid framsidan av	framför	in front of
på kanten av	nära	on the verge of
mitt emot	emot	against
vid sidan av	bredvid, längs	beside, alongside
till vänster om	vänster om	to the left of
norr om	(norr)	(to the) north of
mot bakgrunden av	against	against the background of
runt omkring	runt, kring	around
i närheten av	nära	in the neighbourhood/vicinity of, near, close to
i stället för		instead of, in place of
<i>Temporal</i>		
i början av	först i	at/in the beginning of
i slutet av	sist i	at the end of
under loppet av	under	during the course of
på samma gång som	samtidigt med	at the same time as
<i>Causal</i>		
på grund av	av/genom	because of
med anledning av	av/genom	on account of, due to
tack vare	genom	thanks to
i kraft av	genom	by force of
för Xs skuld	för X	for X's sake
<i>Consequence</i>		
som en konsekvens av	till följd av	as a consequence/result of
som en följd av	på grund av	as a consequence of
<i>Similarity</i>		
i likhet med	liksom	as, like, similar to
i jämförelse med	jämfört med	in comparison/compared with
i enlighet med	enligt	in accordance with, according to
i överensstämmelse med		in accordance with
på samma sätt som	såsom	in the same way as, as

<i>Dissimilarity, conflict</i>		
i motsats till, mot	motsatt	in contrast to, against
till skillnad från, mot		in contrast to
till trots av	trots	in spite of, despite
i strid med, mot	trots	against
i stället för		instead of
<i>Concerning</i>		
i fråga om	angående	as to/for, concerning
med avseende på	beträffande	regarding
vad (det) gäller	angående	as regards
vad angår	angående	considering
vad X angår		as to/as regards X
på tal om	apropå	speaking about, apropos
med tanke på		with a view to
<i>With</i>		
med hjälp av	med	with the help of, by means of
med stöd av	med	with the support of
i närvaro av	tillsammans med	in the presence of
i tillägg till	förutom	in addition to
<i>Without</i>		
i brist på	utan	in lack of, lacking
i avsaknad av	utan	without, in lack of
i frånvaro av	utan	in absence of
med undantag av	utom	except
bortsett från	utom	disregarding
med bortseende från		disregarding
i behov av	saknande	in need of, for lack of
på bekostnad av		at the expense of
<i>Relation</i>		
i relation till		in relation to
i samband med		in connection with
i anseende till		taking into account
i proportion till		in proportion to
i mån av		as
med hänsyn till		in view of
med hänvisning till		with reference to
mot bakgrunden av		against the background of
i ljuset av		in light of
<i>Conditional</i>		
i fall av		in case of
i händelse av		for the event of

For X

till förmån för	för	to the benefit, advantage of
på uppdrag av	för	on X's order
på begäran av	för	at the request of
i utbyte för	för	in return for
från Xs sida		from X's side
å Xs vägnar		on X's behalf
för Xs vidkommande		for X
för Xs räkning	för	on X's account

The syntactic forms of the multi-word prepositions

As is evident from the above table the most common form of the multi-word prepositions, both in Swedish and English is P1 N P2, where P1 means the first preposition, P2 the second preposition and N noun (noun phrase). A rough calculation shows that the most frequent first preposition is *i* in Swedish, *in* in English. Less common are in Swedish *på*, *med*, *till*, *för*, *vid*, *mot* and in English *with*, *to*, *by*, *on*, *for*, *against*. The most common second preposition is *av* in Swedish and *of* in English. Less common as second preposition are in Swedish *till*, *med*, *om*, *på*, *från* and in English *to*, *with*. Certain semantic fields prefer a certain second preposition. Similarity expressions prefer Swedish *med*, *som*, English *with*, *as*, while dissimilarity expressions prefer Swedish *till*, *från* or *mot*, English *to* or *against*.

Some expressions deviate by including other words than typical prepositions, e.g. *som (en) följd av*=*as a consequence of*, *på samma sätt som*=*in the same way as* and above all *vad gäller X* = *as regards X*, *vad X gäller/angår* (literally *as X regards*). One might perhaps call the last expression a circumposition.

The *s*-genitive is seemingly an alternative to Swedish *av*, English *of*, in some cases, e.g. *på uppdrag av X* / *på Xs uppdrag*, English *at the request of X*, *at X's request* and the list includes some cases of this type. It is also possible to say e.g. *i rummets mitt* instead of *i mitten på rummet* or *mitt i rummet*, English *in the room's middle/center*, instead of *in the middle of the room*.

The head noun is normally "frozen" in its indefinite singular form, but sometimes the noun has as an (optional) article, e.g. *som (en) följd av*, *as a consequence of*. English seems to have more cases of nouns with articles as in *with a view to*, *to the left of*. There is generally no attributive to the noun in the multi-word prepositions; exception: *samma* in *på samma gång som*, *at the same time as*.

There are no examples of Swedish multi-word prepositions including more than 4 words (e.g. *som en följd av*, *på samma gång som*), which makes it possible to restrict the span to 4 words when prepositions are to be identified in computer processing of Swedish. There is at least one longer English multi-word English preposition, namely: *at the same time as*. The observation that English has longer expressions may be explained by the fact that English uses free indefinite and definite articles (cf. Swedish *som konsekvens av*, English *as a consequence of*, Swedish *till vänster om*, English *to the left of*).

The shorter alternatives to multi-word prepositions (in vain recommended by language consultants such as the Swedish academic Eric Wellander) are generally the simple prepositions *av*, *med*, *genom*, *om*, *för* illustrated in the middle column of the list. In some cases the alternatives are present participles as: *angående*, *beträffande*, *rörande*, English *concerning*, *regarding*. The most deviating Swedish expressions are *vad (det) gäller*, *(e)vad beträffar*, *angår* with the word *(e)vad* followed by a verb meaning concerning (cf. English *as regards*).

There are generally English multi-word prepositions corresponding to the Swedish ones, and there are often shorter alternatives in English as in Swedish. Prepositions are known to be a problem when translating between Swedish and English. The semantics and distribution of the prepositions of the two languages conform only partially. English seems to use *of* very often and *of* may be considered as the English unmarked (default) preposition. (French favours two prepositions very much: *à* and *de*.)

If one were to translate English prepositions in isolation, as in word-for-word translation, not assuming multi-word prepositions, one would make a number of mistakes. For example Swedish *på samma gång som* would probably be translated as *on same time as*, *till följd av* as *to consequence of*, *i stället för* as *in the place for* and *tack vare* as *thank be*. Part of the problem of translating prepositions is at least solved by assuming multi-word prepositions as is done in Swetra (see Sigurd et al. 1992).

The semantic fields of multi-word prepositions

The table showing multi-word prepositions above is arranged according to certain broad categories of meaning suggested by the words above each division. These words and the divisions may, however, be the object of discussion. It is possible to sort the multi-word prepositions in several ways. The first set consists of local expressions. The second set includes temporal

expressions. Many expressions can, however, be used in both these categories, e.g. Swedish *i början av*, English *at the beginning of*. One may say *i början av månaden*, *at the beginning of the month* and *i början av gatan*, *at the beginning of the street*. The temporal usage may be considered as secondary and metaphorical – it represents passage along the time axis.

The multi-word prepositions are often specifications of simple prepositions, e.g. by adding a noun such as *sidan* (*side*), *mitten* (*middle*), *början* (*beginning*). This specific or extended meaning cannot always be rendered by a simple preposition (as some purists believe). There is not always a synonymous one-word preposition. Thus there is apparently no one-word preposition to express *i jämförelse med* (*in comparison with*). It is an interesting question which meanings can be expressed by one-word prepositions in the languages of the world and which require multi-word prepositions. The multi-word prepositions sometimes seem to be used in a more abstract sense. Thus one would prefer to say in Swedish: *Vid sidan av krig är inflation det största hotet* (Literally: *By the side of war inflation is the worst threat*) rather than *Bredvid krig är inflation det största hotet* (*Beside war inflation is the worst threat*). English can use *beside* equally well in both abstract and concrete contexts. English *by the side of* is best used in a concrete sense and *besides* in an abstract sense.

The “causal” multi-word prepositions constitute another important class, which is closely related to those classified under “consequence”. We note the polar categories “similarity” and “dissimilarity” and those identified by “with” and “without”.

The word “relation” is used to denote a general category, from which some of the others have been taken. The words “conditional” and “for X” are used to distinguish two further categories. The categories established are not based on any extensive and systematic empirical studied.

Prepositions and subjunctions

Several Swedish multi-word prepositions can be used as subjunctions after addition of *att*, e.g. *på grund av + att* (because), *till följd av + att* (as a consequence of + the fact that), *i samband med + att* (in connection with the fact that), *tack vare + att* (thanks to the fact that). Note that English requires the corresponding addition of *the fact that*. The addition of *the fact* can be said to allow the *that*-clause to occur after a preposition.

It is, however, not possible to derive all the subjunctions from prepositions in this way. There are a number of subjunctions which have no

obvious preposition as counterpart, e.g. Swedish *när*, *då*, *medan*, *emedan*, English *when*, *as*, *while*, *because*. And there are prepositions (e.g. local prepositions) which have no subjunctions as counterparts. Following is a table illustrating the relations between some prepositions and subjunctions.

Swedish

English

Temporal

Prepos: Före (Innan) sommaren

Before (the) summer

Subjunc: Innan (Före) sommaren kom

Before (the) summer came

Prepos: Samtidigt med Bill

At the same time as Bill

Subjunc: Samtidigt med att/Under det att/

At the same time as, While

Medan Bill kom

Bill came

Prepos: Efter Bill

After Bill

Subjunc: Efter (det) att Bill kom

After Bill came

Causal

Prepos: På grund av Bill

Because of Bill

Subjunc: På grund av att/Därför att/Med
anledning av att/Emedan/Då Bill kom

Since/As/Because Bill came

Prepos: Tack vare/Genom Bill

Thanks to Bill

Subjunc: Tack vare att/Genom att Bill kom

Thanks to the fact that

Consequence

Prep: Som en konsekvens/följd/

As a consequence of Bill

Till följd av Bill

Subjunc: Som en konsekvens av att/

As a consequence of the

Till följd av att Bill kom

fact that Bill came

Similarity

Prep: I jämförelse med Bill

In comparison with Bill

Subjunc: I jämförelse med

In comparison with the

att Bill kom

fact that Bill came

Prep: På samma sätt som Bill

In the same way as Bill

Subjunc: På samma sätt som

In the same way as

Bill kom

Bill came

Dissimilarity, contrast

Prep: I motsats till Bill

In contrast to Bill

Subjunc: I motsats till hur

In contrast to how

Bill kom

Bill came

Prep: I stället för Bill Subjunc: I stället för att Bill kom	Instead of Bill Instead of the fact that Bill came
<i>Concerning</i> Prep: I fråga om Bill Subjunc: I fråga om att Bill kom	As for Bill As to the fact that Bill came
Prep: Med tanke på Bill Subjunc: Med tanke på att Bill kom	With Bill in mind With the fact that Bill came in mind
<i>With</i> Prep: Med hjälp av Bill Subjunc: Med hjälp av att Bill kom	With the help of Bill With the help of the fact that Bill came
<i>Without</i> Prep: Bortsett från Bill Subjunc: Bortsett från att Bill kom	Disregarding Bill Disregarding the fact that Bill came
<i>Relation</i> Prep: I samband med Bill Subjunc: I samband med att Bill kom	In connection with Bill In connection with the fact that Bill came
<i>Conditional</i> Prep: I händelse av en olycka Subjunc: I händelse av att en olycka inträffar	In the event of an accident In the event that an accident occurs

There is a tendency in some Swedish dialects or informal styles to add the markers *att* or *som* optionally even to some subordinations, e.g. in *eftersom (att)*, *samtidigt som (att)*, *när (som)*. This is a way of prolonging the subordinations but does not add to their meaning. The words *att* and *som* (typical relative clause marker) may be considered as the default markers of subordination in Swedish.

It is also possible to use Swedish *hur*, English *how* after prepositions, as is illustrated by Swedish *I motsats till hur Bill kom*, English *In contrast to how Bill came*.

In many cases English has an alternative way of expressing the clauses with subordinations illustrated. Instead of saying *Due to the fact that Bill came*, one may say *Due to Bill's coming*; instead of saying *Thanks to the fact that Bill came* one may say *Thanks to Bill's coming* etc. Swedish cannot

use this construction with a nominal present participle after the preposition, where the subject appears as a genitive attributive.

It is evident that some prepositions and subordinations which today consist of one word only, have included several words earlier. There is a tendency in the development of languages to contract expressions consisting of several words. English *because* is for example derived from *by cause*. The Swedish preposition *anropå* stems from French *à propos*. The components are contracted in English *instead of*, and Swedish may spell *istället för* or *istället för* (according to the Wordlist of the Swedish Academy, SAOL).

Prepositions and subordinations in a computerized lexicon

A typical computer program for analysis (and/or synthesis) of sentences and text includes a syntactic component which identifies the major phrases, classifies them as noun phrases, verb phrases, prepositional phrases etc. and assigns the subject, predicate, objects, adverbials, attributives etc. of the sentence. This component is typically aided by a lexicon where the form, category and meaning of words are registered. As it is not possible to include all word forms in a lexicon and as many word forms can be derived by rules, there are generally also morphological rules to supplement the lexicon. Such rules may e.g. derive the plural form *winds* from the singular form *wind* and the past tense form *moved* from the infinitive form *move*. Only *wind* and *move* have then to be included in the lexicon.

The lexicon used in Referent (Functional) Grammar and Swetra has a standard format, namely a predicate *lex* followed by 10 positions (slots) where various types of information about the words can be stored (for examples see below). The first slot includes the form of the lexical item (lexeme) – sometimes several words, as illustrated. The second slot includes the meaning of the lexical item and the third slot includes the grammatical category: *n(oun)*, *v(erb)*, *a(djective)*, *p(reposition)*, *sub(junction)*, etc. The meaning is stored as an expression with two slots after *m(eaning)*, e.g. for the Swedish word *vind*: *m(wind,sg)*, for the Swedish word *sprang*: *m(run,past)*. All the word meanings are rendered in a kind of machineese, which mostly reminds one of English supplemented with certain grammatical features.

One has to render the meaning using one word only within the Swetra system. It would be possible to use random combinations of letters or figures to denote meanings, but the use of English-like words and abbreviations or contractions has clear mnemonic advantages. There is no

standardized and generally accepted way of defining word meanings in linguistics and the way used in Swetra is only one solution of this problem, which has to be solved in any automatic translation system. The word meaning representations used in Swetra and illustrated below are tailored to suit the domains of interest to Swetra. The important thing is to use the same defining word for the same meaning in the source and target languages. There is, of course, a problem in deciding which synonyms or near synonyms should be rendered by the same meaning marker. This problem is amply illustrated by prepositions and subjunctions.

One may, furthermore, give additional information about declension, morphological regularities, agreement features, semantic fields, semantic roles in later slots after *lex*. A lexicon built in this formalized way can be accessed by the formal grammatical (syntactic and morphological) rules and be integrated in a complete natural language processing system. Swetra and Referent Grammar are written directly in the programming language Prolog.

Following are lists of Swedish (*slex*) and English (*elex*) entries for some prepositions and subjunctions.

Some Swedish prepositions in the format of Referent Grammar

slex([i],m(in,_),p,_,_,_,_,_,_,_).
slex([av],m(of,_),p,_,_,_,_,_,_,_).
slex([mot],m(towards,_),p,_,_,_,_,_,_,_).
slex([omkring],m(around,_),p,_,_,_,_,_,_,_).
slex([kring],m(around,_),p,_,_,_,_,_,_,_).
slex([än],m(than,_),p,_,_,_,_,_,_,_).
slex([trots],m(despite,_),p,_,_,_,_,_,_,_).
slex([mitt,i],m(inmiddleof,_),p,_,_,_,_,_,_,_).
slex([i,mitten,av],m(inmiddleof,_),p,_,_,_,_,_,_,_).
slex([framför],m(infrontof,_),p,_,_,_,_,_,_,_).
slex([vid,framsidan,av],m(infrontof,_),p,_,_,_,_,_,_,_).
slex([till,vänster,om],m(toleftof,_),p,_,_,_,_,_,_,_).
slex([på,grund,av],m(becauseof,_),p,_,_,_,_,_,_,_).
slex([till,följd,av],m(asconsequenceof,_),p,_,_,_,_,_,_,_).
slex([som,en,följd,av],m(asconsequenceof,_),p,_,_,_,_,_,_,_).
slex([på,samma,gång,som],m(atsametimeas,_),p,_,_,_,_,_,_,_).
slex([samtidigt,som],m(atsametimeas,_),p,_,_,_,_,_,_,_).
slex([i,stället,för],m(insteadof,_),p,_,_,_,_,_,_,_).
slex([istället,för],m(insteadof,_),p,_,_,_,_,_,_,_).
slex([med,undantag,av],m(except,_),p,_,_,_,_,_,_,_).
slex([i,händelse,av],m(ineventof,_),p,_,_,_,_,_,_,_).
slex([med,hjälp,av],m(bymeansof,_),p,_,_,_,_,_,_,_).
slex([tack,vare],m(thanksto,_),p,_,_,_,_,_,_,_).

slex([jämfört,med],m(comparedto,_),p,_,_,_,_,_,_,_).
slex([i,samband,med],m(inconwith,_),p,_,_,_,_,_,_,_).
slex([öster,om],m(eastof,_),p,_,_,_,_,_,_,_).
slex([beträffande],m(asto,_),p,_,_,_,_,_,_,_).
slex([vad,beträffar],m(asto,_),p,_,_,_,_,_,_,_).
slex([vad,gäller],m(asto,_),p,_,_,_,_,_,_,_).

Some Swedish subjunctions

slex([medan],m(while,_),subjunc,_,_,_,_,_,_,_).
slex([under,det,att],m(while,_),subjunc,_,_,_,_,_,_,_).
slex([samtidigt,som],m(atsametimeas,_),subjunc,_,_,_,_,_,_,_).
slex([samtidigt,med,att],m(atsametimeas,_),subjunc,_,_,_,_,_,_,_).
slex([på,samma,gång,som],m(atsametimeas,_),subjunc,_,_,_,_,_,_,_).
slex([på,grund,av,att],m(because,_),subjunc,_,_,_,_,_,_,_).
slex([eftersom],m(because,_),subjunc,_,_,_,_,_,_,_).
slex([emedan],m(because,_),subjunc,_,_,_,_,_,_,_).
slex([för,den,händelse,att],m(intheeventthat,_),subjunc,_,_,_,_,_,_,_).
slex([vad,gäller,att],m(asto,_),subjunc,_,_,_,_,_,_,_).

Some English prepositions

elex([in],m(in,_),p,_,_,_,_,_,_,_).
elex([of],m(of,_),p,_,_,_,_,_,_,_).
elex([towards],m(towards,_),p,_,_,_,_,_,_,_).
elex([around],m(around,_),p,_,_,_,_,_,_,_).
elex([than],m(than,_),p,_,_,_,_,_,_,_).
elex([despite],m(despite,_),p,_,_,_,_,_,_,_).
elex([in,spite,of],m(despite,_),p,_,_,_,_,_,_,_).
elex([in,the,middle,of],m(inmiddleof,_),p,_,_,_,_,_,_,_).
elex([in,front,of],m(infrontof,_),p,_,_,_,_,_,_,_).
elex([before],m(infrontof,_),p,_,_,_,_,_,_,_).
elex([to,the,left,of],m(toleftof,_),p,_,_,_,_,_,_,_).
elex([because,of],m(becauseof,_),p,_,_,_,_,_,_,_).
elex([on,account,of],m(becauseof,_),p,_,_,_,_,_,_,_).
elex([as,a,consequence,of],m(asconsequenceof,_),p,_,_,_,_,_,_,_).
elex([at,the,same,time,as],m(atsametimeas,_),p,_,_,_,_,_,_,_).
elex([instead,of],m(insteadof,_),p,_,_,_,_,_,_,_).
elex([except],m(except,_),p,_,_,_,_,_,_,_).
elex([with,the,exception,of],m(except,_),p,_,_,_,_,_,_,_).
elex([in,the,event,of],m(ineventof,_),p,_,_,_,_,_,_,_).
elex([thanks,to],m(thanksto,_),p,_,_,_,_,_,_,_).
elex([by,means,of],m(bymeansof,_),p,_,_,_,_,_,_,_).
elex([compared,to],m(comparedto,_),p,_,_,_,_,_,_,_).
elex([in,comparison,with],m(comparedto,_),p,_,_,_,_,_,_,_).
elex([inconnection,with],m(inconwith,_),p,_,_,_,_,_,_,_).
elex([to,the,east,of],m(eastof,_),p,_,_,_,_,_,_,_).
elex([as,to],m(asto,_),p,_,_,_,_,_,_,_).

```
elex([regarding],m(asto,_),p,_,_,_,_,_,_).
elex([concerning],m(asto,_),p,_,_,_,_,_,_).
elex([due,to],m(because,_),p,_,_,_,_,_,_).
```

Some English subordinations

```
elex([while],m(while,_),subjunc,_,_,_,_,_,_).
elex([at,the,same,time,as],m(atsametimeas,_),subjunc,_,_,_,_,_,_).
elex([because],m(because,_),subjunc,_,_,_,_,_,_).
elex([as],m(because,_),subjunc,_,_,_,_,_,_).
elex([in,the,event,that],m(intheeventthat,_),subjunc,_,_,_,_,_,_).
elex([due,to,the,fact,that],m(because,_),subjunc,_,_,_,_,_,_).
elex([as,to,the,fact,that],m(asto,_),subjunc,_,_,_,_,_,_).
```

These lexical entries make it possible to translate Swedish prepositions and subordinations into English equivalents and vice versa. There are sometimes several translations to choose from. But we will not discuss the problem of translating prepositions and subordinations more in detail here.

Deriving subordinations from prepositions

As noted above many subordinations can be derived from prepositions by adding *att* in Swedish, *the fact that* in English, e.g. *tack vare att* from *tack vare* and *thanks to the fact that* from *thanks to*.

The following is a Prolog rule which adds *att* to certain Swedish prepositions marked *sposs* and changes them into subordinations.

```
slex(W1,m(B,_),subjunc,_,A,C,D,E,F,sposs) :-
  slex(W,m(B,_),p,_,A,C,D,E,F,sposs),
  append(W,[att],W1).
```

This implicational rule given in Swetra format states that if there is a preposition with the form *W*, marked in the lexical matrix by *sposs* ("possibility to become a subjunction") in a lexical matrix, then one may append [*att*] to the form *W* and get a new lexical form *W1*, which can be used as a subjunction. This rule changes, for example the preposition *efter* (after) into *efter att*, and *tack vare* into *tack vare att*. It adds lexical items. The condition is required, as all prepositions cannot be used in deriving subordinations in this way. The application of this rule presumes that the proper prepositions in the lexicon are marked with *sposs*. Note that the number of subordinations is not more than about 25 and it is, in fact, dubious whether it is more advantageous to derive them by a rule than to include them as separate items in the lexicon.

There are certain problems in relation to the rule. Meaning will be given in the same way in prepositions and subordinations by the rule. This is not the case in all the lexical items illustrated above and might seem strange in some cases. The rule assumes for instance that we accept *m(because,_)* as representing the meaning of the English subjunction *because*, the English preposition *because of*, the Swedish preposition *på grund av*, and the Swedish subjunction form *på grund av att*.

The subordinations can be quite long, in particular in English as illustrated by *in connection with the fact that*, and the grammatical rules handling subordinations must therefore allow for lexical items including six words.

Demo automatic translation of multi-word prepositions and subordinations

The following two commands illustrate how automatic translation using the grammars of Swetra can take place. The Swedish adverbial phrase (*advp*) consisting of a prepositional phrase or an adverbial subordinate clause is translated into the corresponding English adverbial phrase (*eadvp*).

```
advp(F,[tack,vare,inflationen],[]),
eadvp(F,X,[],print(X)).
```

X=[thanks,to,the,inflation].

```
advp(F,[tack,vare,att,inflationen,föll],[]),
eadvp(F,X,[],print(X)).
```

X=[thanks,to,the,fact,that,the,inflation,fell].

The functions of multi-word prepositions and subordinations

Multi-word prepositions (and subordinations) have been the object of puristic discussions (cf. Eric Wellander 1945). Wellander always recommends the shorter form instead of the longer, thus *bredvid* (beside) instead of *vid sidan av* (by the side of), *nära* (near) instead of *i närheten av* (in the neighbourhood of), *inom* (within) instead of *inom ramen för* (within the frame-work of). There are, however, often certain subtle differences between such expressions and the fact that the long expressions persist in usage must be taken as a token of their functional value.

The existence of different alternatives for almost the same meaning allows stylistic variation. This is clearly an advantage in long enumerations, e.g. the following: *Beträffande A* (Concerning A), *i fråga om B* (in the question of B), *Vad gäller C* (As to C), *Angående D* (As regards D) – all

belonging to the category "concerning" mentioned above. It is also true that the multi-word prepositions and subjunctions allow the speaker to put more stress on the expression – although prepositions and subjunctions are normally destressed. Politicians often use the "concerning" type of preposition to signal which topics they are going to express their opinions about. The long prepositions and subjunctions furthermore allow the speaker to prolong the speech, which is of importance in certain ritual or ceremonial circumstances. The multi-word prepositions and subjunctions even allow the speaker to rest a little while planning what to say next (cf. Sigurd 1987).

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Some Acoustic Characteristics of Glottal and Palatal Fricatives in Japanese and German

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Introduction

In classifying Japanese consonants, there are different ways to group the so-called *h-sounds*. In a /hi/-sequence the /h/-part could be realized as either [ç] or as a voiceless high front vowel [i̥], the latter being the devoiced counterpart of the following vowel. The occurrence of either realization can go together with vowel devoicing in specific environments. In Japanese, high vowels are often devoiced between voiceless obstruents, and can even be deleted, either in rapid speech (Vance 1987) or if a fricative or affricate precedes, although coarticulatory effects remain on that fricative (Kawakami 1977). Some linguists point out that [ç] always occurs when followed by a high front vowel. Others, however, have shown, that [i̥] can be found in the same position.

In German, the quality of the glottal fricative /h/ is dependent on the following vowel. It could also be described as the devoiced counterpart of the following vowel (Kaneko & Neyer 1984). Therefore, in the sequence /hi/, as in the German word *hier* ([hiɐ̯], 'here'), the fricative is palatalized. In addition, a contrasting fricative, the so-called *ich-Laut*, which is transcribed as [ç], can be found in German, as in the word *Hierarchie* ([hiɪ̯əçi:], 'hierarchy'). The occurrence of this palatal fricative is very much restricted in its distribution.

In the present study some comparisons of the acoustic structure of specific effects within and between Japanese and German are shown. These comparisons include an investigation of the fricatives in both languages under no further specified context conditions and one that focusses on possible spectral similarities in the fricatives in Japanese /hi/, where the /i/ is

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