Reorganizing dependences

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Strategies of discourse appropriate distribution of information, like Given before New and Balanced Information Distribution, apply to the structure of sentences as a whole and to the internal structure of their phrases. The language-specific differences between the information structures of sentences/ clauses and noun phrases in English and German result in different conditions on discourse-appropriate structural dependencies, which may lead to noun phrase internal or noun phrase external relinking in translations between English and German. The phenomenon will be demonstrated by two types of reorganizing dependencies in translations from English (popular-scientific texts) into German: we have termed them relinking of appositions and postnominal attribute raising.¹

1. Introduction

Neutral distribution of information in written sentences is guided by stylistic strategies that secure easy language processing in discourse. It is generally assumed that there is a universal strategy to present given information before new information - abbreviated in the following as GIN. However, in more complex cases GIN will result in structures which call for more complex strategies to secure processing ease. In particular, there is a strategy of balanced information distribution, BID, which replaces GIN whenever the latter would result in a discursive garden path. The following discussion of German translations of English sentences involving the information structure of noun phrases will demonstrate the complexity of discourse appropriate language use, i.e. the interplay between the discursive relevance of information and its linguistic encoding.

Basically, discursive informativity is determined by progress in discourse: less informative elements are seen as background information, and are - explicitly or implicitly - linked to the preceding discourse; more informative elements are 'new' and, as a rule, taken up in the subsequent discourse. But even if all information seems discourse given (as in (1) below), the identifying relation asserted by the statement may be new (cf. Lambrecht, 1994). GIN and BID are universal strategies, but due to the different language systems they promote different structural solutions even in such closely related languages as German and English (cf. Doherty, 2003a,b). Although the more rigid word order in English is to some extent compensated for by fewer constraints on lexical projections,² the tight link between subject and verb blocks GIN in a great number of cases and creates conditions for BID different from those of German sentences. Thus, Jackendoff's famous sentence, serving to illustrate basic stress patterns (1972):

(1) Fred ate the beans.

¹The paper summarizes the results of the second part of a DFG-sponsored research project on the information structure of NPs in translations between English and German. The results of the first part were presented under 'SAP' (Doherty, 2004). Participating in my project were research assistants (Dr. Bettina Seifried, Thomas Bonk, Renate Kostritz, Andreas Ljungström, Rebecca Schopfer, Jenny Ziebal) and students of translation.

²Due to the fact that there are more verbs with fewer selection restrictions in English, there are more English subjects with non-agentive roles, which German tends to project into (causal, instrumental, temporal, local ...) adverbials. Analogous translations into German result in inadvertent personifications, which are avoided by a shift in perspective. (Doherty, 1996.)
results in a somewhat lopsided information structure if the object is topicalized:

(2) The beans Fred ate.

The initial cluster of phrases contrasts with the well-balanced German version of (2):

(3) Die Bohnen hat Fred gegessen.

The asymmetry of the English sentence structure involves both sides of the verb and processing ease promotes constraints on topicalization which apply to postverbal positions no less than to topic positions. (Doherty, 2003a,b) In particular, information is only topicalized in line with certain discourse conditions if the postverbal position after finite verbs (requiring arguments or adjuncts) is filled by some relevant information. Thus, a sentence like (2) with everything before and nothing after the verb presents a highly marked structure, which would only be used under very special conditions (e.g. a contrast on the verb). In German, (3) is the neutral structure to choose if the sentence is used as a statement about the beans, die Bohnen.

The different variability of word order in German and English has an even greater effect on GIN and BID as there is also a difference in the directionality of verb phrase internal information. While the basic order of arguments seems to be roughly similar in English and German, the order of adverbials relative to each other and to the arguments tends to be a mirror image (Frey, Pittner, 1999). The basic word order of the English verb phrase is head initial, extending to the right; the basic word order of the German verb phrase is head final, extending to the left. The second position of the German finite verb in main clauses does not change the basic direction of the verb phrase internal extensions. However, in discourse the basic order of German is changed whenever it violates the strategy of GIN or BID.

The alternative directionalities of the verb phrases are repeated in the informativity of their constituents. As a rule, the more informative element is verb-adjacent, which amounts to an increase of informativity in the German head-final verb phrase, and a decrease of informativity in the English head-initial verb phrase. If there is only one element after the verb, the information structure of English and German sentences may coincide. But even in a case like (1), the information structure can be similar to that of (3) - with the English subject as the strongest element and a decreasing information structure after it.

If we express the highest degree of informativity, which is normally the information containing the main stress, the focus, by 1, we can expect the order < 2 1 > for most English and German sentences with two informational values - a distribution which is traditionally associated with the concept of 'end focus'. But while the alternative information structure promotes reordering of the sentence in German, (1) will also be associated with < 1 2 > in English. With more complex information structures, the alternative is more differentiated. While the most informative element is to be expected more to the right in German, it will occur earlier in the English VP. Balance in the distribution of information, BID, will thus amount to something like < 2 3 1 > in German, with the weakest element between the more relevant ones, but < 3 1 2 > in English, with the focus surrounded by weaker elements. However, options for BID are heavily constrained by the grammatical rigidity of English. In contrast to German, which allows discourse adaptation of word order freely, English grammar restricts word order variations strongly.

Thus, translations which retain the order of the original may violate target language expectations, presenting information in a discourse-inappropriate way. While the
processing difficulties will in most cases be resolved by reanalysis which reinterprets the information in a discourse-appropriate way, translations which remain too close to the original order will - at least temporarily - mislead their readers. With short sentences like (1) the effect is hardly noticeable - word recognition taking no more than about 250 msec - , with more complex structures it will be felt more strongly.

The differences between English and German information structures are not restricted to verb phrase internal extensions. Although English and German noun phrases seem to possess basically the same means of extensions in prenominal and postnominal positions, there are some grammatical differences promoting an iambic pattern of informativity with verbless attributes in German and a trochaic pattern in English. This is modified if the attribute contains a verb, as such attributes indicate their own information structure. (The fact that VP-attributes are used prenominally in German and postnominally in English seems only natural if we assume that the iambic/trochaic patterns need a special marker to express the alternative information structure.)

The choice between verbless attributes and attributes with verbs - non-finite verb phrases or clauses - is subject to a strategy of attributive parsimony, SAP, which prefers the structurally more economical phrase to the less economical one (Doherty, 2004).

Phrasal and clausal differences in the appropriate distribution of information may require more or less complex reorganization of sentence structure in translations between English and German. Changes which concern noun phrases may be restricted to internal structures of the NP. The different cases of pre- and postnominal attributes were systematically dealt with in Doherty, 2004. Most changes associated with appositions are noun phrase internal, shifting the dependency between head and modifier. They will be treated in the third section of this paper. Changes which involve noun phrase external structures comprise a great number of different subclasses, one of which will be taken up in the following.

To cut down the vast number of cases in which discourse (in)appropriate sentence structures involve noun phrase internal information, we will concentrate on one of the six major possibilities. Roughly seen, a noun phrase consists of a nominal head and its extensions before or after it. Although changes involving pre- or postnominal information will in most cases concern more than one feature, there will often be a major difference triggering the other changes. If e.g. we extract the head of a noun phrase and use it in some other part of the sentence, the syntactic status of the remaining extensions will change automatically.

The coarse-grained distinction between heads, pre- and postnominal extensions results in a subclassification of noun phrase external changes into three types of extractions from and three types of insertions into the noun phrase. The syntactic status of extracted extensions will in most cases be raised by the change, the extracted element being reformulated as an adverbial or argument of the verb phrase. The syntactic status of information inserted into the noun phrase will be lowered from a verb phrase dependent element to a noun phrase dependent element. For the sake of simplicity we will use the term attribute for all sorts of extensions surrounding a nominal head, subsuming adjuncts, complements and specifiers (that might be relevant for the information structure of the phrase).

From a linguistic point of view this may sound like an absurd simplification, but from the point of view of pattern recognition at high speed such simplifications make sense. Although we can always resolve the elements of a structural pattern into their details and identify their features at deeper levels, perceptual shortcuts must evolve to speed up processing. There can be no doubt that linguistic simplifications will follow the most general features of structural organization in syntax: directionality and major dependencies. Consequently, basic typological differences between languages can lead to language-specific variations of the universal strategies of pattern recognition.
There is a second aspect, it seems, of illegitimate use of traditional terms of transformational grammar. Concepts like *raising, extraction, topicalization, deletion*, etc. are normally used to describe classes of relations between structures that are distinguished into basic and derived ones. Applying these terms to relations between original and translated structures means dropping the idea of an increase in derivational complexity. The different structures of original and translation could be equally complex and either one could be more complex or less complex than the other one. However, structural transformations like *dependency shift* (using attributes as heads and heads as attributes), *modifier shift* (using attributes as adverbials or vice versa), *recategorizing* (for example, nominal heads as matrix verbs), *reframing* (mapping thematic roles into another case frame, e.g. by passivizing or reflexivizing) and the like do present relations between structural paraphrases within the grammatical options of a language. Regarding the structure of the original, such paraphrases can be ordered into closer and less close paraphrases within the language of the original or the language of the translation. A systematic order of paraphrases is determined by ‘transformational’ relations reflecting the specific methods of discourse-appropriate information structuring. The paraphrase which is structurally closest to the original will be furthest away from the discourse appropriate structure of the translation and the latter - backtranslated into the source language - will be furthest away from the structure of the original.3 Recurring differences between original and *target versions* (the translation with the highest degree of discourse appropriateness) show us the way to the details of language-specific information structure. The restructuring patterns to be observed between original and translation which involve noun phrases range from relatively simple to highly complex structural changes. Of the four types of changes concerning the lowering or raising of pre- or postnominal attributes, we will in the following concentrate on *postnominal attribute raising*. The discussion of the examples will be ordered according to complexity and position (initial, medial and final) of the original elements and their translations.

2. Postnominal attribute raising under GIN and BID

The difference in the variability of English and German word order allows German to follow GIN more freely than English and promotes different patterns of balanced information structures. The difference may concern the order of elements within the verb phrase extending the finite verb but it may also involve preverbal structures, i.e. phrases in initial position of sentences. As was said above, the basic position of the most relevant information of the verb phrase is verb adjacent in both languages. This means that it is close to the verb initial position in English verb phrases and is often followed by less relevant information. The alternative distribution in German, where the basic position of the verb is VP-final, requires us to prepose less relevant information to an earlier position of the sentence, either medial or initial depending upon the remaining structure of the sentence. This will also include NP-internal structures, especially less relevant postnominal attributes after more relevant heads in VP-final positions. But differences in BID and GIN may also concern NP-internal structures at the beginning of sentences and promote various types of postnominal attribute raising in translations from English into

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3Discourse appropriateness of translational paraphrases were judged by ten to twenty German participants of seminars (students of translation between English and German and research assistants), original and backtranslated paraphrases by one or two native speakers of English. As the original texts were taken from the renowned paper *New Scientist*, we dared to rely on the editorial competence behind the publications - questionable structures seemed to be rare exceptions.
German. The following discussion will concentrate on changes which 'extract' attributes from NPs at the end or at the beginning of sentences.

2.1 Extraction from final NPs

It is not always clear whether a final adjunct is part of an NP preceding the adjunct or part of the VP containing the NP. Irrespective of its VP- or NP-dependency, discourse-appropriateness in German may require a different position of the adjunct if its informativity is less relevant than that of the preceding phrase. The adjunct will be moved to an earlier position so as to secure final position for the more relevant element in line with the German versions of BID or GIN.

Consider the second clause of example (4). The preceding context introduces two main types of supernovae; type I is talked about in the immediately preceding sentence, which places such supernovae among both young and old stars. This is clearly contrasted by the excluding reference to the youngest stars in (4):

(4) Type II, on the other hand, are hydrogen-rich, like most other things in the Universe, but they occur only among the very youngest stars in our own and other galaxies. (n26)

The reference to the galaxies is less relevant, providing information which belongs to our background knowledge about stars - despite its internal contrast between own and other. Thus, the sentence has been translated as

(5) Auch Supernovae vom 2. Typ sind reich an Wasserstoff, sie kommen jedoch bei uns und in anderen Galaxien nur unter sehr jungen Sternen vor.

reordering the adjuncts in the end. It is not clear whether the English reference to the galaxies is an adjunct to the verb phrase of the second clause, or an adjunct to the noun phrase, modifying the very youngest stars. The example could therefore be classified as a case of verb phrase internal reordering of adverbials or as a case of postnominal attribute raising.

Things are clearer with postnominal attributes containing verbs, VP or CP. Such attributes will be structurally reduced in the raising. Nominalizing or deleting the verb may yield a prepositional phrase. Consider

(6) The eruption of Mount St Helens in 1980 provided an unprecedented opportunity to study the impact of volcanoes on the atmosphere. (v2)

where the final VP is nominalized and extracted from the object

(7) Der Ausbruch des St. Helens von 1980 eröffnete für die Erforschung der klimatischen Auswirkungen von Vulkanen ungeahnte Möglichkeiten

Following the title of the text Do volcanoes affect the climate? the postnominal attribute of the original object is clearly less informative than the preceding part of the NP and thus preposed in the translation. The verb of the postnominal attribute may be deleted in the translation if it is a semantically weak verb. Compare a sentence like
Hydrogen and helium are the most abundant elements, accounting for 98 per cent of all the material in our Galaxy. (d63)

which is translated as

Wasserstoff und Helium sind mit einem Anteil von 98% an der gesamten Materie die häufigsten Elemente unserer Galaxis.

The contextually weak verb accounting is dropped altogether, the more informative part of the attribute is preposed before the inherently focused superlative. As the figure itself is not necessary for the discursive progress, the superlative is the prospectively more relevant information. The residual nominal phrase of the postnominal attribute is retained as a genitive NP after the most informative part of the predicative - presumably to reduce the structural burden of the adjunct raised.

The adjuncts in (5) - (9) were all placed in medial position in the translations. Due to the low discourse relevance, the postnominal attributes of the English NPs were raised to an NP external position early in the VP, which is typical of background information in more complex information structures in German. But post-nominal attribute raising can also result in topicalizing of adjuncts, often in line with GIN, i.e. for information structures which are less complex. Among the more frequent cases we have found postnominal attribute raising from subjects introduced by the expletive (focus indicating) there:

There is however an indirect approach to studying heavier elements. (d68)

topicalizes a nominalized postnominal attribute in the translation:

Für die Erforschung schwerer Elemente gibt es aber auch noch einen indirekten Weg.

The postnominal attribute can also be reduced from a relative clause and preposed

There are several crystals that contain this cation, (h83)

Dieses Kation kommt in mehreren Kristallen vor,

Structural reduction may also mean pronominalizing the raised attribute as in

There are two main reasons for this complexity (i12)

which was translated as

Dafür gibt es vor allem zwei Gründe.

The postnominal attribute, complement to reason in the original, is raised to the initial position of the sentence and reduced to a pronominal adverb, as it directly follows its antecedent in the discourse.

Topicalization of postnominal attributes may also be subject to BID, i.e. occur in more complex information structures. The special condition for such cases seems to be a contrastive relation between the final adjunct and the preceding discourse. The adjunct will then function as a contrastive topic in the translation. Compare
(16) However, the fluoride ion shows only normal hydrogen bonding towards water molecules themselves. (h107)

which follows a passage introducing fluoride ions and uracil fluorides as a case of strong hydrogen bonding. Water molecules are clearly contrasted with uracil, just as normal hydrogen bonding is contrasted with strong hydrogen bonding. The following text elaborates on the properties fluoride salts have due to their normal hydrogen bonding. The prospective relevance of the object is higher than that of the postnominal attribute. The English information structure of (16) is < 3 1 2 > which becomes < 2 3 1 > in the German translation.

(17) Mit Wassermolekülen selbst bildet das Fluoridion jedoch nur normale Wasserstoffbrückenbindungen aus.

(As to the position of the adversative connector cf. Doherty, 2003c; as to the perspective of show Doherty, 1996).

The English original does not make use of this type of contrasted topic as the syntactic ties between the nominal head and its attribute - which is a complement - are tighter in English than in German. Thus, the English sentence relies on the lexical focus-indicators (only and themselves) and does not allow the additional marking through topicalization - which is needed to secure discourse appropriateness in German. A particularly vexing example is the case of a postnominal attribute raising from an NP after there are, where the order of referents is maintained in the translation. Compare

(18) Fortunately, there are other planets in the Solar system with interesting atmospheres, ...

which is translated as

(19) Zum Glück gibt es auch auf anderen Planeten unseres Sonnensystems interessante Atmosphären.

The particle auch (also) is inserted to indicate the contrastive focus on andere (other) and the final PP is subjected to a shift in dependency without changing its linear position. The additive meaning of the particle reverses the expectation of end focus. It requires the reader to interpret the remaining sentence as parallel to similar background information. The focus on the object is that of a presupposition (cf. Lambrecht, 1994, Erteshik-Shir, 1997) The English original does not need the additional lexical device to strengthen the prenominal focus on 'other' as it admits less informative elements at the end of the sentence, anyway.4

2.2 Extraction from initial noun phrases

4The iambic information structure of German NPs might assign a focus to the postnominal attribute of an analogous NP:

(i) Zum Glück gibt es andere Planeten im Sonnensystem mit interessanten Atmosphären ...
Postnominal attribute raising may also originate in initial noun phrases. Such changes are mainly due to the different conditions on the use of initial and medial positions in German and English. The difference involves NP internal structures where either the head or the attribute is more relevant than the rest of the NP so that the one or the other could be inappropriate in an analogous position in German.

The English subject - given or new - is normally placed before the verb, and the topicalization of elements before the subject is heavily constrained by conditions on the postverbal structure and discourse relations. The constraints on topicalization promote the use of various other structures in English including those of initial NPs with postnominal attributes. German topicalizes freely in line with GIN and BID and the head and/or the attribute of the initial English NP may violate BID or GIN. Thus, postnominal attributes of initial NPs which are more relevant than their preceding structures may require postnominal attribute raising from within an initial noun phrase.

Compare, e.g., a sentence like

\[(20)\] The contrasts in temperature between the dark bands (belts) and light bands (zones) are also small, ... (j38)

The preceding sentence mentions contrasts in temperature (between the equator and the poles), which attributes a higher relevance to the geographical reference concluding the English subject of (20). The postnominal attribute is raised in the German translation, and used as an adverbial in the topic position of the sentence. The remaining part of the subject is placed postverbally, in the weakest position of the German sentence. The resulting pattern \(<2\>3<1>\) is in line with the German version of BID:

\[(21)\] Zwischen den dunklen Bändern (Gürtel) und den hellen Bändern (Zonen) ist das Temperaturgefälle ebenfalls sehr klein, ...

Again, the attribute raising may be associated with structural reduction. Thus, e.g.

\[(22)\] The grains responsible for the optical extinction must be a few hundred nanometers in diameter, while those producing the far ultraviolet extinction are around ten times smaller. (d53)

does not become

\[(23)\] Für die optische Extinktion müssen die Teilchen einige 100 nm groß sein, für die ultraviolette Extinktion etwa 1/10 so groß.

The head of the original subject has just been mentioned in the preceding sentence, while the two components of extinction 'near infrared' and 'far ultraviolet' have to be reactivated from their introduction ten sentences ago. Forming a contrast, they are more relevant; their extraction and topicalization pushes the head of the original NP into the position immediately after the verb, i.e. into the position of the weakest element of a more complex information structure in German.

The translation of (22) involves a reduction of the postnominal attribute raised - the predicative adjective responsible is dropped as is the weak predicate of the second conjunct (which is altogether reduced to an asyndetically coordinated phrase with gapping).
In some cases the weak head of an initial NP is informationally subordinated by being recategorized as an adjunct of the VP. The passage preceding the following example speaks about the (chemical) properties of water.

(24) *The chemistry of hydrogen fluoride, HF, shows some similarities to water.* (h65)

The attribute of the initial NP moves the topic to another hydrogen compound: hydrogen fluoride; the head is background information. As the following text spells out the chemical properties of hydrogen fluoride, which are similar to water, *similarity* is the most relevant information of the sentence. The translation subordinates the head of the original subject as a modifier to the predicate in the focus domain. (The nominal head of the predicative itself is recategorized as adjective in the translation.)

(25) *Fluorwasserstoff, HF, verhält sich chemisch zum Teil ähnlich wie Wasser.*

But information structures of English NPs may also violate BID in German if the head of the NP is more relevant than the attribute. The inappropriateness of an analogous NP may be enhanced by the obligatory inversion of subject and verb if other elements occupy the topic position. Thus, e.g., if a German sentence begins with a text connector, the subject may have to be shifted after the finite verb and thus occur in a discourse-inappropriate position for any more relevant element. Compare a sentence like

(26) *In addition, the density of water is higher than that of ice, ...* (h36)

which follows a sentence about the melting and boiling points of water, shifting the topic to another property of water: density. The informational relevance of the head is thus higher than that of the attribute and requires a more prominent position. But in the German translation the initial NP undergoes inversion due to the connector *außerdem*, the given information of the original attribute being used as subject in the weakest position. An analogous translation could not indicate the shift in topic, the contrastive nature of *density*. Thus, the translation is restructured in line with GIN: the original subject loses its focused element, the head, which becomes the head of the predicative:

(27) *Außerdem hat Wasser eine größere Dichte als Eis, ...*

This type of extraction of the head can, again, be associated with more noticeable forms of reframing as in j60,

(28) *Furthermore, the latitudes of the maximum velocities in the zonal jet streams are the same as inferred from Earth-based observations extending over the past 80 years.* (j60)

As the preceding sentence refers to velocities of zonal streams, the postnominal attribute of the original is given information except for the first part of its compound head *maximum*. The reference to *latitudes* is new and in the translation moved into the focus domain of the sentence, replacing the pronominal head of the original local predicative:

(29) *Dabei liegen die Maximalgeschwindigkeiten der zonalen Strahlströme tatsächlich zwischen den Breitengraden, die man aufgrund von Beobachtungen aus den vergangenen 80 Jahren von der Erde aus ermittelt hatte.*
If the initial NP is very complex, discourse-appropriateness may require even more striking forms of restructuring, esp. if processing problems of the initial NP interact with other aspects of the original structure. Compare a sentence like

(30) The choice of the beta-haemoglobin gene for use in these animal studies has in part been dictated by possible medical applications. (g86)

The preceding passage describes an experiment using beta-haemoglobin genes in animal studies, which is designed to answer the question whether foreign genes work after they have been inserted into a living animal. The local adjunct at the end of the subject NP is the weakest piece of information (for use even a structural dummy), the specific gene is resumed information, the head, choice, is new. That is, the information structure of the English subject is continuously decreasing and an analogous translation would contradict NP-internal expectations in German. Moreover, seen from a German perspective, the English original does not only contain an extremely heavy subject, but in dictated a verb with a personifying ring to its abstract agent: diktiert von ... Anwendungsmöglichkeiten. Replacing dictated with the initial noun recategorized as verb and splitting the remaining attributes in two parts, subject and (structurally reduced) adverbial, the German translation yields an easy-to-process sentence:

(31) Das Betahämoglobingen wurde für die Tierversuche unter anderem wegen seiner medizinischen Anwendungsmöglichkeiten gewählt.

In line with BID, (31) presents the least specific information in the weakest position after the finite verb.⁵ It is likely that all the cases of postnominal attribute raising in the German translations are due to the fact that the English NPs contain heads or attributes which could not be used (equivalently) in any other position of the English sentence without violating discourse-appropriateness. The grammatically based differences in the strategies controlling discourse appropriateness in English and German can thus produce widely divergent structures. At least, this is what translations of the German target versions back into English suggest. If the translation of nominal heads and/or postnominal attributes violates German expectations, dependencies will be reorganized in line with the German version of GIN and BID. As the examples demonstrate, even very complex cases of multiple postnominal attribute raising can be explained in this way.

3. Appositions

Unlike attributes, appositions are not subordinated to their nominal heads⁶ but in most cases - asyndetically – coordinated with them. The bulk of the apposition is used postnominally and as long as the semantic relation is that of equivalence, head and apposition can replace each other in discourse. This is not the case with attributive appositions, and even less so for appositions with inclusive relations towards their heads.

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⁵The defensive ring of dictated has been lost in the translation, but it may itself be a side effect of the English conditions on discourse-appropriate information structure. The original avoids placing the weakest information for (use in) these animal studies in the most prominent position of an English sentence, right after the verb - which would be the result if we translated (31) back into English:

(i) The beta-haemoglobin gene has in part been chosen for (use in) these animal studies because of its possible medical applications.

⁶There are also appositions to other heads, which will be ignored in the following.
Discourse appropriate translations show that there are also language-specific conditions for the use of appositions. Concentrating on appositions which are separated from their heads by punctuation: commas, dashes, brackets, in a text on genetics, we found 24 cases which were changed in the translation as opposed to 6 appositions retained in analogous translations. The bulk of the changes suggested a strategy organizing dependencies in German in accordance with the prospective relevance of head and apposition so that the more informative relevance dominated the less informative one. Comparisons with appositions from other texts have confirmed the findings. Prospective relevance will in most cases mean (literal) resumption in the following discourse. If neither head nor apposition is taken up in the following, prospective relevance is defined by default, i.e. by which element can be assumed to be more relevant for the discourse in general. We have called the strategy organizing dependency with appositions the strategy of prospective appropriateness, PROSA. In German, the strategy says

PROSA (German):

The prospectively less relevant information is used as apposition.

As PROSA inverts the dominant iambic information structure of German noun phrases appositions could be seen as an indicator of an alternative information structure. While BID and GIN represent strategies relying on retrospective relevance in most cases, i.e. are looking 'backwards' in discourse, PROSA is a strategy looking forward in discourse. This is only natural as PROSA applies to appositions which are referentially equivalent with their heads and cannot be distinguished from them by anaphorical relations to referential antecedents. Appositions that are not equivalent with their heads, i.e. appositions which participate in an attributive or inclusive relation with their heads (Quirk et al, 1985), are semantically more like attributes and thus not controlled by PROSA (see 3.2). The following section represents cases of PROSA requiring a reorganization of dependencies in German translations of English NPs with appositions. PROSA was secured by various types of changes, including deletion or insertion of elements, yielding NP-internal or -external shifts of dependencies (which may even extend beyond sentence borders). Discussion will proceed from the simpler to the more complex cases, exemplifying the various factors determining prospective relevance. The subsequent section will be devoted to language-specific aspects and suggest German and English constraints on PROSA.

3.1 PROSA in German translations

The simplest change in the translation of an English NP with apposition results in a dependency shift of head and apposition. Sentence

(32) She used a long growing cell - the outgrowth produced by pollen grains - to make the difference in calcium concentration between each end easier to distinguish than it would be in short, round Fucus eggs. (e60)

contains an object with apposition. As the preceding discourse discusses polarizing of growing cells, the head of the NP can be considered contextually given except for its prenominal adjective. But it is the postnominal apposition of the object that is the prospectively more informative modifier, taken up in the context that follows. Thus, the
global reordering of the sentence in line with BID (the object being more relevant than the final adjunct) includes an NP-internal dependency shift in line with PROSA:

(33) Um Unterschiede in der Kalziumkonzentration beider Hälften besser erkennen zu können als in den kleinen runden Fucuseizellen, benutzte sie einen Sproß von Pollenkörnern, eine Zelle mit starkem Längenwachstum.

The dependency shift itself may be associated with further changes. In

(34) This, at least, was what occurred to Lionel Jaffe, beginning a research career in the early 1950s with one of the knottier problems of development - that of polarity. (e19)

the apposition introduces a new topic of discourse, polarity, which is a new focus in developmental research. The translation restructures the sentence so as to secure easy processing in German. The dependency shift within the NP complement turns polarity into the head of the original object and uses the original head as apposition:

(35) So jedenfalls dachte Lionel Jaffe, als er sich zu Beginn seiner Forscherlaufbahn Anfang der 50er Jahre der Polarität, einem der vertrackteren Entwicklungsprobleme, zuwandte.

The change is associated with additional structural 'streamlining': deleting of the partitive used with polarity in the original and reframing the original prepositional object as indirect object (basically by the choice of zuwenden instead of beginnen). If the apposition is more complex it may itself undergo greater structural changes, as in

(36) Count Volta and Luigi Galvani, great pioneers of electricity in the 18th and early 19th centuries, were largely attracted to that phenomenon because of its biological manifestations. (e11)

where the adjunct of the original apposition is extracted and topicalized in the translation:


The additional change is due to parsing difficulties which would arise if the temporal adjunct were retained in its original NP. The example demonstrates the importance of the prospective view as a criterion for the use of discourse appropriate appositions. Seen from the preceding context, the two scholars are new information, while the original apposition is anchored to the background by the key concept of electricity. But it is electricity which is the prospectively more relevant information, while the two scholars are not resumed in the following text.

Violation of PROSA can also be avoided by reframing the apposition as attribute or deleting the NP. The next example involves a technical proper noun. Technical terms without any prospective relevance can be considered per default as less informative than the referentially equivalent common noun, so PROSA requires a shift in dependency if the technical term is the head of the NP. The initial NP in

7 dispensing with the redundant pseudo-cleft, among others
(38) In Cecropia, the silk moth, the cell which will give rise to an egg cell divides three times, to produce eight cells. (e66)

is translated as

(39) Bei der Seidenmotte, Cecropia, teilt sich die Zelle, aus der ein Ei hervorgeht, dreimal in insgesamt acht Zellen.

Although the referent (shared by head and apposition) is maintained in the following, it would require special conditions to use the technical term as head of the construction (cf. the discussion of the sentence with aequorin below).

The discursive irrelevance of the technical term may even promote elimination of the apposition as in

(40) But it settles to the seabed, and then generates polarity in response to light, elongating and then forming a holdfast (the root-like structure that acts as an anchor) on the darker side. (e27)

where the translation uses the bracketed apposition as head and drops the German version of the apposition (Haftor, which is morphologically and hence also semantically opaque):

(41) ... das Ei wird länglich und bildet auf der lichtabgewandten Seite eine wurzelartige Struktur aus, die ihm als Anker dient.

3.2 Language specific constraints on PROSA

As PROSA promotes a shift in dependency in all the examples of 3.1, we can assume that the English version of PROSA requires an opposite distribution of head and apposition. This fits in nicely with our observation about verbless attributes in English, which show a tendency towards a trochaic information structure - just opposite to the iambic structure of German NPs. Thus, we can generalize that PROSA is a means of reversing basic expectations of informativity in the NP.

Verbless modifiers, i.e. modifiers which lack the focus potential of verbs, can be said to share the language specific focus expectations of extensions in the VP. German VPs and verbless NPs tend towards an iambic pattern, increasing in informativity towards the right, while English VPs and verbless NPs tend towards the trochaic distribution of information, decreasing in informativity towards the right. (The original idea, presented by Jacobs, 1991/92, referred to stress patterns and did not cover prenominal extensions of NPs. For the basic claims about NP-internal differences in German and English, see Doherty, 2004.) But the set of examples in 3.1 contrasts with cases where English and German NPs show the same dependency. While the translation of the following examples is in line with the German version of PROSA, the original English NPs contradict the English version of PROSA. Consider e.g.

(42) The answer was the vibrating probe, a platinum electrode that is vibrated between two points outside the organism and measures the voltage between those points. (e41)

Head and apposition are both new information, but it is only the head which is resumed - repeatedly - in the following text. Thus, the prospective relevance of the head is higher
than that of the apposition and the analogous German translation is in line with the German version of PROSA:

(43) *Die Lösung war die Vibrationssonde, eine Platinelektrode, die zwischen zwei Stellen außerhalb des Organismus vibriert und dabei die Spannung zwischen diesen Punkten mißt.*

But the trochaic pattern also characterizes the original, contradicting the English version of PROSA. Being extraordinarily heavy, the apposition reminds us of the principle of end weight in English, which is assumed to be responsible among others for changes in the basic word order in the English VP and for extraposition of relative clauses in both languages. (Cf. Quirk et al., 1985, Erdmann, 1988, Hawkins, 1994.) End weight does not underlie all structural differences in sentences, but plays an important role in nominal phrases; cf. SAP.) It may well be that the principle of end weight applies to appositions, too, accounting for a constraint on the English version of PROSA. End weight can also interfere with the German version of PROSA, cf.

(44) *Jaffe, John Gilkey and Ellis Ridgeway observed the wave with the aid of a protein, aequorin, which emits light when it binds Ca++. (e85)*

Neither head nor its apposition is resumed in the text that follows. The prospectively relevant information, *calciumion* is contained in the relative clause. In the English original the non-restrictive relative clause is placed after the apposition. The German translation reverses head and apposition and extraposes the apposition together with the relative clause.

(45) *Jaffe, John Gilkey und Ellis Ridgeway konnten diese Welle ... mit Hilfe von Aequorin beobachten, einem Eiweiß, das Licht abgibt, wenn es sich mit Ca++ verbindet.*

Using less relevant information in the head contradicts the German version of PROSA, but the condition for the extraposition of relative clauses is obviously superimposed upon PROSA. Compare the parsing problems of the alternative order:

(46) *... mit Hilfe eines Proteins, Aequorin, beobachten, das Licht ...*

or

(47) *... mit Hilfe eines Proteins beobachten, Aequorin, das Licht ...*

The interaction between weight and PROSA can even involve sentence borders. Consider the following case of sentence splitting.

(48) *Zygotes - fertilized eggs that have not yet begun to divide - were placed near a source of A23187, a material known as an ionophore, which binds to membranes and provides a channel that allows Ca++ to cross them. (e52)*

The first NP with apposition is in line with PROSA in the English original and in the German translation. Although neither the name of the species nor the explanatory paraphrase presents prospectively relevant information, we can, again, consider the technical term as less relevant by default.
(49) ... brachte man befruchtete Eizellen, bei denen die Zellteilung noch nicht eingesetzt hat (Zygoten) in die Nähe einer Quelle von A23187 ... 

The second NP with apposition is a much more complex case. It is a numerical expression serving as an extension of the local adverbial and is itself modified, in the original, by an apposition with a participial phrase and a non-restrictive relative clause. The prospectively relevant information is ionophore, which is part of the apposition, more precisely, it is part of the VP attribute of the apposition. Since postnominal VPs are normally not available in German, the participle phrase is restructured in line with German focus expectations, which promote an extension into a relative clause with the focus on ionophore.

(50a) eine Substanz, die bekanntlich als Ionophore wirkt.

The following description of the way in which ionophores work is clearly too heavy to be included in the relative clause of the apposition and thus separated into a sentence of its own. 

(50b) Sie setzt sich an der Membran fest und bildet einen Kanal, durch den Ca++-Ionen fließen können.

Language-specific conditions for the use of independent sentences may also work the other way round and lead to the insertion of sentence-external information ('sentence linking') as part of an NP with apposition. In

(51) In the past few decades, however, they have largely ignored one important property of organisms which, it now seems, may well play a significant part in determining growth and form. (e8) That property is electricity. (e9)

the prospectively most relevant element of both sentences is electricity which is extraposed as a sentence of its own in the original (First ideas on a strategy of incremental parsimony, controlling the language-specific use of sentence borders are formulated in SIP, 2003).

The translation uses it as a main focus of the first sentence, modifying it with the information of the original matrix clause, which is turned into an apposition after the main verb. The original relative clause is presupposed and used as matrix clause of the translation:

(52) Eine wesentliche Rolle in den Wachstums- und Gestaltungsprozessen scheint nun aber der Elektrizität zuzukommen, eine wichtige Eigenschaft der Organismen, die in den vergangenen Jahrzehnten meist vernachlässigt wurde.

As the preceding discourse asks about the way in which growth and form in development is controlled, the distribution of information in (52) is in line with GIN, just as the distribution of the information in the focused NP is in line with PROSA. That is, German conditions promote an NP with apposition where English conditions constrain the use of such an NP. The German order violates the English version of PROSA:

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8The separation is even more urgent as the preceding question was attached to (49) in line with German register conventions: Um herauszufinden, ob das polarisierte Wachstum des Embryos durch diesen asymmetrischen Zufluß von Ca++-Ionen gesteuert wird, ...
(53) ... electricity, an important property of organisms

End weight could not license the trochaic pattern since the relative clause contains only information of retrospective relevance:

(54) ... electricity, an important property of organisms, which has been largely ignored in the past few decades.

The non-restrictive relative clause would also counteract the iambic order:

(55) ... an important property of organisms, electricity, which has been largely ignored in the past few decades.

In summary, we can say that the NP-internal distribution of information is controlled by language-specific conditions on discourse appropriateness that are to some extent parallel to the condition on VP-internal distribution of information. The dominant patterns are iambic in German and trochaic in English. The NP-internal patterns are modified by the presence of verbal heads, which merge VP-patterns with NP patterns. NP-internal patterns are reversed by the use of appositions. The interaction of VP and NP patterns is controlled by the language-specific versions of GIN and BID, determining the distribution of information in the sentence as a whole. The differences may even transgress sentence borders.

Literature


**Sources**

*New Scientist*

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<thead>
<tr>
<th>Letter</th>
<th>Term</th>
<th>Reference</th>
</tr>
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<tbody>
<tr>
<td>g</td>
<td>genetic</td>
<td>in: The reconstruction of animals and plants. 26 August 1982: 562-564.</td>
</tr>
<tr>
<td>n</td>
<td>novae</td>
<td>in: Bigger and better bangs in the sky. 12 August 1982: 431-434.</td>
</tr>
</tbody>
</table>