Comprehensibility assessment using the Karlsruhe Comprehensibility Concept[1]

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ABSTRACT

This article makes a contribution to text and translation quality assessment in the functionalist paradigm. It presents a communication-oriented framework for the evaluation of pragmatic texts including their translations with regard to their comprehensibility as one of the central factors of their *skopos* adequacy. It is based on the results of comprehensibility research gained both in the field of cognitive science (schema theory and theory of mental models) and in the fields of educational psychology (the four comprehensibility dimensions presented by Langer et al. and Groeben) and linguistics. It also includes results from communication theory and semiotics. In the resulting framework a distinction is made between six comprehensibility dimensions, 'perceptibility,' 'simplicity,' 'structure,' 'correctness,' 'concision,' and 'motivation.' Requirements derived from the latter four of these dimensions do not only have to be fulfilled by the textual code itself, but also by the mental models to be conveyed by the code.

KEYWORDS

Translation quality assessment, comprehensibility research, comprehensibility concepts, *skopos* adequacy, technical writing.

The objective of this article

According to functionalist translation theories, the degree to which a translation is *skopos*-adequate can be regarded as a measure of its translation quality. This does not only apply to translations but also to original texts. The question that has not been answered yet, however, is how *skopos* adequacy of translations can be determined empirically without leaving the functionalist paradigm (House 1997: 12, 14). According to Hönig (1998: 49), translation quality assessment within the functionalist paradigm is not possible without recourse to methods of readability and comprehensibility research. He criticises that when it comes to translation quality assessment, even within the functionalist paradigm, "linguistic evaluation on a contrastive basis (i.e., on a source-text-oriented basis) is re-integrated through the backdoor with the critic claiming that it is a typical reader's response" (Hönig 1998: 15). If the translation of a pragmatic text is expected to function like an original in the target culture, determining its quality should involve employing the same methods of quality assessment that can be used in technical writing.

This article will focus on one method which can fill the gap pointed out by Hönig. Starting from the assumption that comprehensibility for the intended readership is an important factor of the *skopos* adequacy of a pragmatic text, I will concentrate on this text quality.

Classification of methods for text comprehensibility assessment

To determine the comprehensibility of texts numerous methods have been devised. Schriver (1989) provides a review of these methods and classifies them into three categories: "text-focused methods," "expert-judgement-focused methods," and "reader-focused methods."

An example of a text-focused method is the application of readability formulas. These are popular because they can be easily and quickly applied by means of computer programs but they do not give us a deeper insight into the comprehensibility of the texts to which they are applied because they take into account only certain lexical, syntactical, and stylistic aspects of what makes a text comprehensible or incomprehensible.

This article will present the Karlsruhe comprehensibility concept[2] (Göpferich 2001; 2002) as an example of an expert-judgement-focused method. The Karlsruhe comprehensibility concept represents an extended and improved version of the comprehensibility concepts of the Hamburg group of psychologists Langer, Schulz von Thun & Tausch5 (1993) and of Groeben (1982). It has proved a reliable instrument in pre-optimising non-instructive texts, i.e. optimising them with regard to features which quite obviously are detrimental to the text's comprehensibility (cf. Göpferich 2006a: 154 ff.; Janich 2008: 31), but it cannot replace reader-focused empirical research into text comprehensibility (cf. Schriver 1989: 247).

Reader-focused or, to be more precise, target-group-focused methods undoubtedly provide the least speculative and most reliable results on text comprehensibility because this is a relative text quality which depends on the audience, whose comprehension and comprehension problems are central for its evaluation. Examples of reader-focused methods are usability testing for instructive texts (cf. Byrne 2006) and optimising reverbalisation using thinking-aloud and key-logging[3] for instructive as well as descriptive texts (cf. Göpferich 2006b, c, 2007). These methods have the disadvantage, however, that they are very time-consuming, especially when they are employed for optimising rather poor texts. In such cases, it is of benefit to pre-optimise the texts in question by employing an expert-judgement-focused method such as the Karlsruhe comprehensibility concept before employing the methods of usability testing or optimising reverbalisation.

Other types of target-group-focused empirical methods employed so far in comprehensibility research are Cloze procedures, questions on the texts whose comprehensibility is to be determined, and reproductions of such texts. These methods have the disadvantage, however, that they measure either only aspects of the texts' comprehensibility (e.g., the predictability of words and phrases that fill gaps, the comprehensibility of words or passages relevant to answering the questions asked) or merely their rough overall comprehensibility. Furthermore, some of these methods lead to a confusion of the concepts of comprehensibility and retainability (cf. the research review in Schriver 1989: 244 ff. and in Göpferich 2006a: Chapter 4).

Critical evaluation of the expert-judgement-focused comprehensibility concepts developed in educational psychology

In the 1970s, two expert-judgement-focused comprehensibility concepts were developed in educational psychology. They have attracted much criticism (cf. Heringer 1979 and 1984), but they nevertheless could not be banned from the classroom. The reason for this is that these concepts have turned out to be didactically useful in courses on text production and text optimisation and that no better alternatives had been presented. The concepts referred to here are the so-called Hamburg comprehensibility concept developed by psychologists Langer, Schulz von Thun & Tausch (1993) at the University of Hamburg and the comprehensibility concept developed by the psychologist Groeben (1982) at the University of Heidelberg.

Although the Hamburg psychologists on the one hand and Groeben on the other took different approaches to developing their concepts (the Hamburg psychologists took an empirically-inductive approach and Groeben, a theoretically-deductive one [cf. the summary in Göpferich 2006a: 136 ff.]), they both came to the conclusion that features in four so-called dimensions determine a text's comprehensibility. These four dimensions are:

- '(linguistic) simplicity' ("Einfachheit"/"sprachliche Einfachheit")[4]
- 'arrangement – structure'/'cognitive structure' ("Gliederung – Ordnung"/"kognitive Gliederung")
- 'concision' ("Kürze – Prägnanz"/"semantische Kürze/Redundanz")
- 'motivation' ("anregende Zusätze"/"motivationale Stimulanz")

A survey of the criticism levelled against these two comprehensibility concepts from educational

psychology, which induced me to develop my Karlsruhe concept, is given in Göpferich (2006: 136 ff.). The most serious drawback of these concepts is that they are text-focused and lack a text-external frame of reference (cf. Biere 1989: 41 ff.).

In what follows, I will present such a frame of reference. Furthermore, I will specify the four dimensions, introduce two additional ones ('correctness' and 'perceptibility'), and illustrate which text characteristics help to fulfil the requirements in each dimension.

The development of my model is based on concepts and insights from the cognitive sciences (schema theory and mental models), from educational psychology (the four comprehensibility dimensions), from linguistics (stylistics, text linguistics, psycho-linguistics, LSP research/terminology science), as well as from communication theory and semiotics (communication model and sign concept).

Framework for text evaluation

Figure 1 gives an overview of the framework, the comprehensibility dimensions, and their range of application. The concepts introduced in this framework will be explained in the following sections.

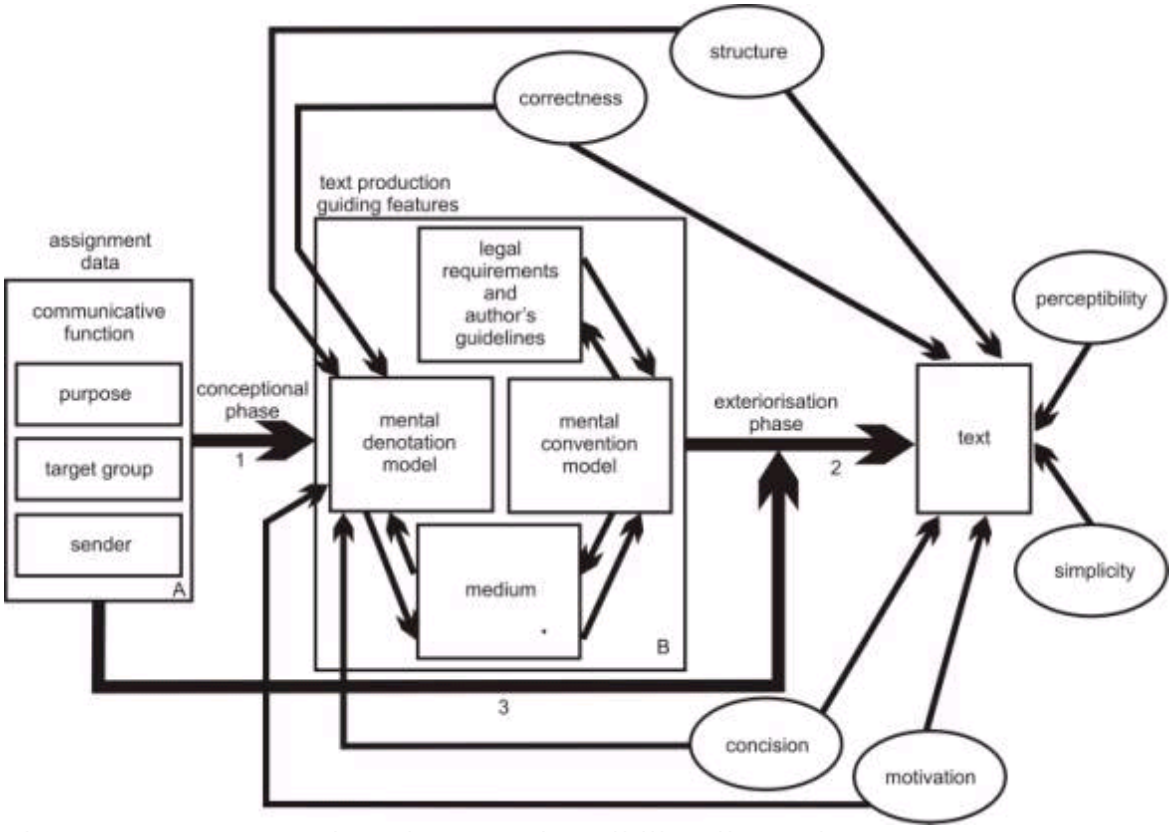

Figure 1: Framework and comprehensibility dimensions

Communicative function

The quality of a text cannot be determined without taking into account its communicative function. This also applies to the comprehensibility of a text, which forms *one* factor of its quality. In fact, text quality can even be defined as the degree to which a text fulfils its communicative function, the latter representing a specification to which a text can be composed. If we want to use a text's communicative function as such a specification or as a frame of reference against which its quality can be evaluated and optimised, it has to be specified with a certain degree of precision taking into account a) the purpose of the text, b) its target group, and c) its sender.

4.1.1. Purpose

The concept of *purpose* is rather vague because it can be specified with varying degrees of precision. If we want to use this concept as a frame of reference for text production, text evaluation, and text optimisation, the precision with which it is specified must have a certain minimum degree. A general intensional definition of this minimum degree of precision which applies

to all texts cannot be given. I must therefore confine myself to defining a few purposes with the necessary degree of precision as examples: enabling the target group to make a phone call with a mobile phone; making the target group understand why a friction clutch is inevitably subject to wear; enabling the target group to understand the invoice of their car's clutch repair; informing people about therapies for patients infected with AIDS.

4.1.2. Target group

What a text must look like in order to fulfil its specified purpose also depends on its target group. It goes without saying that a text about AIDS therapies written for doctors who have specialised in this field must differ from a text about the same topic written for patients suffering from AIDS. Differences will not only occur in the terminology used but, among other things, also in the explicitness and depth in which the therapies have to be described. Examples of target-group features which may have an impact on text comprehension are: age; sex; social, regional, and cultural background; education and training; hobbies; other prior knowledge and prejudices regarding the topic concerned; homogeneity of the target group, especially with regard to their prior knowledge on the topic covered (for reasons cf. Göpferich 2006a: 157).

4.1.3. Sender

Apart from the purpose and the target group, the sender is another factor which has and must have an impact on the characteristics of a text. A leaflet informing students about modifications in their degree programs which is issued by the Ministry of Education will differ clearly from a leaflet with the same purpose and target group which is issued by student representatives. A manufacturer of luxury cars will use corporate wording in its driver's manuals that is different from that used by a manufacturer of cheap cars (cf. *our automobiles* vs. our *cars*).

In addition to characteristics such as age; sex; social, regional, and cultural background; education and training; and hobbies, which are relevant target-group features, too, the following characteristics may be relevant sender features: the situation in which the text is issued; the person or institution in whose name the text is issued (individual, association, institution, company); and the social relation between sender and recipient (for reasons cf. Göpferich 2006a: 158).

The purpose, the target group, and the sender of a text make up its communicative function. In the conceptional phase, this communicative function first determines the guiding features of text production (arrow •in Fig. 1) and then also the encoding itself (arrow *ƒ* in Fig. 1) wherever the guiding features of text production leave the author room for personal decisions.

Guiding features of text production

The guiding features of text production comprise a) the mental model of the objects, processes, events, etc. covered in the text (mental denotation model), b) the mental model of the genre to be used (mental convention model), c) the medium in which the information is conveyed, and d) legal requirements and author's guidelines, if applicable.

4.2.1. Mental denotation model

This is the mental picture or movie of the objects, processes, events, etc. which must appear before the mind's eye during text reception, if the text fulfils its communicative function. Ideally, the signs used in the text and the top-down processes they induce invoke the desired pictures and movies in the reader's mind. In the conceptional phase, the mental denotation model represents the author's mental picture or movie of the objects, processes, events, etc. to be conveyed, which s/he encodes, i.e. transforms into signs, in the exteriorisation phase.

What the mental denotation model conveyed in a text must look like depends on the text's communicative function. The following examples will illustrate this.

A very simple mental denotation model of a friction clutch can be visualised as shown in Figure 2.

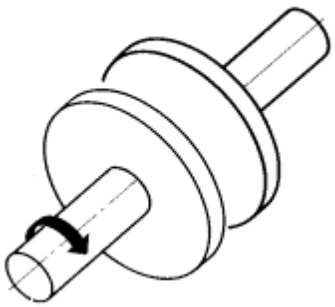

Abb. 2: Simple mental denotation model of a friction clutch (adapted from Niess et al. 1984: 211)

Figure 2

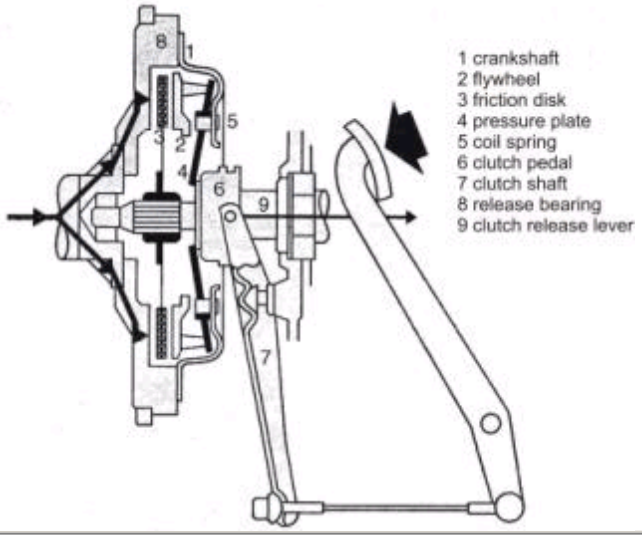

Abb. 3: Complex mental denotation model of a friction clutch, in this case a diaphragm-spring clutch (adapted from Volkswagen 1988: 5)

Figure 3

For a text with the purpose of 'explaining the functional principle of a friction clutch' and the target group 'laypersons in the domain of automotive engineering' the mental denotation model in Fig. 2 will be fully sufficient: When the two disks are pressed against each other with sufficient force and the shaft on the left hand side turns, the disk on the right hand side will also be caused to turn due to the friction force at the mating faces of the two disks. This simple mental denotation model will also suffice if the purpose of the text is to explain why a friction clutch is inevitably subject to wear. Mentioning further details, such as the full range of components of a clutch (pressure plate, friction disk, diaphragm spring, etc.; cf. Fig. 3) would be superfluous for these purposes.

If the purpose of the text on clutches is to enable a car owner to understand the details in his clutch repair invoice, however, a more complex mental denotation model will be necessary, as shown in Fig. 3. This more complex mental denotation model must also include the components of the clutch which can be replaced and may therefore appear in the invoice.

4.2.2. Mental convention model

When encoding their mental denotation models during the exteriorisation phase, authors are not completely free in choosing the signs to use, but have to follow the conventions of a genre appropriate for the text's communicative function. In contrast to legal requirements and author's guidelines, these genre *conventions* are not codified in the written form but have gradually developed into patterns of language use and text composition (cf. Reiß/Vermeer 1984: 177). These have been internalised by competent language users in the form of mental (genre) convention models with which they are familiar, at least as far as text reception is concerned. Mental convention models may comprise schemata of the structure (macrostructure) of genres and of genre-specific standardised formulations, etc.

Familiarity with the convention model of a genre controls and facilitates text comprehension. If this familiarity is not only a passive one, but also comprises the productive level, it also facilitates the production of texts of the respective genre. During text reception, the mental convention model takes over the function of an *advance organiser*, which makes it easier for the recipients to integrate the information from the text into a consistent whole. It controls the recipients' expectations of what will come next in the text and also of the way in which this will be verbalised (style, standardised formulations, terminology, etc.). If these expectations are met, the mental convention model will facilitate comprehension (cf. Kintsch/Green 1978). If they are disappointed, as in example (1) below, they may have a negative effect on text reception and comprehension.

It seems plausible to assume that mental convention models remain in the subconscious and do not require any processing capacity in the reader's working or short-term memory as long as they

are not broken. If they are broken, however, the recipient's expectations will be disappointed and this may cause parts of the mental convention model to be raised to consciousness thereby triggering *top-down* processes which help to interpret the discrepancies. In such cases, comprehension no longer *occurs*, but *has to be struggled for* (cf. Heringer 1984: 60).

Interpretation efforts triggered by broken conventions can be illustrated by the following example: In letters in which an applicant is informed that the job has been given to somebody else, hedging is conventionally used to convey the message in a polite manner. These hedges make the text longer (cf. the following variants):

(1a) We will not employ you.
(1b) We have decided in favour of another applicant.
(1c) We regret to inform you that we have offered the position you applied for to another applicant.

Variants (1a) and (1b) are shorter than variant (1c) (cf. the requirements to be derived from the comprehensibility dimension of 'concision' in section 5.1. below), but this does not make them more comprehensible in the genre 'negative feedback on an application'. On the contrary, since variants (1a) and (1b) do not conform to the conventions of this genre, they sound unusual to the reader, which may already have a negative effect on text comprehension. The discrepancy may trigger unwanted top-down processes in the reader's mind, such as reflections on why the author did not conform to the conventions (impoliteness?, humiliation?, etc.). Such reflections require memory capacity which will then not be available for processing the central information of the text.

4.2.3. Medium

The medium in which the message is conveyed may also be determined by the text's communicative function. In addition to this, it also depends on the mental denotation model. If this comprises processes which are difficult to describe by means of words and/or static pictures only, a medium has to be chosen which allows animated nonverbal representations, such as computer-based trainings (CBTs). The medium, in turn, may have an influence on the mental denotation model. If multi-media representations can be used, this leaves more room for the creation of mental denotation models than situations in which information can be conveyed in the written form only.
The medium also has an impact on the mental convention model and vice versa. This becomes obvious when we compare the conventions in a letter with those in an e-mail (here the medium determines the conventions) and take into account that certain standard situations (such as quitting a job) require the use of a specific medium (e.g., the written form) (here the convention model determines the medium).

4.2.4. Legal requirements and author's guidelines

Examples of such requirements are guidelines to be met by technical documentation. In many companies they can be found in so-called style guides, collections of formatting, layout, and writing rules to be followed to achieve more consistent and comprehensible texts which are easier to translate. Other requirements such as the ones in EU directives have to be met for legal reasons. They specify which contents must be covered in operating instructions, how they have to be structured, which style has to be used in them, etc. (cf. Göpferich 1998: Chapter 11).

These requirements and guidelines, which exist in the written form, have an impact on mental convention models, which only exist in the language users' minds, and vice versa. On the one hand, existing conventions have an impact on what can be prescribed in written regulations and guidelines. Written regulations and guidelines only narrow down the range of options conforming to conventions. On the other hand, regulations and guidelines have an impact on conventions causing them to be reduced to certain options in the course of time.

All the text production guiding features together determine the leeway authors have in their text production process (arrow , in Fig. 1).

The assignment data (communicative function comprising the purpose, the target group, and the sender of a text), the text production guiding features (mental denotation model, mental convention model, medium, as well as legal requirements and author's guidelines) and the

interdependences between them form the framework for text production and evaluation.

The next section will deal with the six comprehensibility dimensions (cf. Fig. 1) and the components within this framework to which they refer.

Comprehensibility dimensions

Following the comprehensibility concepts developed in educational psychology, I differentiate between the comprehensibility dimensions of 'structure' (derived from the dimensions 'arrangement – structure' and 'cognitive structure' respectively), 'concision,' 'motivation,' and 'simplicity' (derived from the dimension '[linguistic] simplicity'). New terms are introduced here to avoid confusion of my concepts, which are defined more precisely, with the rather vague ones of the educational psychologists. In addition to the four dimensions mentioned above, my comprehensibility concept comprises two further dimensions: the dimension of 'correctness' and the dimension of 'perceptibility.' They take account of the fact that the correctness of a text on all levels (contents, layout, typography, etc.) and the ease with which it can be perceived and thus transferred to the reader's cognitive systems for further processing are two additional important factors which determine text comprehensibility.

Another major difference between my comprehensibility dimensions and the ones introduced by the educational psychologists is the following: I make a distinction between requirements from dimensions which refer to the text (the encoded units) only and requirements from dimensions which, in addition to this, have to be fulfilled by the mental denotation model to be conveyed. The educational psychologists' comprehensibility concepts do not make a distinction between these two types of requirements.

5.1. Concision

The dimension of 'concision' refers both to the mental denotation model to be conveyed in the text and the textual code itself. A text has an ideal degree of concision if

1. the mental denotation model conveyed in the text has been reduced to the minimum of information that is absolutely necessary or relevant for the text to fulfil its communicative function taking into account the requirements to be derived from the guiding features of text production (mental convention model, medium, legal requirements and author's guidelines) and the other five dimensions (cf. Gutt 2000), and
2. the mental denotation model that fulfils these requirements has been exteriorised with the minimum of signs possible to achieve its communicative function without violating the guiding features of text production and the requirements from the other comprehensibility dimensions.

Examples of maximum economy in mental denotation models, which depends on the communicative function of the texts, have been given in Fig. 2 and 3. Against the background of their communicative function, mental denotation models must have neither gaps nor include superfluous details. Superfluous details may not automatically have a negative effect on text comprehensibility but they increase the text reception effort and this is not in the reader's interest.

The second requirement specified above implies that a mental denotation model can be conveyed with varying amounts of signs so that the different presentations can be compared with regard to the amount of signs used in them. A prerequisite for such a comparison would be that the versions compared were equivalent except for the amount of signs used in them. This equivalence requirement has been discussed extensively and for a long time in Translation Studies (cf. Neubert 1973; Jäger/Müller 1982; Nord 1989; Koller 1992; Schreiber 1993; etc.). The results of this discussion are that we must differentiate between various types of equivalence, such as denotational equivalence, formal equivalence, stylistic equivalence, etc., which cannot all be achieved at the same time, so that the translator has to establish a hierarchy (cf. Schreiber 1993: 66 ff.). The criterion for establishing this hierarchy cannot be found in the source text itself. It can only be derived from the function (*skopos*) of the translation (cf. Vermeer 1978; Reiß/Vermeer 1984; Holz-Mänttäri 1984; Hönig/Kußmaul 1984; Nord 1993; Hönig 1995; Schmitt 1999). This *skopos* – at least according to the functionalists – can be completely different from that of the source text so that it may be necessary to deviate from it on all levels and aim for zero-

equivalence. This insight has led to the equivalence requirement being rejected – at least by the functionalists – and replaced with the requirement of adequacy for a specific function, the so-called *skopos* (Reiß/Vermeer 1984: 133).
This *skopos* theory can also be applied to text optimisations as types of 'intralingual translations.' Absolute equivalence between different text variants cannot be achieved within the same language either, nor is it desirable: The optimised version is intended to be 'better' than the original one, i.e., it has to be different. What can be achieved is an optimisation for a specific communicative function. This communicative function has to be specified before the optimisation, something which neither Langer et al. nor Groeben do (sufficiently). Other important text-external factors which determine the minimum amount of signs that can be used to convey a message are the target group with their specific characteristics (e.g., their prior knowledge in the respective subject domain and the terminology they are acquainted with) and the genre with its genre-specific conventions to be used (cf. example (1) in section 4.2.2.).
Violations against the requirements to be derived from the dimension of 'concision' can be categorised into four groups:

1. Missing or superfluous details in the mental denotation model

2. Long formulations instead of appropriate shorter ones which convey the same text-relevant information

3. Tautologies

4. Redundancies between the information given in the written text itself and the information the recipient can find in the material accompanying it (such as a software user interface)

Whereas excessive concision always leads to poorer comprehension, a lack of concision may not have this type of negative effect, and there are even culture-specific differences with regard to the concision expected. Nevertheless, pragmatic texts, especially instructive texts, should be concise to minimise the effort and time the reader has to invest in reading them. Apart from comprehensibility, reception economy is another characteristic of high-quality pragmatic texts.

Correctness

'Correctness' (and thus consistency) is a comprehensibility dimension Langer et al. and Groeben do not take into account. They seem to take it for granted that the texts to be optimised and their optimised versions do not contain any mistakes, which is rarely the case (cf. Schmitt 1999: 59 ff.).

The correctness requirement applies to all components in the framework in Fig. 1: from wrong assumptions about the target group's prior knowledge via an unsuitable mental denotation model, convention model or medium to linguistic mistakes in the text itself.

Since text production, text evaluation, and text optimisation are impossible without knowing the text's communicative function and since misconceptions with regard to the audience or the sender will become evident either in the text itself or in the guiding features of text production in box B (especially in the mental denotation model), the requirements from the dimension of 'correctness' (as the requirements from the dimension of 'concision') primarily refer to the mental denotation model and the encoding in the text itself. Violations against conventions (violations against the mental convention model), against legal requirements and author's guidelines as well as an unsuitable medium will become visible in the mental denotation model or the encoding in the text so that the requirement of 'correctness' need not be formulated for these components separately.
The mental denotation model and the encoding in the text, however, have to be checked for correctness separately, although the mental denotation model is reflected by the encoding in the text. The reason for this is the following: Inexperienced writers often start from a correct mental denotation model but are unable to exteriorise it without distorting it. If such writers are made aware of the distortions, they often explain that they had meant the right thing (i.e. that their own mental denotation model had been correct) but that they were unable to express it in such a way that the text conveyed the right message and induced the creation of an appropriate denotation model in the reader's mind (this is what my technical communication students often explained to

me). There are also cases, however, where the author's mental denotation model is wrong from the beginning, and even cases in which both an unsuitable mental denotation model and distortions in the encoding phase occur.

Pinpointing the origin of the defects is important from a pedagogical point of view. If the mental denotation model was wrong already, the author can only solve the problem by acquiring more domain knowledge. If the mental denotation model, however, was correct and the mistakes have occurred in the encoding phase, the problem can be tackled by conveying linguistic and semiotic knowledge.

Motivation

What is covered by the comprehensibility dimension of 'motivation' is only the text-induced type of motivation, i.e., the motivation aroused by the text itself. Requirements that can be derived from this dimension are that a text must first of all attract the reader's attention. This applies to popular science articles, for example, but not so much to operating instructions which the reader is automatically forced to read if he or she does not know how to handle a product. Furthermore, the attention that a text has attracted must be kept alive. This requirement, too, applies to popular science articles, but not so much to operating instructions.

Like the requirements from the dimensions of 'concision' and 'correctness', the requirements derived from the dimension of 'motivation,' too, refer both to the mental denotation model and to the encoding in the text.

Motivation on the level of the mental denotation model can be aroused by exemplifying and illustrating things by means of examples from the target group's personal experiences. This is the case in the following example from an information leaflet informing students-to-be about a new program in sensor systems technology:

If your father drives his Mercedes into a car wash and does not leave with a Fiat Panda, this is due to sensor systems.

This example from everyday life makes the reader aware of the fact that we encounter sensors everywhere in our lives. It is unlikely that motivation for reading the text would be aroused by introducing the program of sensor systems technology with a lexicon definition of sensor systems such as "the object of sensor systems technology is the development of intelligent sensor/actor systems."

In instructive texts motivation on the encoding level can be aroused, for example, by addressing the readers directly instead of using impersonal constructions:

Avoid: This chapter deals with creating tables in *Word*.

Use instead: This chapter explains how tables are created with *Word*.

Or: In this chapter you will learn how to create a table with *Word*.

Another option to arouse motivation on the encoding level is the use of comic strips, especially for young readers who like this format.
In some cases, arousing motivation may lead to longer texts. In such cases, the author has to decide which of the two dimensions, 'concision' or 'motivation,' plays the more important role with regard to the communicative function of the text. Furthermore, we have to take into account that the ways in which motivation can be aroused are culture-specific and therefore may require adaptive measures during the translation process (cf. Göpferich 2006a: 169 ff.).

Structure

In contrast to the educational psychologists, whose dimension 'arrangement – structure'/'cognitive structure' comprises both the content structure and the graphical and typographical design of a text, my dimension 'structure' refers to the content structure only.

Like the requirements from the dimensions of 'concision,' 'correctness,' and 'motivation,' the requirements derived from the dimension of 'structure,' too, refer both to the mental denotation model and to the encoding in the text. The mental denotation model must have been broken down into adequate components (schemata) which, in the course of the text, must be joined together in an appropriate sequence.

The structure of a mental denotation model can only be accessed via the encoded text in which it becomes evident. Since I would like to differentiate between the global structure of a text, which results from the features of the objects, events, processes, etc. described in it, and a local structure, which is determined by grammatical requirements (among other things), the two concepts *macro-level structure* and *micro-level structure* will be introduced here: The term *macro level* refers to the level which encompasses more than two adjacent sentences (usually the level of passages and longer units). The *micro level* does not encompass more than two adjacent sentences. It seems legitimate to associate the macro level with the mental denotation model, and the micro level with the encoding in the text because readers can remember the exact wording and grammatical structure (the encoding) of a maximum of two sentences they have just read, whereas they forget the wording and structure of sentences which are further away; what they can remember here is only the mental denotation model conveyed by them.

Within the macro-level structure a distinction can be made between the content structure, which refers to the objects, processes, events, etc. dealt with in the text (object structure, cf. recommendation 1 below), and the meta-communicative structure, which is created by meta-communicative elements such as *advance organisers* and statements concerning the reception situation such as *You may have known this function already.* (cf. the recommendations 2 and 3 below).
Strategies which may help to fulfil the requirements to be derived from the dimension of 'structure' on the macro level are:

1. The splitting up of complex actions into individual steps must be adapted to the target group's prior knowledge.

2. Before describing how something is done, technical authors should describe exactly what the result will look like. This helps the readers to construct a rough mental model of their goal (cf. section 4.2.1.) against which the individual steps can be interpreted much better. This can be achieved by illustrations (such as screenshots) which show the result. This ensures that the readers always know what they are doing and that they can find out whether they are still on the right track. System reactions should be described after every major step.

3. The less conventionalised a genre is, especially with regard to its macro structure (cf. Göpferich 1995: 217 ff.), and the more leeway the author has in his or her text composition, the more important it is to introduce *advance organisers*. They control the readers' expectations and help them to structure the information conveyed in the text.

On the micro level, the order in which the individual concepts and schemata are conveyed in the text and their logical relation to each other (indicated by conjunctions, adverbial phrases, etc.) have to be taken into account and evaluated. Features which play an important role on this level are the functional sentence perspective and the logical linking of sentences.

Strategies which may help to fulfil the requirements to be derived from the dimension of 'structure' on the micro level are:

4. Information (especially instructions) should be given in the order in which the user needs it:

Avoid: Loosen X after discharging Y.
Use instead: Discharge Y, then loosen X.

5. For the reasons mentioned under item 4, conditional clauses should precede the main clause in instructive texts:

Avoid: Press [ESC] when you want to leave the program without saving you data.

Use instead: When you want to leave the program without saving your data, press [ESC].

6. Begin sentences with thematic elements and put rhematic elements in the end position unless you want to express a contradiction or make a very emotional remark.

Simplicity

In contrast to the dimensions of 'concision,' 'correctness,' 'motivation,' and 'structure,' which refer to both the mental denotation model as an analogous representation of what is conveyed in the text, and to its encoding as its digital representation, the dimension of 'simplicity' refers to the encoding in the text only. The simplicity of the mental denotation model is covered by the dimension of 'concision.'

In the educational psychologists' comprehensibility concepts, the dimension of 'simplicity' or 'linguistic simplicity' refers to the lexis and syntax only. To determine which words and sentence constructions can be regarded as simple, a frame of reference is needed, which is not provided by the educational psychologists. In my framework, this frame of reference is formed by all components which directly or indirectly (via other components) determine the text, i. e., its communicative function (box A) and the guiding features of text production (box B).

Questions which have to be answered for assessing a text's simplicity are:

- Is the choice of words adequate (lexical simplicity)? – What has to be assessed here is whether the unexplained terms and abbreviations that occur in the text can be regarded as familiar to the target group and as appropriate for the genre. Furthermore, we have to check whether the specialised terminology that has been introduced for reasons of economy, but cannot be regarded as familiar to the audience, has been explained sufficiently. If several synonymous expressions for a concept exist, we have to make sure that the expression that the target group is most familiar with is used.

In a research report:

Avoid: The fish were observed to exhibit a 100 % mortality response.

Use instead: All the fish died. (European Commission Translation Service no year)

- Is the syntax adequate (grammatical simplicity)? – Here we have to answer questions such as: Can sentence complexity or the number of hypotaxes be reduced without violating the text's communicative function, its genre conventions or the requirements from the other comprehensibility dimensions? Can nominalisations be transformed into more verbal constructions? Can passive-voice constructions be transformed into active-voice constructions? Can negative sentences be transformed into affirmative ones? Will such measures make the text more readable for its target group? If not, modifications with regard to this dimension are not necessary.

Verbal constructions instead of nominalisations:

Avoid: Through the introduction of measures aimed at the creation of jobs, it is the intention of the commission to facilitate the improvement of the economic and social situation.

Use instead: By introducing measures to create jobs, the Commission intends to help improve the economic and social situation (adapted from European Commission Translation Service no year)

Active voice instead of passive voice:

Avoid: New guidelines *have been laid down* by the President in the hope that the length of documents submitted by DGs *will be restricted* to 20 pages.

Use instead: The President *has laid down* new guidelines in the hope that DGs *will_restrict* the length of documents to 20 pages. (Wagner no year)

Affirmative sentences instead of negative ones:

Avoid: It is *not uncommon* for applications to be rejected, so *do not complain unless* you are sure you have *not* completed yours *in*correctly.

Use instead: It is *quite common* for applications to be rejected, so *complain only if* you are sure you have completed yours *correctly*. (Wagner no year)

In addition to these questions which are also asked by the educational psychologists in connection with their dimension of '(linguistic) simplicity,' my dimension of 'simplicity' also covers the following questions:

- Is the degree of directness which is achieved on the illocutionary level adequate for the genre? – Maximum directness on the illocutionary level is not always the best option. Letters with negative feedback on an application, for example, require indirectness through the use of hedging (cf. example (1) in section 4.2.2.); in instructive texts, however, indirect instructions must be avoided, as in the following example:

Avoid: The door is opened by pressing the switch.
Use instead: Open the door by pressing the switch.

- Are the words and constructions used precise enough, i.e., is ambiguity avoided? – Ambiguous terms, illocutionary indicators, and grammatical constructions should be avoided.
- Are lexis and syntax used consistently? – Here we have to take into account that some genres, such as popular-science articles, require elegant variation for reasons of motivation, whereas it may be misleading in genres such as instructive texts. In these texts, elegant variation also has a negative effect on the efficiency with which translation memory systems can be used to translate them.

Perceptibility

This comprehensibility dimension covers those features which determine the ease with which texts can be perceived with our senses and thus be made accessible to our cognitive systems for further processing as well as the features which support the reader's recognition of content structures nonverbally (cf. the dimension of 'structure' in section 5.4.). It refers to layout and design characteristics (macro-typography), the fonts used and other paraverbal features (micro-typography), as well as nonverbal elements. Thus, it comprises the features which are the object of legibility research, and additionally also includes the features which determine the 'legibility' and 'readability' of nonverbal elements (cf. the Gestalt Laws in Göpferich 1998: 55 f.) as well as those elements of the formal text structure which educational psychologists group under the dimensions of 'arrangement – structure' and 'cognitive structure' respectively (such as the use of bullets in enumerations).

Like the dimension of 'simplicity', the dimension of 'perceptibility' refers to the encoding only.

Completeness of the Karlsruhe comprehensibility concept?

According to the Karlsruhe comprehensibility concept, ideal comprehensibility depends on six dimensions of a text: simplicity, structure, correctness, motivation, concision, and perceptibility. Here the question arises whether this enumeration of dimensions is exhaustive? – In a comprehensibility study in which I used the target-group-centred method of optimising reverbalisation with thinking-aloud (cf. Göpferich 2006b, c, d), the subjects' criticism of the text to be assessed and the optimisation maxims and strategies they employed revealed what they considered to be the basic 'ingredients' of comprehensibility. A comparison of these 'ingredients' of comprehensibility with the six dimensions of the Karlsruhe comprehensibility concept revealed that there were no items of criticism that could not be attributed to one of the dimensions of the Karlsruhe concept. This suggests that the comprehensibility concept underlying the Karlsruhe model matches the intuitive comprehensibility concepts of the subjects in the experiment.

Comprehensibility assessments may lead to the wrong impression that a text which is

comprehensible must also be usable (cf. Krause 1991: 396 f.). Especially for instructive texts, which tell the reader how to do something, optimal legibility, readability and comprehensibility are no guarantee for optimal usability. In addition to the three requirements mentioned above, these texts must also be complete, correct, conform to legal requirements with regard to form and contents (cf. Göpferich 1998: Chapter 11), save reading time (reception economy), provide quick and selective access to the information needed by the reader (via a table of contents, an index, and a user-friendly layout) and help the reader to discern descriptions from instructions. These additional requirements are also covered by the comprehensibility concept presented in this article: the requirement of completeness of content has been taken into account by the fact that the dimension of 'concision' does not only refer to the encoding in the text, but also to the mental denotation model. The correctness requirement has been taken up in the dimension of 'correctness.' Conformance to legal requirements can be derived from the 'legal requirements and author's guidelines' in the text production guiding features. Reception economy is taken into account by requiring 'concision' for the encoding of the text. Whether quick information access is possible is evaluated in the dimension of 'perceptibility,' and speech-act theoretical aspects have been taken into account in the dimension of 'simplicity.'

Since the main evaluation criterion in my framework is whether a text fulfils its communicative function (or *skopos*) and since text quality can be defined as the degree to which a text fulfils its communicative function (cf. section 4.1), the framework presented here cannot only be used for text comprehensibility assessment but for all kinds of text quality assessment including translation quality assessment in the functionalist paradigm (for examples of the application of this framework cf. the analyses by Göpferich 2006a: Chapter 4.7.3).

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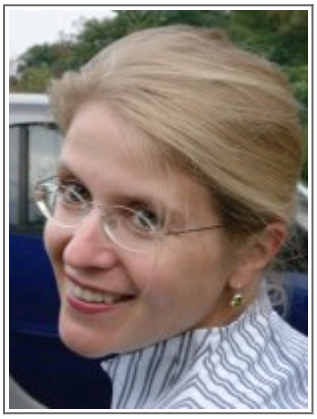

Note 1:
This article is an extended and revised English version of Gopferich (2001; 2002).
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Note 2:
I called it *Karlsruhe comprehensibility concept* because I was a Professor at the Karlsruhe University of Applied Sciences at the time I developed it and its predecessor, the Hamburg comprehensibility concept, had also been named after the city where the researchers who had developed it worked.
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Note 3:
In experiments using optimising reverbalisation with thinking-aloud and key-logging, subjects who belong to the target group of the text to be assessed are asked to reverbalise (paraphrase) the text in a key-logging program in such a way that the result will be optimally comprehensible for its target group. During the experiment, the subjects have to think aloud.
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Note 4:
The terms in brackets are the original designations used by the Hamburg group and Groeben respectively.
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