

## SCIENTIFIC AND TECHNICAL TRANSLATION

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# Scientific and Technical Translation

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SCIENTIFIC AND TECHNICAL TRANSLATION

Volume VI

1993

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## *Editors' Preface: Technical Translation and the American Translator*

SUE ELLEN AND LELAND WRIGHT

Technical translation, as defined for the purpose of this volume, encompasses the translation of special language texts, i.e., texts written using Languages for Special Purposes (LSP). As such, technical translation (and "technical terminology" as well) includes not only the translation of texts in engineering or medicine, but also such disciplines as economics, psychology and law. These texts require not only a firm mastery of both the source and target languages, but also at least an informed layman's (or even journeyman's) understanding of the subject field treated by the text, coupled with the research skills needed to write like an expert on the leading edge of technical disciplines. Technical translators are typically either trained linguists who develop specialized research skills along with ancillary knowledge in selected technical areas, or engineers, scientists and other subject-area specialists who have developed a high degree of linguistic knowledge, which they apply to the translation of texts in their fields of specialization. Because of the diverse know-how demanded for producing high-quality technical translation, collaboration among linguists and subject specialists is not uncommon.

Ideally, a collection of articles on technical translation published under the auspices of the American Translators Association would reflect a representative cross-section of technical translation in America. Instead, this volume more nearly reflects a cross-section of what is being written about technical translation on

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both sides of the Atlantic. The latter is not necessarily identical to the former. The final collection of articles reflects a high concentration of interest in the translation of German to English and vice versa, which also reflects the flow of technology transfer. These articles are augmented by articles treating French and, interestingly enough, Polish language as well. Despite the high incidence of activity in the translation of technical texts to and from Japanese, into Spanish and from Russian, these language combinations are not specifically treated here. The reason for this omission is not attributable to the editors' failure to encourage articles in a broader range of language combinations, but rather more likely to the fact that 1) many technical translators are simply too busy translating to find time to write about the process itself, and 2) Germanic sociolinguistic traditions favor reflective and even theoretical analysis more than some other traditions do. With a few exceptions (Polish bibliography, for instance), the true message conveyed in these articles has more to do with the nature of translation *per se* than of translating any one language. Indeed, eclectic readers who venture beyond their own language combinations will find they have much to learn about their own work reflected in the observations of translators working in other environments.

Although the selections do not necessarily represent the widest possible range of language combination, they do present a broad sample of the types of research being conducted in North America, by Americans with strong ties to European translation studies and, conversely, by Europeans with strong ties to North America. Almost all authors are themselves "bona fide" translators. Writers such as Teague, Park, Gerzymisch-Arbogast, Watt and Wright draw heavily on their experience in the translatorial trenches to illustrate general tactics and strategies that can be applied in recurring textual contexts. Maier, Massardier-Kenney, Niedzielski, Gommlich and Shreve address critical issues affecting their hands-on experience preparing the next generation of technical translators. Gommlich, Shreve, Galinski, Budin and Gross address issues that impinge on the organization of human knowledge and the development of systems to represent knowledge for the benefit of human translators and the further development of more

effective machine translation systems. Niedzielski, Shreve and Benhamida all point to the role that empirical studies and socio-linguistic research methods can play in clarifying the conditions that affect the translation process.

In the past some translators have maintained that technical translation is solely a matter of correctly transferring technical content and that style is not the province of the technical translator. *Section 1: Style and Register in Technical Translation* strongly contradicts this claim. *Herman* debunks the so-called "myth of literality," going on to stress that effective English language target texts must strive for clarity of English idiom and concision as well as correctness. *Gerzymisch-Arbogast* examines scientific and technical register in terms of differing culture-specific author-reader conventions, contrasting author-oriented German register types with the reader-oriented expectations of English target audiences. *Watt* leads the reader through a collection of translation problems, both deceptively simple and frustratingly complex, and provides sample master translations, together with commentary underscoring the recurring nature of specific translation problems and reliable strategies for addressing those problems wherever they may arise. *S.E. Wright* demonstrates the need for translators to address their attention to questions of style at the situation, macrocontextual, microcontextual and terminological unit levels in order to meet the differing expectations between the projected audiences for the source and target texts.

The division of articles into sub-groups remains an inexact science at best. *Section 2: Special Applications* concentrates on distinct subject areas and could have claimed far more articles than appear here. As noted above, other authors draw on domain-specific examples, but their primary foci lie elsewhere. The articles grouped in this section concentrate on the history, features and challenges posed by translation in targeted areas. *Fischbach* outlines the contribution that translation has made to the dissemination of science, with particular emphasis on the role of ancient and Renaissance translators in the transfer and preservation of classical medical knowledge. *Park* describes the terminological and contextual problems involved in the translation of documentation for model-building, stressing the need to apply the same criteria

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of terminological accuracy and stylistic appropriateness to this field as are demanded for "real-world" topics. *Meraw* details the fundamentals of patent claim drafting as they pertain to the translation of patent materials and provides a concise overview of stylistic and grammatical considerations essential to the proper preparation of patent documents. (For further information pertinent to patent translation, see "Patent Terminology" in the January 1993 *ATA Sci-Tech Newsletter*.)

Section 3 treats *Training and Autodidactic Approaches for Technical Translators*. All three of the articles in this section address the perennial concern that translators must master—or at least write as if they have mastered—a broad range of frequently unanticipated topics over the course of a career as a translator. *Niedzielski* and *Chernovaty* report on their empirical study of the relative effectiveness of linguistic versus technical training in the preparation of future translators and interpreters, concluding in the end that technical training provides a slight advantage for translation, whereas linguistic training definitely provides an advantage for interpreting. Interesting as *Niedzielski* and *Chernovaty's* findings may be, their subjects are students of linguistics and technical specialties, not advanced graduate level translation students or practicing translation professionals who have mastered special collaborative and research skills in order to compensate for any linguistic or technical lacunae that may plague the individual translator. *Maier* and *Massardier-Kenney* recount their efforts to establish a pedagogical model to be used in the preparation of specialized texts based on four key aspects of translation practice: research skills, technical writing skills, collaboration and theory. Based on this premise, they examine the extent to which parallels may be found in the literature for training specialized journalists in the research skills needed for non-specialists to write specialized texts accurately and effectively. Although *Teague's* article would also be highly useful as a pedagogical model for translation students, he proposes a methodology to practicing translators who must efficiently and effectively research unfamiliar specialized areas of knowledge in order to document terminological and text typological information needed to produce high-quality technical translations.

It is readily evident from the various articles contained in this volume that much of translator training and of translation studies rests on two pillars: text typology and terminology. It would be inappropriate to feature these “pillars” as solitary Greek columns, however; they should more readily be visualized as great multi-ribbed members supporting the complex stress system of a fan vault. As Wright indicates (see Section 1), terminology and text typology interface particularly at the level of phraseology and standard text blocks. Most of the articles in this book treat either terminology or text typology or both to some degree, but the articles contained in *Section 4: Text Analysis and Text Typology as Tools for Technical Translators* focus particular attention on the role that text typology can play in helping translators create high-quality translations. They both also examine potential methodologies for incorporating text typological information into computer-assisted translation (CAT) systems and translation-oriented knowledgebases. *Gommlich* describes a text base system designed to aid translators, particularly student translators, in selecting appropriate TL text types based on computer-assisted, model-based text analysis. *Shreve* introduces the notion of using Standard Generalized Markup Language (SGML) to identify textual components within a text base/knowledgebase in order to facilitate computer-assisted textual analysis.

*Section 5, Translation-Oriented Terminology Activities*, explores the different aspects of terminology work, addressing knowledge management, language planning, terminology resources and novel methods for representing concept systems. *Galinski* and *Budin* note the so-called information or knowledge crisis that has resulted in the parallel expansion of new terminology, a phenomenon that places special demands on the resources of translators. They indicate the advantages that concept-oriented multilingual terminology can provide to the working translator. *Benhamida* documents her sociolinguistic study into adoptive behavior on the part of Francophones outside of France with respect to the neologisms prescribed in connection with the Bas-Lauriol legislation and analyzes the role of translators and interpreters in disseminating official terminology; her statistical findings would indicate that outside France, non-native speakers of

French are more likely to accept “authoritative” terminology than are native speakers. This factor no doubt reflects the confidence (and deeply felt linguistic prejudice) of native speakers in determining their own usage as opposed to the urge of non-native speakers to accept authority in order to offset any perceived uncertainty or fear of being incorrect.

People who write *about* doing terminology work are frequently criticized for not *doing* more of it. Unfortunately, the size restrictions placed on monographs such as this one simply do not allow for the inclusion of significant terminological material, nor does the highly specialized and ephemeral nature of most small terminology collections, however well-done they may be, lend itself to inclusion in a collection designed to reach a broad audience over a protracted period of time. By preparing a detailed *Bibliography of Polish Terminology Resources*, Mitchell has attempted to do the next best thing: to provide translators working in a language of limited diffusion with a guide to existing resources. Her inclusion of a *Subject Guide to Authors* renders her bibliography truly useful as a research tool.

The General Theory of Terminology defines three basic types of concept systems, partitive (part-whole), logical (generic) and thematic (associative). The two-dimensional line diagrams traditionally used to represent these concept systems have recently been declared inadequate by many serious terminologists who recognize the need for more comprehensive, multifaceted, multi-dimensional methods for representing the complex conceptual and linguistic relations that exist in the real world and form the framework for the kind of knowledgebases being developed for the next generation of computer-aided translation systems. Against this backdrop, Gross suggests a *Theory of Fractal Linguistics*. In an article treated as the introductory segment to a larger discussion, he introduces the notion of “linguistic space” and the validity of using fractal geometry as a model for visualizing the complex relations that exist within and among concept systems in both monolingual and multilingual environments.

First and foremost, the editors of this volume intend it to be of use to working translators, as well as to highly practice-oriented translator trainers. The gap between practitioners and theorists

can only be bridged by thoughtful, goal-oriented writing on the part of translators and clear, accessible writing on the part of the theorists. Gerzymisch-Arbogast's analysis of author-reader expectations clearly points the way not only for translators, but also for writers in translation studies who hope to reach a broad American and international audience. The "interactional aim" of this collection is to help close that gap.

#### REFERENCE

European Patent Office in Vienna, "Patent Terminology: INID Patent Codes," *Sci-Tech Newsletter*, A Publication of the Science and Technology Division of the American Translators Association, 9.1 (January, 1993): 5-8.

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## *Section 1:*

# *Style and Register in Technical Translation*



## *Technical Translation Style: Clarity, Concision, Correctness*

MARK HERMAN

Clarity, concision and correctness, the principal stylistic goals of technical writing, are simultaneously those of technical translation; an excellent technical translator is an excellent technical writer.

This essay discusses some techniques to help achieve clarity, concision and correctness when translating technical documents from various languages into English. Included are breaking up the long sentences possible in inflected languages into the shorter sentences often required by uninflected English, substituting more specific or less specific English terminology for the more general or less general terms of other languages, and recasting the thought patterns of other languages into those of English. Also discussed is how a translator might deal with misstatements, incomprehensibilities and unknown words in the original.

### *Types of Translation and the Myth of Literality*

To begin, it is useful to define just what is meant by technical translation and how it differs from translation of other types. Burton Raffel divides translation into three basic categories according to the source text: nonliterary prose (including technical material), literary prose, and poetry. According to Raffel, all three require the translator to produce "a comprehensible document" in

the target language, to convey the context of the original document, and to grapple “with syntactical and lexical features of both” the source and target languages. Knowing and conveying the context of the original document is crucial. A translation of French *ballon* into English as “balloon,” “football,” or even the technical-sounding “flask” will not do if the word in context means a storage sphere (such as for pressurized natural gas).

All three of Raffel’s categories imply a translation intended for an audience which will read only the translated version and not the original document, as opposed to ponies, trots and other versions intended to help an inexperienced reader of the original text. No translation meant to stand on its own, even one of a technical document, can be literal in the word-for-word sense. A purposely far-fetched example will demonstrate this proposition.

A well-known German pun is *Der Mensch ist, was er ißt*. The literal meaning is “The human being (the masculine form connotes either male only or both sexes) is, what he eats.” The pun arises because *ist* and *ißt*, translatable as “is” and “eats” in English, are pronounced identically in German. Ignore the pun for the moment, and consider the statement to be written in non-literary technical prose, perhaps at the conclusion of a paper on the incorporation of various nutrients into muscle tissue. A correct translation, if the muscle tissue of both sexes has been studied, is “Man is what he eats.” Modern usage, however, prefers the more inclusive “A human being is what he or she eats,” or the less awkward plural “Human beings are what they eat.” None of these three translations is literal. In the first, German *der* (English “the”) must be eliminated before “man” or the English statement, even for old-fashioned usage, cannot apply to both sexes. In the second translation, the definite masculine *der* has been changed to the indefinite non-sexual “a” and the phrase “or she” added for clarity. In the third translation, the statement has been put into the plural form and *der* once again eliminated, which would not be allowed by German grammar even if the original had been plural (*der* would have been pluralized to *die*, but would not have been eliminated).

If the German statement were found in a literary work rather than a technical document, a translator might consider its

proverbial tone or humor to outweigh denotation and try to re-create one or the other in English even at the expense of literal meaning. For the German pun, a proverbial translation is "You are what you eat" or "We are what we eat." And a humorous translation completely sacrificing literal meaning is "GIGO-bytes aren't good for computers and other living things."

A translation of technical prose, though non-literal, should convey the exact meaning of the original text as directly as possible. Purposeful ambiguities, ungrammatical constructions and sound combinations which call attention to themselves are the province of literary translation.

### *Clarity*

If the syntactical and lexical features of the source and target languages differ, clarity often requires that the sentences in the target language be completely recast. For example, highly inflected languages such as Russian and, to a lesser extent, German can string together long chains of independent and dependent clauses, with many referents and antecedents, finite, infinitive and compound verbs, and still keep the whole meaning clear. English cannot. Consider a German sentence from a recent patent application:

*Hinzu kommt, daß Anstriche aus Emulsionspolymerisaten bekanntermaßen aufgrund ihres Gehaltes an Emulgatoren und weiterer wasserlöslicher Hilfsstoffe, die für die Lagerstabilität dieser Anstrichstoffe meist erforderlich sind, wie Verdickungs- und Pigmentdispergiermittel, eine starke Wasserquellbarkeit zurückbehalten.*

A literal translation into English, keeping all the nouns compounded as they are in German, is:

Moreover occurs, that coatings from emulsionpolymers well known on the basis of their content of emulsifiers and further watersoluble auxiliarmaterials, which for the storageability of

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these coating materials mostly necessary are, as thickening- and pigment dispersion media, a strong water swellability retain.

Obtaining this English “sentence,” unreadable as it is, still requires work on the part of the translator beyond merely looking up words in a dictionary. The translator has already had to decide that *kommt*, usually translated “comes,” here means “occurs”; that *Anstriche*, usually translated “paints,” is better rendered here by the more general word “coatings”; that *aus*, usually translated “out,” here means “from”; and that the first *die* is translated “which,” while the second one is translated “the.” But all these choices, necessary as they are, still do not allow the reader to determine with certainty what modifies and/or is the subject of what. The next step away from literalism includes separating the compounds and recasting the grammar within each clause, but the result is still too literal for comprehensibility:

Moreover occurs, that coatings from emulsion polymers well known on the basis of their content of emulsifiers and further water soluble auxiliary materials, which are mostly necessary for the storage stability of these coating materials, as thickening and pigment dispersion media, retain a strong water swellability.

The sentence now sounds as though it may mean something. It does not. Not yet. The main noun for meaning, “coatings,” is too far away from the main verb for meaning, “retain.” Putting the two words closer together generally means throwing some of the intervening material into a second sentence and making additional changes. There are several ways to do this. One is:

Moreover, coatings made from emulsion polymers retain a strong capability of swelling in water. These coatings are well known as thickening agents and pigment-dispersion media because they contain emulsifiers and additional water-soluble additives, both of which are necessary mainly to prolong shelf life.

Now the translation is comprehensible, but it is far from literal. In addition to splitting the single German sentence into two English

sentences, the principal verb of the German sentence, *kommt* (“occurs”) has been eliminated entirely. It is irrelevant whether the use of *kommt* is good or bad German technical style, or whether it is necessary or optional by the rules of German grammar. Since it is superfluous in English, obscures the clarity (and diminishes the concision), it should be eliminated.<sup>1</sup>

In addition to breaking up and rearranging the original sentence, clarity sometimes requires the use of English terminology with a different degree of specificity than that of the original. English has a larger lexicon than virtually any language that has ever existed. Therefore, in comparison with other languages, many English words carry comparatively narrower lexical meanings. Further differences in ranges of meaning can also arise from differences in the thought processes embodied in different languages.

Consider the French noun and adjective *plat*. As a noun, *plat* means something—anything—flat, such as a plate, a sheet, a dish, the flat part of a hand, or the scale of a balance; or a thing which is not really flat but the essence of which is found in its “flatness,” such as a pan. There are some more specific words in French for various flat objects, and the word *plat* itself can have modifiers to clarify the meaning, but the fact remains that a French writer finds nothing wrong in writing only *plat*: the word, especially in context, is sufficient for the French speaker to draw a satisfactorily specific meaning. But a translator into English usually cannot simply write “flat object”: English speakers find the concept too abstract to draw a satisfactorily specific meaning. The specific English term must be discovered from the context or accompanying diagrams. If the context and diagrams are not helpful, the word, simple as it is, is essentially non-translatable, and the translator must provide a footnote to the reader with as much usable information as possible.

Occasionally, the translator into English will use a term more general than that of the original. The translation of *Anstriche* in the above patent excerpt into “coatings” rather than into “paints” is not quite an example of this because the German word includes the lexical meaning of both English words; there is no meaning in either English word which is excluded from the German word.

But some German words do have a narrower lexical meaning than any English word; they are usually translated by English words which include meanings not present in the original. For example, Hawkins (30) has shown that German verbs are systematically restricted by prefixes in a manner which has no counterpart in English. A German verb taking an effected object, i.e., an object produced by the verb, usually does not take a prefix. Thus, *brennen* means "to burn" in the sense of burning a hole. The burning produces the hole. A German verb taking an affected object, i.e., an object pre-existing before the action of the verb, usually does take a prefix. Thus *verbrennen* means "to burn" in the sense of burning coal or oil. The distinction could be maintained in English by translating *verbrennen* as "to burn up," but it is often more idiomatic to leave off the "up." Thus two words with different meanings to a German speaker are translated by a single English word including both meanings.

Finally, clarity in a translation into English may sometimes require less or more repetition than in the original. For example, French has the word *réalisation* and German has *Realisierung*, both of which are translatable into English as "realization." But such a translation is more problematic than it appears. In French, and to a lesser extent in German, the distinction between the plan, design or idea for something and the realization of that plan, design or idea is much sharper than in English, as any translator who has ever dealt with plans for new or modified facilities can attest. French speakers consider a plan to be a more or less abstract idea, to be embodied later in the actual constructed and operating facility, the *réalisation*. A French speaker might consider illogical a literal translation of the statement, "This plant will double production while cutting costs," if what is being referred to is a drawing on a piece of paper. The French thought process is, "The plant which will come into being as a result of the realization of this sketch will double production while cutting costs." And the French write the way they think, which sometimes requires repetition of the word *réalisation* and some word meaning "plan"—*plan*, *dessin*, *projet*—in almost every sentence. If at all possible, the translator should recast the sentences into English

thought patterns, eliminating unnecessary repetition. The result will be clearer and more concise.

On the other hand, translators into English often need to repeat nouns or noun clauses where the original inflected language has only one short pronoun. The inflections make the antecedent obvious in the original; repetition is required for similar clarity in English.

### *Concision*

The first draft of any translation is likely to be wordy in order to ensure that every idea of the original is included. Concision requires an extra pruning step. Since most technical translators are paid by the translated word, it is doubly disadvantageous for them to take this extra step: more work earns less money. The profession would be better served by rates based on the number of words in the source document. However, until the economic facts of translation life are changed, each translator must decide how far he or she is willing to go to make the final result concise.

One major step towards concision is beyond the usual scope of technical translation: that obtainable by improving the basic organization of the original document. Only rarely will a client ask and be willing to pay for technical editing as well as technical translation. Unfortunately, technical authors in any language are often chosen for what they know, not how well they write, and many write very badly. A poorly organized document does not efficiently carry the reader from section to section. It must constantly remind the reader of previously stated information by repeating it. Such wordy documents are the technical translator's daily fare, and there is little he or she can do about it.

Still, a translator can improve concision sentence by sentence. As for the previously cited example from the German patent, words which do not contribute to meaning or clarity can be eliminated once the sentence has been recast from the source language into proper target-language word order. And, as also previously indicated, repetitions required by the source-language thought

processes can be eliminated if the target language does not require them.

### *Correctness*

Correctness in a technical translation means two things. First, it means accurate re-creation of the ideas and technical terms of the original in the target language. This re-creation is usually impossible unless the technical translator has some detailed knowledge, preferably considerable detailed knowledge, about the subject of the document to be translated. "Accurate" re-creation also means suppressing obvious typographical and grammatical errors in the original if these do not impede comprehension. For example, French engineering reports sometimes include English-influenced constructions contrary to the rules of French grammar. A native English translator should find the meanings evident and need not point out the fractured French to the client. Finally, correctness in this first sense requires that words or grammatical constructions that are not totally understandable be footnoted as such. Non-footnoted guessing is impermissible in a technical translation.

Correctness in the second sense means producing an accurate technical document in the target language despite mistakes in the original. Although the translator cannot be expected to discover and refute arcane errors or falsifications, no one else is likely to read the original technical document as closely. Therefore, no one else is as likely to discover misstatements, inconsistencies and even blatant errors of fact. Common errors in technical papers, which the translator's knowledge of the subject matter should allow him or her to detect, include inconsistencies between numbers listed in tables and the conclusions drawn from those numbers, textual references to one thing and accompanying diagrams clearly showing something else, parameters in the text referred to by their full names and the same parameters in the tables referred to by non-obvious symbols with no definitions of the symbols ever being given, and, of course, the inevitable statements violating the laws of thermodynamics. The translator should correct

such errors in square brackets or footnotes, both in order to render the client a service and to preclude the client's blaming such errors on the translator.

### *Final Remarks*

It should be evident from this essay that technical translation requires more than writing down the dictionary equivalents of words. As for all translation, facility with the source language is important, but facility with the target language is crucial. Just as no one but a skilled poet is likely to make a good translation of a poem, no one but a skilled technical writer is likely to make a good translation of a technical document. But knowledge of the source language and writing skill in the target language are still insufficient. A technical writer must also know the subject matter of the original document. Only then is a clear, concise and correct translation possible.

#### NOTE

1. There are some who argue that a certain amount of specific wording is necessary in a valid legal document, such as the patent application from which the German quotation is taken. If *kommt* is an example of this, it should not be eliminated by a translator. But, at least in English-speaking countries, the claim of necessary legalese is often a fraudulent excuse for poor writing. In the United States, some jurisdictions have enacted laws requiring certain legal documents, such as insurance policies, to be written in "plain English."

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# *Contrastive Scientific and Technical Register as a Translation Problem*

HEIDRUN GERZYMISCH-ARBOGAST

## *Introduction*

Scientific and technical (ST) register has been extensively treated as one of the specific features of LSP<sup>1</sup> communication (Sager, Dungworth 1980). However, descriptions of ST register, being traditionally limited to lexical-terminological and syntactic levels have usually not extended beyond the sentence level. Although the topic of ST discourse phenomena has become more prominent in recent LSP discussions (e.g., Hoffmann 1985), cross-cultural variance has only been marginally featured in contrastive register analyses (Ulijn 1989). Contrastive descriptions of varying discourse phenomena in ST register, however, are a prerequisite for making technical and scientific register transparent and accessible as a problem of translation.

Proceeding from the idea that ST register is related to the function of ST texts,<sup>2</sup> the following article attempts to show that variant ways of presenting and sequencing information are register phenomena that reflect cross-culturally different author-reader relationships.<sup>3</sup>

After discussing the general notion of register, this paper describes differing arrangements of "given" information to "new" information with respect to differing author-reader relationships and conventions. Then an attempt is made to establish and classify criteria for describing discourse phenomena in ST register by

examining cross-cultural variation in “given”-“new” contracts between author and reader. The relevance of these differences as potential translation problems is shown on the basis of English-German examples, taken largely from the experience of co-translating Samuelson & Nordhaus, *Economics* into German. This article will thus be limited to English written ST register in the field of economics and the discussion of possible German equivalents.<sup>4</sup>

### *Scientific and Technical (ST) Register*

There is considerable confusion when it comes to defining register in general.<sup>5</sup> For our purposes, we will follow Ulijn’s illustrative explication (1989:185ff) since it specifically accommodates ST register:

“[register is the] verbal repertory of the speaker . . . a term originally drawn from music, suggesting the various drawers of a chest (the verbal repertory of the speaker) which are pulled out in any particular communication situation. One of such situations is inherent in technical and scientific register.”

Descriptions of scientific and technical (ST) register in LSP research have been largely systems- or *langue*-oriented,<sup>6</sup> concentrating on such important lexical phenomena as frequency and distribution of terms and term-formation patterns resulting in neologisms and *faux amis* (misleading cognates; literally, “false friends”). On the syntactic level it was possible to isolate the more frequent use (in comparison with common language) of syntactic function words, participles, infinitives and the present tense. It was also established that sentences are likely to be lengthier, nominalizations more frequent, and the passive voice more popular in ST texts.<sup>7</sup>

On a sentence-transcending, i.e., textual or discourse level, however, systematic comparative studies are almost non-existent—a fact that may be largely due to the lack of linguistic criteria for description, which in turn results from the controversial theoretical status of discourse phenomena in general.<sup>8</sup>

Most of the lexical and syntactic analyses have focussed on the dichotomy 'languages for special purposes (LSP)—common language' in the interest of teaching foreign ST languages (not translation), and have led to the general conclusion that "languages are apparently similar from the *textual* point of view as well" (Ulijn 1989: 212). The assumption or likelihood of comparative differences on the textual or discourse level, on the other hand, is a prerequisite for making the topic of ST register that exceeds the sentence level relevant to translation.

For translation, a systems approach is a necessary but not a sufficient dimension since translation sets out from the *parole* level of language and consequently needs to encompass *parole* phenomena. It is, therefore, a necessary precondition for translation purposes to identify and describe discourse phenomena on a *parole* level before cross-cultural differences can be discussed. The following section will attempt to identify translation-specific discourse phenomena in ST register in terms of *Information Dynamics* and *Information Packaging* as they reflect differing author-reader conventions.

### *Discourse Phenomena as Expressions of Culture-Specific Author-Reader Conventions*

In describing ST discourse as *Information Dynamics* and *Information Packaging* phenomena we will proceed from the idea that texts reflect language functions (Bühler 1934) and that the text function is manifested in the structure of the text,<sup>9</sup> which in turn can be described as alternating sequences of "given" and "new" information, "given" or "new" in the sense that the author perceives the reader to consider the information imparted as either "given" or "new" and organizes the information in a way that makes these chunks of information (more or less easily) identifiable to the reader.

It is important to emphasize that a text contains both, "given" and "new" information for the reader, "given" or "new" not in

absolute but relative terms: "given" or "new" relative to what the author perceives the reader to know (= "given") or not to know (= "new"). Information in the text is thus not *per se* "given" or "new," but is "given" in the sense that the author thinks it is "given" (= known) or "new" (= unknown) to the reader (i.e., classified according to the author's perspective). Whether the information is indeed "given" to the reader, i.e., whether the reader can identify the author's intended "given" information as "given," depends on the reader's knowledge of the (text) world (reader's perspective). More specifically, it depends on whether the reader's knowledge of the (text) world is similar to what the author perceives the reader's (text) world knowledge to be or, in linguistic terms, to what extent the two perspectives of author and reader overlap with respect to shared assumptions in a specific communicative situation (cf. Mudersbach 1981, as applied in Gerzymisch-Arbogast 1987).<sup>10</sup>

Following Grice's cooperative principle of manner (Grice 1975:46),<sup>11</sup> we can assume that ST register reflects an implicit agreement between author and reader about how (1) information that the author thinks is "given" or known to the reader and (2) information that the author thinks is "new" to the reader is proportioned and alternately arranged in a discourse.

We can further assume that the proportions of "given" and "new" information in texts and their alternate arrangement is determined by convention as an "author-reader contract" which varies cross-culturally.

For the purposes of this article we will proceed from the hypothesis that contrastive ST registers vary cross-culturally according to different types of implicit author-reader contracts which are determined by different cultural norms and that depending on the type of "author-reader contract," "given" and "new" information in texts may be provided in different quantities and/or proportions and may be differently presented and sequenced. Author-reader contracts and their proportionate arrangement of "given"- "new" information in texts can be categorized into an author-oriented contract form, stressing the expressive language function (Bühler's *Kundgabefunktion*) and a reader-oriented contract form, stressing the vocative function of language

(Bühler's *Appellfunktion*). These two forms constitute the extremes on a scale of author-reader contracts, i.e., on a scale of cross-culturally varying ST register types, a phenomenon that manifests itself in the way the author presents his information to the anticipated reader in a closer (reader-oriented contract) or more distant way (author-oriented contract).

Reader-oriented contracts or register types can be characterized by the author's intention to obtain the reader's "empathy" towards the information presented by trying to establish a "closeness" with the reader. This is generally achieved by providing a great deal of "given" information to enable the reader to relate the "new" information to a familiar situation or experience. The reader-oriented strategy proceeds from the assumption that if a reader can identify more readily with the message the author wants to impart, the text appears more understandable and thus more "interesting" to him (cf. "Information Packaging" below).

Author-oriented register types, on the other hand, are less considerate of the reader, focussing on the author's knowledge and qualifications, which are presented with the primary intention to convince the reader of the importance of the "new" message the author has to convey. Being less concerned with the reader's interest or ability to identify with or understand the message, the author can afford granting less "given" information, focussing instead on the presentation and development of "new information."

Whether a more reader-oriented or a more author-oriented contract is the accepted norm in a particular culture depends on (1) the value system prevalent in a society with regard to the status of knowledge and science and technology (ST register) and (2) the relevant values of an individual vis-à-vis other individuals or the society as a whole. This may not be an "either/or" situation but rather measurable as values on a scale.

### ***Describing Contrastive ST Register: Information Dynamics and Information Packaging***

Accepting the postulate that ST register can be classified according to differing author-reader contracts in terms of (more or less) “given” vs. “new” information, we can distinguish two dimensions for describing the differing arrangements of “given”-“new” units, (1) a macro-level dynamic perspective (Information Dynamics) and (2) a micro-level static perspective (Information Packaging):

#### INFORMATION DYNAMICS

On the macro-level of texts, Information Dynamics describes the way in which authors proportion and sequence the “given”-“new” information they want to convey to their readers. It is a dynamic measure in that it describes the arrangement and development of information throughout the text and is reflected in parameters such as:

- Titling
- Initiating
- Sequencing

#### ***Title Conventions***

Title conventions refer to what type of information is conveyed in what manner and how the title relates to the remaining text (Hellwig 1984).

Based on “given”-“new” information, a title can serve the following basic functions:<sup>12</sup>

- to indicate what the text following is about (reflecting Bühler’s *Darstellungsfunktion* of language and the “informative” text function (Reiss 1976) based on Bühler’s *Darstellungsfunktion*):

**Example:** G. Brown & G. Yule, *Discourse Analysis*. Cambridge, 1983.

In these cases the title is a factual “reduced paraphrase of the text” (Dressler 1973), serving only to inform the reader about the contents of the text following. The title here is “new information,” signaling the “new” information following in the text, i.e., is a “new-type” title.

- to describe the author’s attitude to the text following (reflecting Bühler’s *Kundgabefunktion* of language and the “expressive” text function (Reiss 1976) based on Bühler’s *Kundgabefunktion*):

**Example:** L. Rosten, *The Joys of Yiddish*. New York, 1968.

In this case the text following is characterized by the author from the author’s perspective. The title here contains some “new” information, signaling the text topic, but also “given” information—the author’s attitude to the text—the attitude being “given” in the sense that the reader can identify with a (shared) feeling, value judgement or irony (= given). These are “given/new-type” titles.

- to attract or “lure” the reader into reading the text following (reflecting Bühler’s *Appelfunktion* of language and the “vocative” text function (Reiss 1976)):

**Example:** G. Lakoff, *Women, Fire, and Dangerous Things*. Chicago, 1986.

In this case the author intends to make the text interesting to the reader; the title contains primarily “given” information in the sense that the reader “knows” the objects and/or events referred to in the text following, i.e., it is a “given-type” title.

The way in which a title relates to a text as a “new-,” “given/new” or “given-type” title varies cross-culturally. ST text titles commonly have the primary function of being “informative” about the following text, i.e., are “new-type” titles. However, different ST registers may allow varying ranges of secondary,

superimposed functions, i.e., “given/new-” and “given-type” titles.

### *Initiating Information*

Initiating refers to the type of information presented first at the beginning of a whole text or chapter and how it is presented and ties in with the remaining text segments.

Here, again, we can distinguish three different types of “given”-“new” arrangements according to Bühler’s language and Reiss’ text functions:

- to indicate what the text following is about, (Bühler’s *Darstellungsfunktion* and Reiss’ “informative” text function):

#### **Example:**

This study will touch on a variety of topics in syntactic theory and English syntax, a few in some detail, several quite superficially, and none exhaustively. It will be concerned with the syntactic component of a generative grammar . . .

Noam Chomsky, *Aspects of a Theory of Syntax*.  
Cambridge, 1965, p.3 (beginning of book).

In this case the initiating statements are factual, indicating what the text following is about and how it is set up, informing the reader about the text contents. Initiating is done here via introducing “new information,” i.e., “new-type” initiating.

- to describe the author’s attitude or relationship to the text following (Bühler’s *Kundgabefunktion* and Reiss’ “expressive” text function)

#### **Example:**

I have already and repeatedly presented you, my learned friends, with my new views of the motion and function of the heart, in my anatomical lectures: but having now, for nine years and more confirmed these views by multiplied demonstrations . . . I at length yield to the requests,

I might say entreaties, of many, and here present them for general consideration in this treatise.

William Harvey, *An Anatomical Disquisition on the Motion of the Heart and Blood in Animals*. Chicago, 1952 (originally published in 1628), beginning of book.<sup>13</sup>

In this case, initiating serves to express the author's perspective of the following text. It contains some "new" information, featuring the text topic, but also "given" information, featuring the author's perspective—an attitude being "given" in the sense that the reader can identify more readily with the personal relationship or attitude, a (shared) feeling, value judgment allusion or irony. These are "given/new-types" of initiating.

- to attract or "lure" the reader into reading the text following (Bühler's *Appellfunktion* and Reiss' "vocative" text function):

**Example:**

If I begin chopping the foot of a tree, its branches are unmoved by my act, and its leaves murmur as peacefully as ever in the wind. If, on the contrary, I do violence to the foot of a fellow-man, the rest of his body instantly responds to the aggressions by movements of alarm or defense. The reason for this difference is that the man has a nervous system, whilst the tree has none.

William James, *The Principles of Psychology*. Chicago, 1890/1952. Beginning of Chapter II.

In this case the author intends to make the text interesting to the reader. The initiating statements contain primarily "given" information in the sense that the reader "knows" the objects and/or events, feelings, value-judgements, allusions and/or irony referred to in the following in the text, i.e., it is a "given-type" initiation.

Like title conventions, the way in which a text is started, i.e., initiating is effected, varies cross-culturally. For ST texts, initiation typically serves the primary function of being "informative" about the text following, i.e., is "new-type" initiating. However,

different ST registers may allow varying ranges of secondary or flanking “given/new-type” or “given-type” initiating.

### *Information Sequencing*

Information sequencing reflects an implicit author-reader contract in the way “given” and “new” information is chronologically or alternately arranged on a macro-level, i.e., in the entire text.

We can distinguish three basic types:

- “new-type” information sequencing, which follows cultural norms that require established, fairly rigid sequencing routines, proceeding from a set pattern of (1) “new” information (in the form of an argument, thesis or definition) that is theoretically developed (2). It may be substantiated by evidence (3) obtained on the basis of an acknowledged methodology (4) depending on the norm prevailing in a particular domain of science (natural sciences vs. humanities). “Given” information is optional or even uncommon. Texts like this are, therefore, difficult to follow, “hard to read.” An example for such “new-type” information sequencing is Wittgenstein’s *Tractatus*.
- “given/new-type” information sequencing presents the thesis and/or arguments as well as other text segments embedded in “given” information e.g., in the form of examples, alternating “new” chunks of information with “given” portions, and making the text easier to read. In Toulmin’s argumentation chain (1958:104) the “thesis” element is typically embedded in “given” information.
- “given-type” information sequencing typically begins with specific “given” information such as commonly-known phenomena and develops the “new” information (thesis, general rule or definition) from there. An albeit extreme example is Bonheim’s article “What German Students Call their Cars,” (*German Life and Letters*, 4/1984), featuring 57 “messages”

(= predications), including 33 illustrative examples: more than 50% of the article's message is examples.

Author-oriented ST register tends to follow "new-type" information sequencing, starting with and developing "new" information; reader-oriented contracts, on the other hand, typically use "given-type" information sequencing, starting from the known specific to the "new" information, with a possible use of alternately varying "new" with "given" information.<sup>14</sup>

#### INFORMATION PACKAGING

Just as Information Dynamics describes the flow of text information, Information Packaging depicts the way in which authors "wrap up" the "given" and "new" information they want to convey to their readers; it is a static parameter, measuring how information is presented to the reader at a particular stage of the text. Information Packaging parameters include:<sup>15</sup>

- the frequent use of examples (= illustrating the "new" message, by "framing" it into "given" information with which the reader is familiar)
- personalizing the message (= establishing direct contact with the reader by frequent use of direct addresses like "you," "imperatives," and/or "rhetorical questions")
- redundancies (= coating "new" messages with information already "given" in the text itself)
- reference (= the use of specific "given" vs. general information, which may create "closeness" vs. "distance")
- terminological co-reference (= the alternating use of quasi-synonymous terms or paraphrases (= "given") for technical terms in an attempt to make the message more comprehensible to the reader)

- varying degrees of “formality” (= the use of everyday speech and colloquialisms (= “given”) in ST texts, with which the reader can identify more easily than with Latin or Greek expressions commonly found in ST texts).

On the basis of the Information Dynamics and Information Packaging parameters shown in Fig. 1 we can proceed to examine our central hypothesis, i.e., that the generally recognized more hermeneutic-abstract kind of knowledge generation of German uses a more author-oriented register when compared with the more positivistic-pragmatic orientation of English which employs a more reader-oriented ST register. We can describe and “measure” author-oriented ST register specifically in that it typically presents large “chunks” of “new” information, using “new-type” title-, initiating-, and information sequencing devices while reader-oriented ST register caters to the reader by Packaging the “new” information into “given” information via such devices as the frequent use of examples, personalizing the message, using specific reference, redundancies, terminological co-reference and varying degrees of formality.

<b>Information Dynamics</b> (i.e., Macro/Dynamic)	<b>Information Packaging</b> (i.e., Micro/Static)
Title conventions	Use of Examples
Initiating Information	Personalization
Sequencing Information	Redundancies
	Explicitness of Reference
	Terminological Co-Reference
	Formality

*Figure 1: Information Dynamics and Information Packaging Phenomena*

### *The Translation Dimension*

These differences in ST register may necessitate a considerable amount of adaptation in the way “given” and “new” information is proportioned, sequenced and presented—i.e., “given” information is expanded or reduced when it comes to translating ST texts involving culturally diverse ST registers. This can be illustrated using examples from the English original and the authorized German translation of the economic textbook Samuelson & Nordhaus, *Economics*.

#### BASIC DECISIONS

As stated previously, ST register phenomena have mostly been treated from the interests of teaching ST languages (Ulijn 1989) and have hardly been discussed as a cross-cultural translation problem (Reiss/Vermeer 1984, Newmark 1988, Hatim/Mason 1990). In fact, discourse phenomena in general—even without the ST dimension—have hardly been treated in their relevance to translation.

Proceeding from the idea above, that a text’s function is reflected in its structure, which can be described in terms of alternating “given” and “new” information arrangement, translating involves the basic decision as to whether the source text function must be kept constant or can be varied (Reiss/Vermeer 1984). Constancy or similarity of ST function would render a more “literal” or “faithful” translation while varying the ST function might imply a considerable restructuring of the information contained in the source text to make it fit the target ST register.

Varying the translation function could possibly involve changes in one or both parameters—Information Dynamics and Information Packaging—reflecting the different author-reader contracts. While Information Dynamics involves restructuring translation decisions on the macro-level of texts, i.e., regarding what type of “given” or “new” information in which logical arrangement is transferred from source to target text, Information Packaging as a static parameter involves decisions on the micro-level of texts, regarding the precise way in which “given” or “new” source text

information is presented in the target ST register. It is clear that the macro-level decisions affecting Information Dynamics involve more re-structuring, i.e., possibly more adaptation than the micro-level decisions involved in Information Packaging. In concrete terms this means that translating ST texts from German into English may involve expanding or even newly creating “given” information segments in texts, a problem that makes German→English ST register translations much more difficult (one possible reason why it takes so long for German philosophical texts to be translated into English?). On the other hand, translations from English to German would involve adapting or reducing a lot of the “given” instances prominent in English ST register.

For translation purposes, we therefore need to first establish the target text’s function as being either source text- or target text-oriented before we can discuss possible ST register problems. If it is decided that the source text register is not to be maintained, Information Dynamics must be adapted to fit the target reader expectations, i.e., expanding (German→English translation) or reducing the “given” portions of information (English→German translation). If the source text register is to be maintained, no such restructuring on the macro-level has to occur. As far as Information Packaging phenomena are concerned, contrastive ST register norms most probably do call for changes in the “given”-“new” arrangements but these are less fundamental since they affect the micro-level of the text, and can thus be effected ad hoc.

It is important to note that the translation problems resulting from cross-culturally differing ST registers cannot be solved in absolute terms but only relative to the basic decision of whether the translation function is to be kept constant (= no restructuring of “given”-“new” arrangements on the macro-level with possible ad hoc restructuring of Packaging phenomena) or is to be adapted to fit the target culture (= restructuring of “given”-“new” units on the macro- and micro-levels).

In many cases, such as in the following examples, these basic decisions are not left to the translator to make but are specified by publishing houses or authors who want the translation done in a certain fashion. In our case, with Samuelson being a Nobel prize winner, the German translation was to preserve as much of the

author's original "style" as possible. The following examples reflect this source-text orientation since no changes were made in Information Dynamics, but some changes were nevertheless necessary on the micro-level.

### *Translation Examples of ST Discourse Phenomena*

#### INFORMATION DYNAMICS

##### *Title conventions*

As discussed above, a title or subtitle can serve various functions in its relation to the following text with the function of the title usually depending on cultural conventions.

In contrastive terms, it can be said that German ST register norms call for new-type titles (cf. Hellwig 1984:12), while English ST titles seem to be more flexible, serving the function of also attracting the reader by providing him with "given" information.

The following examples of sub-titles from Samuelson & Nordhaus, *Economics*, clearly follow English ST register norms, exposing the German reader to a different cultural norm. (The English original is followed by the authorized translation with page numbers from each given in parentheses.)

##### **English Original**

Inside the Black Box: Aggregate Supply and Demand (88)

To TIP or not to TIP (253f)

Consumers as Wizards? (415)

Roundaboutness (653f)

##### **German Translation**

Die 'black box' Makro-  
Ökonomie von Innen: Gesamt-  
angebot und Gesamtnachfrage  
(157),

TIP oder kein TIP - das ist die  
Frage (383f)

Jeder Konsument ein Hexen-  
meister? (639)

Der Produktionsumweg (357f)

Awash with profits (660f)

Schwimmen die Unternehmen  
im Geld? (357f).

In German, the “vocative” function inherent in the translated subtitles do not all conform to ST register norms, although they were largely preserved following the translation function of reflecting the source text-oriented register.

### *Initiating Information*

English academic texts often seem to start out with a very general statement, a practical example or a rhetorical question to “hook up” the “new” information following in the text to something that is “given,” i.e., to “tune in” the reader with the topic the author is about to discuss. They thus often feature “given/new” or “given-type” initiation. Although this may not necessarily always be the case, the English author seems to have the choice, whereas German ST register norms typically call for initiating an academic text with the object and aims of a study, i.e., with “new-type” initiation.

A fitting example, therefore, is that Samuelson & Nordhaus start out their textbook with the rhetorical question:

#### **English Original**

Why study economics? (3)

#### **German Translation:**

Wozu soll man überhaupt  
Wirtschaftswissenschaft  
studieren. Erfahrungsgemäß  
. . . (27).

This question would seem rather unusual to a German student who at the point when he starts reading an introductory textbook has already made his decision to study economics.

Again, the German translation reflects the English reader-oriented ST register norms but resorts to German “Packaging” norms to make the text less “alien” to German readers: in the present case by avoiding the direct address of the reader and using the depersonalized general pro-form of *man*.

### *Information Sequencing*

ST register in German follows a fairly rigid “new-type” information sequencing pattern, proceeding from information on the text’s or study’s object, aim and set-up to describing its methodology and results, presenting large “new” chunks of information in an orderly sequence expected by the academic reader.

In English ST register, on the other hand, information sequencing does not seem to necessarily follow such a rigid sequence, but arranges “new” chunks of information alternating with “given” information (examples, redundancies, specific reference; see below), thus helping the reader relate to and integrate the “new” messages with something already known. English ST register thus seems to give the author a choice between “new,” “given/new” or “given-type” information sequencing.

In Samuelson & Nordhaus, “given-type” information sequencing is primarily used as illustrated in the following passage, which appears under the subtitle “Transactions Demand”:

**English Original:**

People and firms need money as a transactions medium. Households need money to buy groceries and pay for electricity and fuel bills as well as occasional large consumer durables. Firms need money to pay for materials and labor. These elements constitute the transactions demand for money . . . (315)

The author first talks about people and firms and their needs for money, thus progressing to explaining the concept of the transactions demand for money. The German reader would expect that “transactions money” be defined or at least be the topic of the subsequent paragraph or, in this case, the chapter.

The translation reflects English ST register in terms of Information Dynamics, although Information Packaging was adapted to reflect German ST norms by making more frequent use of nominalizations.

**German Translation:**

Die privaten Haushalte und die Unternehmen brauchen Geld zur Abwicklung von Transaktionen: Die Haushalte zum Einkauf von Lebensmitteln, zur Begleichung von Elektrizitäts- und Benzinrechnungen ebenso wie gelegentlich zum Kauf von langlebigen Konsumgütern. Die Unternehmen brauchen Geld zur Finanzierung von Material und Arbeitskräften. Aus diesen Komponenten setzt sich die 'Nachfrage nach Transaktionsgeld' zusammen. (Vol. I, 488).

We can see that target-text ST register norms do not necessarily require information re-structuring on the macro-level, but that a certain adaptation to ST register norms can be effected by resorting to target-text Packaging norms. Varying ST registers can thus be treated in the sense of a "displaced equivalent" (*versetztes Äquivalent*, Reiss/Vermeer 1984:160).

## INFORMATION PACKAGING

*Use of Examples*

The use of examples can be viewed from the perspective of their relative, dynamic frequency vis-à-vis other segments of the text or in their absolute static function of illustrating a "new" message by "en-coating" it into "given" information.

The following example from Samuelson and Nordhaus illustrates this category:

**English Original:**

But can misperceptions about wages and prices really lie behind deep depressions and persistent bouts of unemployment? Did it really take people a full decade to learn how hard times were in the Great Depression? Like *Rip Van Winkle*, did people fall asleep on the job in 1929 and not wake up until full employment returned in 1943? (342)

Here, the use of the "given" information (*Rip Van Winkle*) is combined with a set of rhetorical questions, which have an additional personalizing effect on the reader. Original German ST

register would probably not provide such an example in an academic text, but in the present German translation, Information Dynamics was kept and English ST register maintained.

**German translation:**

Aber können Fehleinschätzungen über Lohn- und Preisentwicklungen wirklich tiefgreifende Rezessionen und anhaltend hohe Arbeitslosenquoten heraufbeschwören? Brauchte man wirklich ganze zehn Jahre um zu begreifen, wie schlecht die Zeiten während der Weltwirtschaftskrise waren? Schiefen die Leute 1929 über ihrer Arbeit ein und wachten, *wie der nach 20 Jahren aus dem Tiefschlaf wiedererwachende Rip van Winkle*, erst wieder auf, als 1943 wiederum Vollbeschäftigung herrschte? (Vol. 1, 529).

Apart from the fundamental question of Information Dynamics and Information Packaging, the translation of examples is often complicated by the fact that they are culture-specific. They can only fulfil their function of providing the reader with “given” information, i.e., illustrative purposes, if the reader can relate to the quoted example. This may not be the case cross-culturally: Rip Van Winkle is a less prominent figure in Germany than in the U.S. Among the five strategies suggested by translation theory (Koller 1979 162-166), a “defining paraphrase” was chosen in the German translation (indicated in italics above).

***Personalizing a Message***

A statement can be made more personal by directly addressing the reader using “you,” “imperatives” and/or “rhetorical questions.” The combination of these devices to render a text more “readable” are particularly frequent in Samuelson & Nordhaus:

**English Original Example:**

*Be skeptical* of approaches that claim to have found the quick route to success. *You* can't get rich by consulting the stars (although unbelievably, some investment advisers push astrology onto their clients). (291)

The German translation eliminates the imperative and the direct address, which are still very uncommon even in general, common language texts and uses the impersonal *man* instead:

**German Translation:**

*Bei allen Aussagen, die für sich beanspruchen, einen schnellen Weg zum Erfolg zu weisen, ist Vorsicht geboten. Man kann nicht reich werden, wenn man auf die Sterne vertraut (obgleich es einigen Investment-Beratern wider besseres Wissen gelungen ist, ihre Kunden für die Astrologie zu erwärmen). (Vol. I, 455)*

**Redundancies**

Redundancy of information typically exists when information that is already “given” earlier in the text is used to “coat” “new” information.

**English Original:**

While this view may have some microeconomic merit, it misses the larger point that ‘the essence of monetary control *is to set legal reserve requirements too high*’. *By setting them so high*, the Fed can be assured that banks will not want to hold excess reserves and the Fed can thereby control the supply of money. (274)

In the first sentence “to set legal reserve requirements too high” is “new” information upon being introduced, but “given” information once the reader gets to the second sentence which provides the reasons for such a Fed policy as “new” information. This “new” information in the second sentence is now explicitly “en-coated” into the reiteration of the previous sentence’s information.

In German ST register, redundancies by reiteration of information are generally avoided. Instead, pronominal adverbs are often used to resume “given” information, leaving it to the reader to make the “linking” hypothesis between two sentences. This phenomenon is reflected in the following translation:

**German Translation:**

Während diese Betrachtung mikroökonomisch möglicherweise Vorteile bietet, geht sie insofern am Wesentlichen vorbei, als 'der Steuerung der Geldmenge der Grundsatz zugrunde liegt, daß die Mindestreservesätze bewußt zu hoch angesetzt werden.' Damit will die Zentralbank sicherstellen, daß die Banken kein Interesse haben, darüber hinaus Überschußreserven zu halten und kontrolliert so die Geldmenge. (432)

*Explicitness of Reference*

As a discourse phenomenon, explicitness of reference features the choice between specific vs. general reference. It seems to vary with more or less reader-oriented contracts and influences "closeness" or "distance" between reader and author. Specific information provides security by increasing the reader's ability to identify, which leads to more closeness than a general statement that is open to interpretation. Generalization opens room for doubt and thus insecurity, lowering the ability to identify and leaving a greater distance between reader and author.

By this packaging parameter English ST register also seems to reflect a closer author-reader relationship, as the following highlighted examples of specific reference show:

**Original English Example:**

An efficient market is one where all new information is quickly understood by market participants and becomes immediately incorporated into market prices. For example, say that *Lazy T-Oil Company* has just struck oil in the *Gulf of Alaska*. This is announced at 11:30 a.m. on *Tuesday*. When will the price of *Lazy T-'s* shares rise? *Wednesday morning* after J.R. has read the *Wall Street Journal*. Or perhaps *after lunch on Tuesday*, when the stock analysts have had time to chew it over a bit? Or perhaps *a week later*, after *Grandpa* has placed *his* order to *his* St. Louis broker? No, says the efficient market theory. (288)

In German, ST register calls for general reference—in analogy to the tenet that "good" theory needs to have a high level of generality and along with generality a high level of abstraction.

Following this precept, this whole example paragraph would probably be omitted, since the information (i.e., that all new information is incorporated into the market prices immediately) is already given in the first sentence. As a compromise between the German norm and the desire to keep the source-oriented register, the specific references to Lazy-T Oil Company and Grandpa were generalized.

**German Translation:**

Ein effizienter Markt liegt dann vor, wenn neue Informationen rasch von den Marktteilnehmern absorbiert und sofort in die Marktpreise integriert werden. Nehmen wir zum Beispiel an, *eine Ölgesellschaft* im Golf von Alaska sei gerade auf neue Ölvorkommen gestoßen. Diese Neuigkeit wird an einem Dienstag mittag um 11.30 bekanntgegeben. Wann würden die Aktienkurse *der Ölgesellschaft* steigen? Am Mittwoch früh, nachdem J.R. Ewing die Nachricht im Wall Street Journal gelesen hat? Oder bereits am Dienstag nachmittag, wenn die Börsenexperten in der Mittagspause Zeit genug hatten, die Neuigkeit zu verdauen? Vielleicht auch erst nach einer Woche, wenn *irgendwo irgendjemand eine entsprechende Order beim Börsenmakler* pliziert? Die Theorie des effizienten Marktes verneint all diese Fragen . . . . (Vol. I, 451)

*Terminological Co-Reference*

Using alternating paraphrases (= "given" information) for technical terms in an attempt to make the message more comprehensible to the reader is very common in ST register but can also lead to vagueness (Gerzymisch-Arbogast 1987, 1989). It is sometimes hard for the non-expert reader or translator to correlate alternating expressions to one underlying "meaning" of a term.

**English Original:**

We summarize as follows: The *demand for M (M1)* arises from our need for a medium of exchange, that is from a transactions demand. We hold currency and checking accounts to buy goods and pay our bills. As our incomes rise, the value of the goods we buy goes up and we therefore need more money for

transactions, raising our *demand for M*. The *transactions demand for M* will be sensitive to the cost of holding money. (317)

In this passage *the demand for M (M1)* is co-referent with *demand for M* and *transactions demand for M*, (with M being set equal with M1 earlier). The resulting vagueness is kept in the following translation:

**German translation:**

Wir fassen also wie folgt zusammen: *Die Nachfrage nach Geld (M1)* entsteht aus dem Bedürfnis nach einem Tauschmittel, das heißt, aus einem Bedarf an Transaktionsgeld. Wir halten Münz- und Papiergeld, ebenso wie scheckfähige Einlagen zum Kauf von Gütern und zur Begleichung unserer Rechnungen. Bei steigendem Einkommen steigt auch der Wert der gekauften Güter, und zur Abwicklung von Transaktionen brauchen wir zusätzliches Geld. Damit steigt unsere *Nachfrage nach M1*. Die *Nachfrage nach Transaktionsgeld* reagiert empfindlich auf die Kosten für die Geldhaltung . . . . (Vol. I, 491).

*Varying Degrees of Discourse "Formality"*

In English ST register, the line between the written and spoken modes of language does not seem to be as clear-cut as it is in German, where the use of everyday speech and colloquialisms in ST texts is uncommon. Again, using "common language" can be viewed as presenting the reader with something familiar from everyday experience (= "given"), with which it is easier and more comfortable to identify rather than with abstract Latin or Greek terms.

Examples of "formality" are numerous in Samuelson & Nordhaus:

**English Original:**

Those who have studied the performance of chartism say, 'The chartists generally *end up with holes in their shoes. So forget it.*' (291)

**German Translation:**

Erfahrene Investoren sind allerdings der Meinung, daß die Chartists *auf verlorenem Posten stehen und ihre Methode wenig Aussicht auf Gewinn verspreche*. (Vol. I, 455)

Or the description of the 1929 stock market crash:

**English Original:**

The *bottom fell out of the market . . . . The market fell still further . . . . The soaring bull market was over. The sagging bear (declining) market had taken its place. And as the former had lived on its dreams, so the latter was consumed by its own nightmares*. (286).

**German Translation:**

Die Kurse *fielen ins Bodenlose . . . . Der Markt drückte die Kurse immer weiter . . . . Die phantastische Hausse war vorüber. An der Börse herrschte die Baisse. Und wie zuvor die Hausse vom Optimismus gelebt hatte, so wurde die Baisse von dem durch sie hervorgerufenen Pessimismus genährt*. (Vol. I, 448).

The more “formal” pattern in German is achieved by:

- the use of “dissociated” terms (Leisi 1974:57ff) as in the case of the French terms *Hausse* and *Baisse* (for the metaphoric bull and bear markets) and expressions like *Optimismus*, *Pessimismus*;
- substituting colloquialisms for more formal expressions (English: *end up with holes in their shoes; forget it*; German: *auf verlorenem Posten stehen; wenig Aussicht auf Gewinn versprechen*);
- lengthy premodifiers instead of relative clauses (English: *its own nightmares*; German: *den durch sie hervorgerufenen Pessimismus*).
- “displaced” equivalents, i.e., using formal ST register features wherever possible to balance the “colloquial” effect of the English original (like using complex function verbs: ‘keine zusätzlichen Mittel zur Verfügung haben’ instead of just the verb *verfügen*).

### *Concluding Remarks*

The examples quoted are neither complete nor representative. Systematic analyses need to follow to include phenomena using the reverse direction, i.e., German→English translations which involve constant or varying translation functions and as such, ST register adaptations. It would be interesting to investigate cases when “given” information needs to be added or expanded in English to make original German texts more “readable.” For instance, this might make it possible to substantiate (or reject) Bettelheim’s criticism of the translations of Freud’s works into English or at least explain why they impress the English reader as “abstract” and “scientific”:

[The erroneous or inadequate translation of many of the most important original concepts of psychoanalysis] makes Freud’s direct and always deeply personal appeals to our common humanity appear to readers of English as abstract, depersonalized, highly theoretical, erudite, and mechanized—in short, ‘scientific’—statements about the strange and very complex workings of our mind . . . the translations attempt to lure the reader into developing a ‘scientific’ attitude toward man and his actions, a ‘scientific’ understanding of the unconscious and how it conditions much of our behavior. (Bettelheim:5)

Perhaps the problem lies in that Freud’s excellent translators, for whatever reason, did not make the necessary switch to the more reader-oriented English ST register by providing more “given” information! (Gerzysmisch-Arogast 1992)

#### NOTES

1. LSP is the acronym for Languages for Special Purposes, referring to all scientific and/or technical communication.
2. For reasons of space, this cannot be discussed in detail in this paper. The interested reader will find detailed and formal “given”-“new” analyses in Gerzysmisch-Arbogast (1987).

3. It is a generally acknowledged fact that English scientific texts are "easier to read," i.e., less theoretical and abstract than their German counterparts.

4. Since no statistical material can be presented, the problems discussed are of an exemplary nature and can thus only have a heuristic value.

5. Lewandowski (1985:833) still regards register to be "characteristic syntactical and lexical patterns, formed by speech events in similar situations" (translation by H. G.-A.). Some authors identify it with style (*Stilgattungen*, Benes 1969) or language variety. The most fitting discussion seems to be the London School's two-dimensional approach, differentiating between user-related language varieties (such as geographical, temporal, social or idiolectal dialects) and use-related varieties, i.e., registers (Halliday, McIntosh and Strevens 1964). Catford's example is also interesting in this context: "By register we mean a variety correlated with the performer's social role on a given occasion. Every normal adult plays a series of different roles—one man, for example, may function at different times as head of a family, motorist, cricketer, member of a religious group, professor of biochemistry and so on, and within this idiolect he has varieties (shared by persons and other idiolects appropriate to these roles). When the professor's wife tells him to 'stop talking like a professor', she is protesting at a misuse of register" (Catford 1965:89)

6. Representative of this trend are Drodz and Seibicke (1973), Bungarten (1981), and Fluck (1985).

7. A detailed and systematic account of these LSP-markers in English can be found in Beier (1980:41-80).

8. This is typically epitomized by the theme/rheme, topic/comment, given/new controversy over the appropriate level on which the phenomenon should be described (Is it a syntactic, semantic or pragmatic phenomenon?), resulting in a flood of inconclusive "definitions" of the concept. For reasons of space this will not be discussed here; a detailed account of the various approaches can be found in Lutz (1981); cf. also Gerzymisch-Arbogast 1987:27-95). Cognitive "given-new" research in the US is largely process-oriented, focussing primarily on the psycholinguistic dimension of the concept (Clark 1977) and the thematisation process in discourse (Brown/Yule 1983) while European approaches generally focus on the (formal) description of the phenomenon (Mudersbach 1981 as applied in Gerzymisch-Arbogast 1987; Sgall/Hajicova 1987).

9. This may be done by a variety of thematic progression types (Danes 1970, Gerzymisch-Arbogast 1987) with the static constant theme progression being regarded as typical for LSP communication (Benes 1981). We expand this idea here by suggesting that, within the universal progression types, LSP texts seem to be differently "organized" in terms of "given-new" information chunks and that this variance is culture-specific. For instance, in German it is common practice to start out an academic text or article with "new information," i.e., proceeding from (1) (intended) subject area and (2) (intended) objective of the study, followed by its methodology, set-up and organization, which seems to be different in English.

10. This version of a "given-new" contract between author and reader extends the notion described by Clark/Havilland (1974) and Clark (1977), in that it proceeds from the relative parameter of individual perspectives of the communicative partners (Mudersbach 1981 as applied in Gerzymisch-Arbogast 1987) as a fundamental prerequisite for describing information processing in a successful communication process.

11. Grice proceeds from five conversational maxims:

"Make your conversational contribution such as is required, at the stage at which it occurs, by the accepted purpose or direction of the talk exchange in which you are engaged." (1975:45)

Of the other four maxims (Quantity, Quality, Relation and Manner), at least the "manner" principle seems to be open to cultural variation:

"Finally, under the category of MANNER, which I understand as relating not (like the previous categories) to what is said but, rather, to HOW what is said is to be said, I include the supermaxim - 'Be perspicuous' and various maxims such as: 1. Avoid obscurity of expression, 2. Avoid ambiguity, 3. Be brief (avoid unnecessary prolixity), 4. Be orderly." (Grice 1975:46)

We can see that 3.) and 4.) certainly are not absolute standards (does "being brief" have the same value in Spanish as in English and is what is considered "orderly" in German the same as in English?), but may vary with culture. It is interesting to note that the cooperative principle is sometimes intentionally violated to provoke the alienating effect in modern absurd plays (cf. Gerzymisch-Arbogast 1988).

12. For a more detailed description of title functions and their relevance in translation, see Nord (1988).

13. This is—after dedications—the beginning of Harvey's famous book and must not be confused with "The author's motives for writing," which follows later as a separate Chapter I.

14. Examples for this parameter have been omitted here because of space restrictions.

15. Again for reasons of space, examples have been omitted.

16. The problems of cross-cultural specificity of objects and/or events or proper names is not limited to translation theory (Newmark [1981:70-83] provides a detailed account), but has interestingly also been raised in contexts that are not necessarily primarily translation-oriented such as in Hofstadter, D. (1979:379): *Gödel, Escher, Bach: An Eternal Golden Braid*.

17. Using imperatives is particularly infrequent in German and is not even used in texts with a typical "imperative," i.e., directive message, like fire escape directions or cookbook recipes, which use infinitive or impersonal constructions instead. Un-restructured direct translation of English imperatives into German imperatives can typically result in unacceptability of the message. For example, the translations of US management guides or textbooks notoriously sell badly in German translation. This may be because it would belittle and offend the German reader to be directly ordered to do things, especially at the management level. As Güttinger (1963:138) puts it, "[der Leser möchte nicht] durch das ganze Buch hindurch mit 'du' angerempelt [werden]."

18. Lyons (1977:1) sets an example by his convention to use terms only in their defined sense and marking them accordingly, a strategy that would certainly be most welcome by translators of ST texts.

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# *The Challenges of Simplicity and Complexity: German-English Modes and Interrelationships*

RICHARD K. WATT

## *Introduction*

Both very simple and very complex structures pose a threat to the unwary translator of German technical texts. The following specific examples reveal reliable strategies that can aid translators in navigating even the most treacherous waters.

## *Simple Basics*

In technical writing, even simplicity may be relative, and literal translation of apparently simple sentences may be as wrong-minded as unnecessary length and complexity: i.e., simplicity may not necessarily guarantee respectability of character.

*Je Kommando ist ein Eintrag einzugeben oder zu ändern.* (1)

A literal, ostensibly simple version dictates:

An entry is to be input or changed for each command.

Oddly, this solution misses the mark significantly, and a clear, idiomatic English version must be thought out with some care

based on the broader context. An obvious (and technically correct!) approach seems, inevitably, to result in false starts: “Each command . . .” / “An entry [should/must].” Finally, resourceful recasting provides an accurate solution:

A command is required for any entry or change.

If, however, the offending sentence appears in a series of instructions, an even more idiomatic English solution would be to use a direct imperative:

Issue a command to input or change an entry.

The next example, although deceptively simple, is strangely inaccessible because of *belastet*:

*Durch die Meßpunkte soll die Vermittlungstechnik möglichst wenig belastet werden.* (2)

Since English telecommunications terminology does not include “burden,” the ubiquitous “load” can be used here, but it is necessary to convert the German verb “belastet” to a noun:

The call-processing load due to test points should be reduced to a minimum.

Yet it is tempting to go one step further, for clarity:

The increase in CP load due to test points should be minimized.

If the context permits, direct address would be even simpler:

Minimize the increase in CP load due to test points.

Dubious usage and style may make it difficult to capture the right English nuance:

*Weitere Zugriffe auf dieselben APS-Dateien sind somit zeitlich vernachlässigbar.* (3)

The first inclination is to pounce on the neat verb concept “cannot be accessed,” but the transformation leaves us with a troublesome *zeitlich*. Using the convenient *future* to translate *weitere* cancels *zeitlich* due to a fortuitous semantic link; a final semantic leap nicely snares the meaning:

Future access to these APS files is irrelevant.

Transformations are required to solve the following problem:

*Voraussetzung für das erfolgreiche Einrichten ist, daß bei der Generierung des SW-Systems Vorleistungen getroffen wurden.* (4)

A characteristic change of noun phrases to verb phrases reduces volume and injects Anglo-Saxon idiom:

A successful setup requires pre-engineering when generating the SW system.

An equally valid option enlists the use of the verb *ensure*:

Pre-engineering when generating the SW system will ensure a successful setup.

### ***More Basics: Straightforward, “Linear” Clauses***

German style is notoriously rich in static nouns. The following simple sentence contains five of them:

*Dieses Tool soll erst durch den Einsatz der Entwicklungsstellen auf volle Funktionalität und Einsetzbarkeit überprüft werden.* (5)

Assimilating *Einsatz* into an active verbal structure helps to reduce the surfeit of nouns. *Funktionalität und Einsetzbarkeit* represent an

example of the near-synonym pairs common to German technical style (*Steuern und Regeln, Qualitätssicherheit und -Steuerung, etc.*) that can lead to redundant over-explicitation in the English target text. It can be argued that *fully operational* implies both *functionality* and *applicability*:

Development should check this tool first to verify whether it is fully operational.

Simplification may involve a transformation from an “in-case” hypothesis to a matter-of-fact infinitive:

*Es wird sofern berücksichtigt, daß CC die Aufträge zum Splitten von SN und MB ablehnt, falls dies einen Totalausfall verursachen würde.*

Note that CC will reject requests to split SN and MB to prevent a complete breakdown.

German cause/result clauses can easily be reversed in the translation: the result clause (“therefore”) is canceled by subordinating the opening clause with “since”:

*Die Anordnung der SMD auf nur einer Leiterplattenseite erfordert weniger Arbeitsgänge und ist daher zu bevorzugen.* (7)

Since the configuration of SMDs on only one side of the pc board requires fewer operations, it is preferred.

Style is now critical: the sentence is top-heavy, and the conclusion too abrupt. A reversal of ideas is in order:

SMD configuration on only one side of the pc board is preferred because it requires fewer operations.

Now, combine the main subject and verb for the best idiomatic version:

The SMD should be arranged on just one side of the pc board because this configuration requires fewer operations.

The final example in this section presents a series of short German dependent clauses, which would result in a choppy presentation if transferred literally into English. The proposed solution shows how to develop a linear idea to flow over and through multiple clauses with a leveling effect:

*Wird mehr als ein Parameter angegeben, so kommt der Benutzer erst in ein Auswahlmenü, in dem er entscheiden kann, welche Datei zur Umdefinierung der Funktionstasten benutzt werden soll.* (8)

The procedure for solving this translation problem is easier to describe if we break it into a series of steps:

- 1) Convert the general language formulation *kommt in* to the "technical" verb *accesses*.
- 2) Merge semantic elements from two clauses into a single verb (*entscheiden kann, welche* ⇒ *to select*).
- 3) Convert the verbal noun *Umdefinierung* into a gerund (*for redefining* eliminates *-tion + of*, which would have resulted in an overly wordy string of prepositional phrases).

These transformations result in a simple sequence of verbs that form a straight line pointing directly to the solution, ensuring linear access to meaning:

If more than one parameter is specified, the user first accesses a menu to select the file for redefining the function keys.

### *Tied Up in "Not"s*

Having demonstrated the problems posed by simple structures, let us now plunge headlong into complexity: technical German seems to favor a negative approach: obliqueness often results from the highly favored (and misguided) use of multiple negatives:

*Bei solchen Verfahren ist es nicht mehr gesichert, daß Produktionsdateien nicht manipuliert werden können, wodurch großer Schaden entstehen kann.* (9)

A positive solution is necessary to eliminate juxtaposition of the two phrases "do not guarantee / that they cannot be manipulated." Manipulation (of the verb!) is required to convey (lack of) possibility (*nicht gesichert*) and interaction with the subsequent negated verb:

These procedures may encourage manipulation of production files, causing great damage.

Negative environments tend to complicate structures and ideas:

*Die Zustandsanalyse soll weitgehend verhindern, daß durch Lücken im HW/SW-System der Fehlererkennung oder durch äußere Einflüsse zentrale Betriebseinheiten des SSP113D un bemerkt nichts zur Leistung des SSP113D beitragen.* (10)

A first (already slightly refined) stab at the beast might suggest the opening: "should prevent from going unnoticed the fact that" or even "should not allow the fact to go unnoticed that." When the sentence is analyzed with the intent of expressing the inherent meaning instead of duplicating the surface structures of the German sentence, a simpler formulation becomes evident:

Status analysis should reveal that the central operating units do not contribute to the performance of the SSP113D due to, etc.

The adverbial structure “erst nach” perennially poses problems in sorting out adverbial relationships in the English target sentence:

*Um zu verhindern, daß im Falle einer Überlast die übriggebliebenen Einträge erst nach der nächsten Meldung gespeichert werden, wird beim Start des Prozesses ein zyklischer Timer aufgezogen, der den Prozeß regelmäßig macht.* (11)

Down-to-earth Anglo-Saxon sequencing patterns favor reporting events in the order of their actual occurrence, hence the Anglophone ear abhors the literal solution “preventing the fact that the entries are not stored until after.” As in Example 10, expressing the concept in the positive mode provides a quantum leap directly to the meaning of the sentence:

To ensure that the remaining entries are stored before the next message in case of an overload, a cycle timer is used to initiate the process, etc.

### *Quantities and Capacities*

Numbers, averages, percentages, ratios and proportions may seem innocent enough, but too often require tricky rephrasing. In the following example, an adverb (*mehrfach*) *must* become a noun phrase:

*Da die Datei nicht mehrfach angelegt werden muß, wird Platzverschwendung vermieden.* (12)

Space is not wasted since multiple copies of the file are not required.

Or one action may be played off “at the expense of” another:

*Man spart in diesem Fall die Analyse von 15 Moduln zu Lasten der Kopierungen von 6 Dateien.* (13)

After several translation “phases,” the following emerges:

This procedure avoids the need to analyze 15 modules by copying 6 files.

The “dangling” comparative employed in the following German sentence would defeat immediate understanding in English:

*Für eine lokale Applikation können nicht mehr entfernte Applikationen eingerichtet werden als diese verarbeiten kann.* (14)

A brave initial attempt does not quite yield victory:

No more remote applications can be created for a local application than this application can process.

This hopeful option remains awkward: *no more* is too far removed from its resolution, *than*. Use of *not any more* provides no improvement in this case, and the delayed connection between *more* and *than* still results in a doubletake.

Two alternatives come to mind:

A greater number of remote applications cannot be created for a local application than this application can process.

Or “as many . . . as” might replace the comparative:

Only as many remote applications can be created for a local application as the local application can process.

A similar strategy was applied in another awkward situation:

*Tabelle um dem neuen Typ entsprechend viele Plätze erweitern.* (15)

Literalness (“many fields corresponding to”) produces a startling failure. The situation demands major rephrasing, again prescribing a direct imperative:

Extend the table by as many fields as the new type requires.

### *Combinations, Averages, Proportions*

The need to combine an assortment of elements is sometimes self-evident. Some ingenuity is needed to untangle knotty thoughts to produce a direct, “linear” version:

*Zulässig ist jedoch die in der Praxis vorkommende, weitgehend parallele Entstehung beider Papiere, die fast gemeinsam zur Reife gebracht werden.* (16)

English is rich in specific meaningful verbs, which the translator can use to solidify the action beyond the impotent combination of *zulässig ist* with the noun structures *Entstehung* and *zur Reife bringen*:

Standard practice allows the documents to be generated and completed together.

It is not uncommon for a German writer to draw on near synonyms to create a well-balanced original sentence that avoids surface redundancy but that causes problems if English lacks a variety of synonyms for the concept being invoked. A literal translation of the following example would produce a startling surfeit of *averages*:

*Dies muß beim Vergleich mit Schmalbandanwendungen berücksichtigt werden, da hier die Nutzung über die breite Masse der Durchschnittsnutzer gemittelt wird.* (17)

For readability, the translator must recast the three *averages*: *über die breite Masse*, *Durchschnitt*, and *gemittelt*.

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This factor must be considered when making comparisons with narrowband applications, since normal utilization by the entire spectrum of average users is involved.

Any English version must improve the stylistically questionable use of a repetitive “umso mehr . . . je mehr . . . je mehr” construction in the following example:

*Die Funktion “ETB gesamt regenerieren” benötigt umso mehr Zeit, je mehr Daten aus der SWU-DB übernommen werden und je mehr NICHT-SWU-Einträge im ETB bereits vorhanden sind.* (18)

An awkward copycat recital of “the more . . . the more . . . the more” must clearly be outlawed:

The time required for the function “Regenerate entire ETB” increases in proportion to the SWU-DB data and the NON-SWU entries already in the ETB.

The negative modifiers below clearly identify specific qualities:

*Um auch die noch nicht freigegebenen MRP zu berücksichtigen, die auf das Projekt zeigen aber noch nicht produziert sind, werden diese gesucht und der obigen Menge hinzugefügt.* (19)

To achieve the clarity of the original in the target text, the translator must recast the basic concept in English idiom:

To include the unreleased, project-specific MRPs not yet produced, they are searched for and added to the above list.

However, infinitive clauses can more comfortably be replaced by a subordinating conjunction, particularly “since”:

Since the unreleased, project-specific MRPs not yet produced should also be included, they are searched for and added to the above list.

An alternative strategy would use “so that” and switch the subject:

The unreleased, project-specific MRPs not yet produced are located and added to the above list so that they can also be considered.

Now the Main Clause—in awesome capitals—appropriately states the complicated information, while the dependent clause contains the simple conclusion: a pronoun and a verb. However, if the context allows, a direct imperative would provide the most straight-forward solution. In an in-house translation where a certain level of jargon would be permissible, the slightly awkward “not yet produced” can also be eliminated:

Locate unreleased, project-specific MRPs in the pipeline and add them to the above list so that they can also be considered.

### *Categories: Separate and Equal*

Distinct references and specific assignments are a constant feature of any technical exposition. The following example again demonstrates the conversion of a verbal noun into an direct imperative verb.

*Klassifizierung der Meßergebnisse nach Auswahl je einer gespeicherten Pegel- und Geräuschschablone.* (20)

Classify the test results by selecting one pattern each from the stored level and noise patterns.

Ordinarily, use of the adjective “respective” proliferates to an alarming degree in overly literal technical translations; yet it can often be avoided. This usage is reflected, somewhat obliquely, here:

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*Die Steuerungen zur Ausgabe von Display und Tone durch je ein Flag müßten um ein Flag zur Steuerung der Ausgabe von Sprache erweitert werden.* (21)

Anglo-Saxon idiom requires some internal transformations to prevent a disjointed and muddy version:

The display and tone controllers, which assign one flag to each function, would have to add another flag for controlling speech output.

A more complex example concludes this section:

*Besteht ein Meilenstein aus mehreren Schalen, so werden die Schalen bei einem Setz-Auftrag für den Meilenstein einzeln, nacheinander gesetzt, wenn sie erreicht sind.* (22)

The *Meilenstein* redundancies must be eliminated. Use of a noun-adjective string and properly positioned pronouns results in a straightforward, more concise sentence:

Translation 1: If a set job is executed for a milestone [consisting] of several shells, each shell is set as it is reached.

Translation 2: A set job for a multi-shell milestone sets each shell as it is reached.

### *Identical Differences*

The more dubious the syntax, the greater the challenge:

*Um die Abläufe weitgehend mit den bisherigen Abläufen identisch zu behalten, jetzt aber pro LINE bzw. Satzanschluß mehrere unterschiedliche sogenannte Satzanschlußdaten auftreten können, erscheint das Einrichten von fiktiven LINES sinnvoll.* (23)

The train of thought is interrupted by a turgid embedded clause that splits the sentence and delays the core meaning by adding information at the wrong time (and the wrong place!). This can be avoided in translation by placing the middle clause at the beginning or end of the English sentence and reducing the overwhelming redundancy by omission:

Since several different line data may exist for each LINE, it may be advisable to set up pseudo-lines to keep both previous and current sequences basically identical.

Or: “. . . pseudo-lines should be set up . . . .”

### *Clauses, Demonstratives—and Breakdowns*

The following severely segmented sentence illustrates several problems:

*Wird ein Patch formelmäßig erfaßt, so ist es nicht zulässig, daß formale bzw. Syntaxfehler erst beim “on line” in der Testanlage auffallen und der Test deshalb abgebrochen werden muß.* (24)

The unfortunate combination of hypotheses, adverbials, negatives and alternatives is terminated by the dizzying effect of an abrupt coda (“therefore!”). As noted in the Example 11, the *nicht . . . erst* construction in the German sentences requires a shift to the positive mode—an apparently drastic step designed to make “the rough places plain”:

If a patch is recorded in a form, format and syntax errors should be detected before they are displayed “on-line” in the test system so that the test does not have to be aborted.

Although grammatically legal, the proliferation of articles (which constitute almost half the sentence!) in the following

example creates a staccato pattern that punctuates the “style” of a statement describing speech paths and messages:

*Das bedeutet, die LDI0 bedient zusätzlich zum Sprachweg und Meldungsverkehr des eigenen Steckplatzes den des Steckplatzes der DIU2 und die LDI1 den des Steckplatzes der DIU3.* (25)

English sensibilities require a more legato version:

LDI0 supports the speech and message channels of the DIU2 cable connection as well as its own; LDI1 supports those of the DIU3.

### *Centrifugal Motion and Miracles*

The translator must be adroit to escape hidden whirlpools:

*Hinter den in 3.1 definierten Sequenzen stecken Aktionen, hinter denen sich wiederum “intelligente” Routinen verbergen.*

A resourceful verb transfer combined with a reversal of subject and predicate provides a less vertiginous solution:

The sequences defined in 3.1 imply actions, which in turn imply “intelligent” routines.

Another text rotates around the subject and object, which pose the threat of becoming near-synonyms in translation:

*Die oben vorgeschlagene Lösung stellt nur eine punktuelle Entschärfung der Verkehrsmessung dar.*

It would be easy for a translator to be sucked into the maelstrom with “the suggested solution represents a solution . . .” Transformation of the adjective/noun structure in the source text to a target-text noun (*vorgeschlagene Lösung* ⇒ *suggestion*) and “the above” to “this” puts him/her back on the straight path to an effective target text. A second echo (*nur eine punktuelle*) could be

dampened by another reduction: *point-by-point* ⇒ *specific* (optional!):

This suggestion represents only one (specific) solution to the traffic measurement problem.

Ostensibly this translation appears to be quite respectable. If one were not especially knowledgeable about the system being described, it would probably never occur to him to introduce any further change in the sentence. In this case, however, familiarity with the process inspired a hunch that led to the following revision, which represents a subtle change in meaning:

This solution affects only traffic measurement problems.

At this point, the document introduces a commentary on this text by another German engineer, who expresses the meaning of this sentence in his own words:

*Die in der Notiz beschriebene Lösung betrifft nur die Verkehrsmeßprozesse.*

This miracle of a same-language Rosetta stone, clearly another German version of the first sentence, has “deciphered” the turgid and pompous original. And the translator’s second extrapolated English version is vindicated!



# *The Inappropriateness of the Merely Correct: Stylistic Considerations in Scientific and Technical Translation*

SUE ELLEN WRIGHT

## *The Relevance of Style to Technical Translation*

A lively debate has continued for many years between those translators who maintain that technical translation does not need to concern itself with matters of style and those who assert that all writing, whether it be technical, journalistic, literary, etc., should be designed to conform to the stylistic conventions that reflect the specific expectations of the target audience. At the outset, it is important to note that by "style" I am using the word in the broad sense that is understood by most American translators. In this regard, style refers to a wide scala of considerations, ranging from the overall structural form of the entire text to lexical choice at sentence fragment level. It is the thesis of this paper that the full gamut of these factors plays a role in selecting appropriate translation solutions.

The view that stylistic factors are of little relative importance is most often espoused by in-house translators who have had the specific experience of producing "for-information-only" texts for use by scientists and researchers who only need to maintain a general awareness of foreign research trends in their technical fields. On the one hand, if these translations are consistently meeting the needs of their clients in an economical environment, it is difficult to fault their performance. On the other, it can be

noted that indicative machine translation may serve this purpose just as adequately and perhaps more economically than human translation.<sup>1</sup>

In contrast to indicative translations generated strictly for in-house research purposes, translations produced for the purpose of communicating with individuals outside corporate structures must conform to the same criteria that are imposed on original source texts in the target language intended for the same audience. In the modern commercial/industrial environment, high quality documentation implicitly communicates an overall, company-wide commitment to high quality products, user-friendly operation and responsive customer support. In fact, in light of current stringent customer/supplier quality audits, very few significant documents exist that companies can classify as non-critical with respect to content and presentational features.

On the in-house level itself, all documentation used by corporate personnel should also be written in perfectly clear English to avoid expensive errors and time-consuming inefficiencies. Nor should the psychological impact of "foreign" English be ignored: well-written, idiomatic English favorably predisposes native-tongue English speakers to the constructive use of materials, whereas even minor flaws in usage contribute to the "them" and "us" mentality that can seriously undermine worker morale in multi-national companies. Documents must speak "the language" of the target audience and should resemble other texts produced within that particular language community and subject domain. Furthermore, target language texts should in no way offend ethnic, sexual or other culture-related sensibilities. In some cases, differences in text type applications from language/society<sub>1</sub> to language/society<sub>2</sub> require drastic revision of even apparently straight-forward, factual documents. These considerations frequently require that the translator move beyond *merely correct* strategies in terms of lexical and grammatical content in order to account for *stylistically appropriate* solutions. The presentation will provide concrete examples where significant lexical, syntactic and even organizational transformations at the macrotextual level are required to ensure that the target audience will both understand and be favorably disposed to the translated text.

## *Text Types Requiring Careful Stylistic Modeling*

Typical types of texts requiring high quality content, as well as stylistic and typographical features, include:

- **All levels**  
Computer user interfaces and documentation
- **In-house documentation**  
Application-oriented documentation  
Bench-level operating and Quality Assurance instructions and procedures  
Materials resources planning documentation, routings, etc.  
Personnel management documentation
- **Client/customer-related documents**  
Advertising, marketing and product literature  
Proposals and purchase agreements  
Operating and service documentation  
In-house documentation subject to Quality Assurance external audit procedures  
General and technical correspondence
- **Supplier-related documents**  
Bid tenders and purchase agreements  
Material specifications  
Machine and project descriptions  
Supplier Quality Assurance requirements and related forms

### *Stylistic Levels*

As previously noted, the ideal text product in these cases should “read like” an original source language text to the extent that the user is unaware that it was ever translated in the first place. In order to achieve this kind of seamless, highly “user-friendly” target text, the translator must be clearly aware of the

appropriate stylistic considerations that must be brought to bear on target text production at four basic levels:

- the situation level
- the macrocontextual level
- the microcontextual level
- the terminological unit level.

The *situation level* describes the external environment out of which the source text evolves and for which it is created, coupled with the parallel (or in many cases, asymmetrical or heterovalent) environment that is the locus of the target text.

The *macrocontext* represents the global environment of the entire text itself, or of extended sections thereof, specifically the structural coherence established throughout the text and the logical interaction of its constituent parts.

The *microcontext* delimits the local environment surrounding terminological units that are the primary carriers of technical meaning within the text.

*Terminological units* comprise the smallest units of discourse that must be accounted for during the conversion process and may consist of the individual words (lexemes and terms, phraseological material in the form of collocations, set phrases, and even standard texts (“boilerplate”).<sup>2</sup>

In actual practice these four levels interact with one another. In many cases, individual factors that affect one level play a role in determining the scope of the next level as well. The illustrations on the next two pages provide a clear overview of these relationships:

### *Situation and Macrocontext*

Figure 1 provides a schematic representation of the situational level for the first of my sample texts, as reflected in the following details:<sup>3</sup>

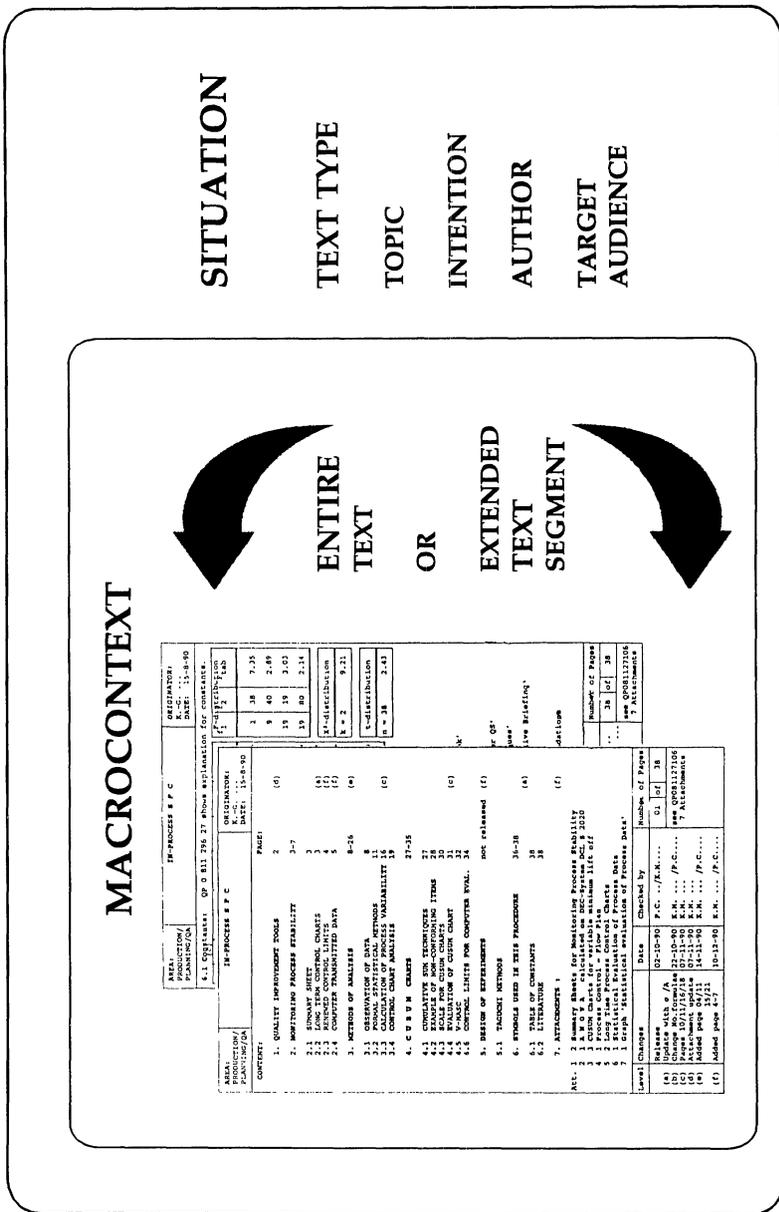


Figure 1: The macrocontext seen within the situational context

- *Source text type:* *Quality Assurance (QA) Procedure*
- *Specific topic:* *In-Process Statistical Process Control (SPC)*
- *Purpose:* *Description of in-house procedures*
  - *for instructing in-house QA personnel*
  - *as documentation for external QA audit*
- *Author:* *Non-native English speaker working in the UK*
- *Target audience:* *QA technicians and administrators, speakers of UK-English*
  
- *Target text type:* *Ditto above*
- *Specific topic:* *Ditto above*
- *Purpose:* *Ditto above*
- *Translator/Revisor:* *Native speaker of US English*
- *Target audience:* *QA technicians and administrators, speakers of US English*

Figure 1 also represents the macrocontextual level, i.e., the entire body of the text itself, from beginning to end. In this illustration, the macrocontext is graphically outlined by a detailed table of contents that clearly states the logical superstructure of the text. The macrocontext itself, however, consists of the entire text.

As indicated from the outline showing the situational components of this text, the intention of both the source and target language authors, as well as the application of the text and the expectations of the source and target audiences are sufficiently identical to indicate that there are no obvious inconsistencies between the source and target language texts at the macrocontextual level.

### *Situational and Macrostructural Heterovalence*

The relationship between source and target texts does not always represent the kind of symmetry reflected in this first

example. In some instances, the external expectations of the target audiences differ enough to indicate that significant changes should be made in the target language text. For instance, a typical text taken from a German company newsletter contained the following passage from a description of the parent company's Department of Sales Engineering:

*[Several paragraphs of text outlining the exact duties of various members of the department and their working environment.] Ausgerüstet ist diese Werkstatt mit allen erdenklichen Maschinen und Hilfsmittel . . . .*

*Natürlich geht es nicht ohne Papierkram, darum hat diese Abteilung auch ihre "gute Seele". Frau W. . . . kocht nicht nur guten Kaffee, erledigt die Korrespondenz und schreibt die Angebote, nein, sie erinnert auch mal ihre Herren an Privates wie Geburtstage der Frau/Freundin und ähnliches.*

The actual translation of this passage poses few problems, although we could probably discuss the best solution for *gute Seele* at some length if we were so inclined:

The workshop is equipped with every conceivable machine and accessory . . . .

Naturally, none of this activity would be possible without the eternal paper chase, so the department is not without its distaff side. Ms. W. . . . not only makes good coffee, takes care of correspondence and writes up proposals, no, she also remembers private matters on occasion, such as birthdays for wives and girlfriends and the like.

Needless to say, female engineering and clerical staff in the company's US subsidiary or, even worse, female US purchasing representatives for potential US clients, might well recoil in horror if this passage were retained as a direct translation. Any translator with the company's best interests at heart would suggest modifying the text to reflect the predictable cultural expectations of the target audience:

Naturally, none of this activity would be possible without the eternal paper chase. Ms. W. . . . provides a strong organizational focus for the department, takes care of all correspondence and writes up proposals. . . .

This item is, of course, a minor detail that can be simply remedied. In some other cases, differences in target audience expectations dictate drastic revisions. I was once asked to revise another UK translation of a German text to adapt it for US use. The British translation was so very good that I only found a handful of lexical and terminological anomalies that required revision. In fact, I was startled that the client had sent the text out for revision in the first place, since virtually any intelligent US reader would have been capable of making the necessary changes. The text was a detailed product maintenance manual, printed on a standard impact printer and self-reproduced. It had the following overall structure:

Detailed history of the company, including a profile of the company's founder and current CEO

Detailed description of the company's design team, with emphasis on state-of-the-art equipment and in-house organizational practice

Extensive descriptive information on the company product-line, complete with precise information on each product's operational function

Rather sketchy information on general maintenance features, with frequent recommendations to contact the company's service staff in the event of malfunction or difficulties in using the product.

Convinced that the revised translation represented an excellent functional equivalent to the original text, I sent it off to the American client, with the full expectation that he would be pleased. A few days later he called to report that the text did read well and did represent an accurate rendition of the original, but he was still

dissatisfied with the overall product. “Do you personally feel that this document represents an effective piece of product literature?” Since I had viewed the material as a maintenance manual, not as marketing literature, of course my answer was “Absolutely not.” American target audience expectations would dictate:

- Glossier, more professional print values [It is important to note that the print values were also very much sub-standard for the German market as well.]
- In place of company history, the American audience is interested in the company’s current market posture. The CEO’s personal history is of little or no significance; in fact, its inclusion in such a piece of literature communicates a narcissist lack of professionalism.
- A briefer, well illustrated profile of design team functions is not necessarily without interest, but this material, together with the general company information cited in the previous paragraph, should be relegated to a less conspicuous location in the back of the book.
- The most important information to be included in the front of the book would graphically and succinctly answer the following questions:
  - How can the potential client use the company’s product to meet specific technical needs? What kind of results can be expected from using the product? How will it make operations more efficient and more economical?
  - What specific steps must the client follow in order to use the product? [Detailed functional descriptions are probably irrelevant or should be moved to a separate appendix in the back of the book. Although the original text described the sequential function of the product, little information was provided on the user’s interaction with it—for instance, it never indicated how to install the product, where to plug it in, or how to turn it on!]

- What sorts of malfunctions are likely to occur? What specific steps should the customer follow to troubleshoot these problems himself? If need be, where can he obtain spare parts or service in the United States? [In the past it has not been unusual for German companies to rely on in-house training sessions to familiarize customers with new products rather than providing them with detailed, well-written operating and maintenance instructions. Fortunately, the trend over the last ten to fifteen years has been to provide this kind of documentation, especially for exported equipment.]

Needless to say, free-lance translators are at a disadvantage when they are faced with this kind of serious macrocontextual asymmetry. Frequently, the precise application of the target text may not be absolutely clear. Translators also have a vested interest in proceeding with great care when it comes to criticizing the source text because it is entirely possible that the immediate client contact is him or herself the author of the offending text. (Company CEOs who write their own promotional and product literature are the worst offenders when it comes to producing inappropriate source-language texts, and inadequacies in the original are likely to be magnified several-fold by even a competent translation process. Furthermore, non-writers who insist on writing their own literature frequently also have their own ideas about how a translation should look.) Tact and good judgment, as in any other endeavor, are the only guidelines the translator can follow in directing the client toward a more effective text. In the case of the text described above, the American contact and I reached agreement very rapidly on how we thought an effective, market-oriented text should look, but were unable to convince the German parent company (i.e., the CEO author of the problematic text) that revisions were in order to meet the expectations of an American audience. In other words, you win some and you lose some.

### *Interaction of the Terminological Unit at the Microcontextual Level*

Figure 2, taken from the same text shown in Figure 1, illustrates the relationships between *terminological units* and *microcontexts*. Whereas macrocontexts constitute either entire texts or extended text sections, microcontexts are smaller text segments, usually identified at the sentence or sentence fragment level (Hohnhold, 78, and Dubuc, 62). The difference between the microcontext and the “translation unit” discussed by many translation theorists can be an elusive one. The translation unit is “understood as a cohesive segment lying between the level of the word and the sentence” (Snell-Hornby, 16). When dealing with formulaic material, translation units may on occasion take the form of sentences and clauses—the concept is admittedly difficult to tie down precisely. Terminologists are most concerned with *terminological units*, which, along with lexical units representing general language, make up the translation units. The terminological units represent the elements of technical language embedded in the text and manifest themselves in the form of meaningful morphemes used in compound words, single word terms, collocations, set phrases and even standard texts (“boilerplate”), at which point the translation unit and the microcontext merge.

#### MICROCONTEXT

A detailed list of strategies to be applied at the microcontextual level would encompass an entire catalog of translation procedures and would go far beyond the limits of this article (see, e.g., Vázquez-Ayora or Vinay and Darbelnet). Common examples include the transposition of passive structures in favor of direct address for the representation of instructions, or the breaking up of extremely dense, hypotactic structures into more manageable paratactic periods and transposing rheme/theme relationships within such sentences.

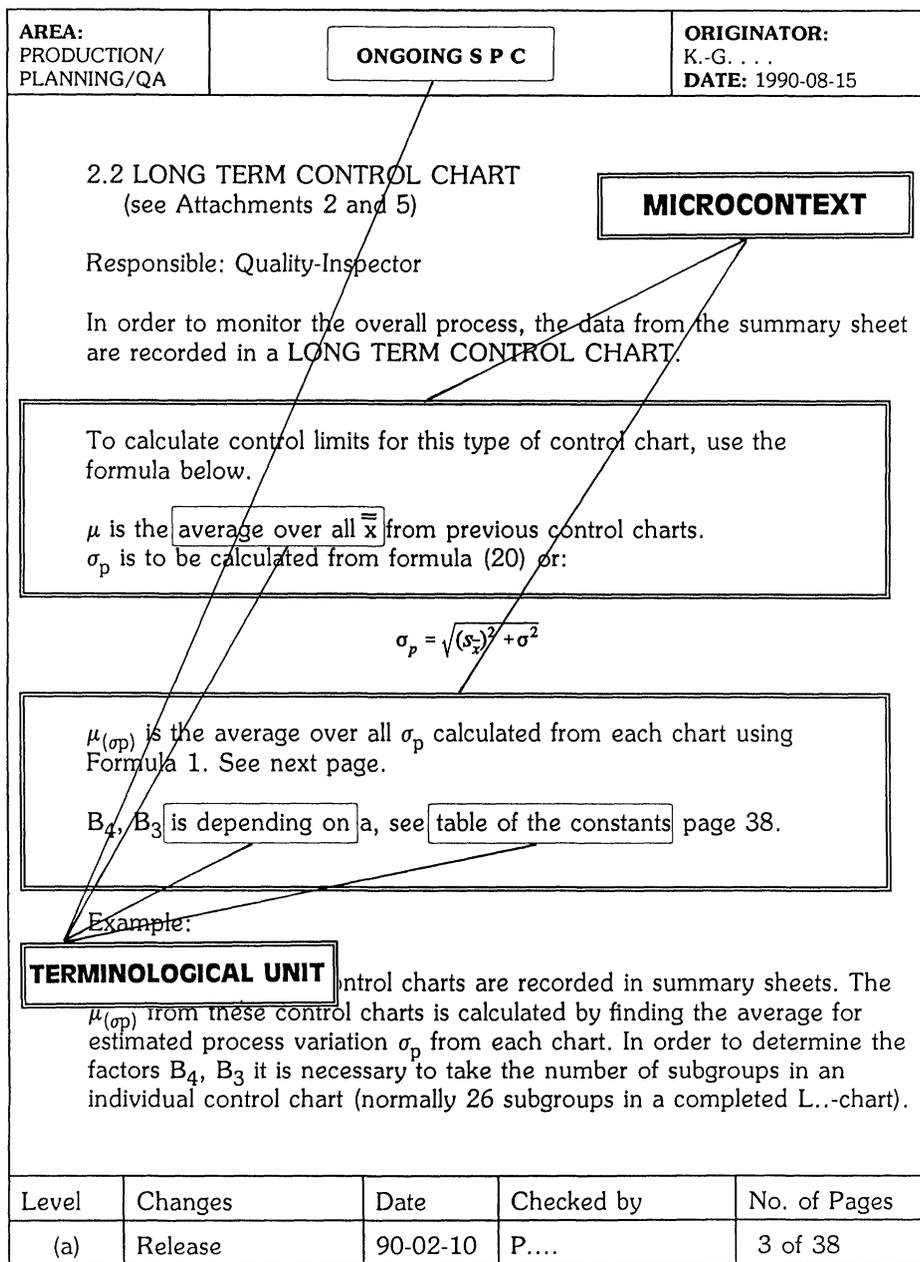


Figure 2: Microcontext and terminological unit levels

*Examples:***Source text**

*Kleinstmaß der Fensterbreite an dem in der Produktzeichnung angegebenen Abstandsmaß. Davon abgezogen wird ein Luftspalt von 0.03 mm pro Seite.*

**“Correct” translation:**

Minimum dimension of the window width [based on] the distance dimension indicated in the product drawing. From this value is subtracted a clearance of 0.03 mm per side.

**Revised translation:**

Window width: determine the minimum dimension based on the distance shown in the product drawing. Subtract a clearance of 0.03 mm for each side.

**Source text**

*Die Creeping-Stufe erlaubt es, bei Motormomenten, die am ursprünglichen Übergang zur Zugstufe lagen, nun durch deutlich geringere Steigungen als in der Zugstufe eine Absenkung der Resonanzdrehzahl und eine gewisse Schwingungsisolierung zu erreichen.*

**“Correct” translation:**

The creep stage allows [us] at engine torques that would have originally been located at the transition point to the drive stage to achieve a reduced resonance speed using wind-up angles that are significantly lower than in the drive stage and a certain degree of vibration isolation.

**Revised translation:**

The creep stage achieves two effects. By using significantly lower wind-up angles than in the drive stage, we can reduce the resonance speed. This solves the problem of the engine torques that were originally generated in the transition range at the beginning of the drive stage. This procedure also produces a certain degree of vibration isolation.

## TERMINOLOGICAL UNITS

The items highlighted by the single-line boxes in Figure 2 represent several of the forms that terminological units can take. Starting from the top of the page, “ongoing SPC,” the title of the document, is a not totally uncomfortable equivalent of the German *laufende statistische Prozeßkontrolle*. Although this solution would be understood by any English-speaking audience, it is nevertheless desirable to change to the more idiomatically correct “In-Process SPC,” which reflects standard US QA usage. This is an example in which a terminological unit functions as a translation unit.

The second sample translation unit, “the average over all x-double-bar,” is an example of a technical collocation. Although “average of” is also an acceptable collocation in some cases, the choice “average over” is actually more precise in this particular context because “average over” refers to an average of values recorded during a specific period of time (“from previous control charts”). Thus the microcontext determines the choice of the appropriate functional equivalent at the level of the terminological or translation unit.

The third highlighted translation unit, “is depending on,” represents a grammatical misuse of the English present progressive mode of the verb (remember, the author is not a native speaker). “B<sub>4</sub>, B<sub>3</sub> depends on a” is the correct form; failure to use this form marks the text as non-native in origin.

The phrase “table of the constants” fails to observe formulaic English patterns for such titles, as well as American capitalization rules for the titles of important sections of a document. “The Table of Constants” provides a stylistically appropriate wording,

analogous to the set phrase (which is virtually a multiword term) "The Table of Contents."

The highlighted examples view the terminological unit as it manifests itself as a multiword term, a technical collocation, grammatical and lexical units, and set phrases. Morphemic elements used as components in multiword terms can also serve as terminological units, for instance in the case of "control limits" (not highlighted here), whose German equivalent *Eingriffsgrenzen* is a compound term in the source language but must be split into a multi-word term in the target language (see Wright, 1991).

If the word-fragment level represents the smallest possible manifestation of the terminological unit, boilerplate standard texts constitute the opposite extreme. The following excerpt recurs in a company's material specifications. Whenever it appears, it must be replaced by a parallel American citation that is appropriate to the needs and experience of the target audience:

*Fähigkeitsnachweis für kritische Merkmale bei der Erstbemusterung*

*Der Zulieferer hat in Rahmen der Erstbemusterung Fähigkeitsnachweise zu erbringen, in Anlehnung an VDA-Richtlinien Nr. 4 "Sicherung der Qualität vor Serieneinsatz", Ausgabe 1986, Abschnitt 7.*

**Initial Sample Inspection: Proof of Capability for Significant Characteristics**

Within the framework of initial sample inspection, the vendor must provide proof of capability based on VDA Guidelines No. 4, "Quality Assurance before Production Startup," 1986 Edition, Section 7.

The document cited here is a very valuable, well-written guideline issued by the Association of German Automotive Engineers, which combines a detailed discussion of product development, quality planning, Failure Mode and Effects Analysis, and Statistical Process Control. No official translation has ever been prepared, in no small measure due to the fact that the original

information is based on several existing English language texts. Preparation of an English translation is undesirable for more than this reason alone. Presentation of an obviously “foreign” text to American suppliers would provide ample excuse for them to insist on increased prices for “specialty work,” even if there were no real substantive difference from American practice. Unfortunately, however, no one industry standard neatly incorporates precisely the same information into one compact resource in the way that VDA No. 4 does. Fortunately, Juran’s widely used *Quality Control Handbook* includes chapters on all the important topics covered in VDA No. 4. Hence, the following substitute text has been adopted:

As part of the Initial Sample Inspection Report, the vendor must provide proof of capability based on standard project planning and statistical process control procedures, for instance as outlined in *Juran’s Quality Control Handbook*, J.M. Juran and Frank M. Gryna, eds., New York: McGraw Hill, 4th ed. 1988,

Section 7: Organizing for Quality

Section 13: Product Development; Planning; FMEA

Section 24: Statistical Process Control.

### *Summary*

This paper has demonstrated the extent to which stylistic considerations affect every level of target-text generation, underscoring the importance of appropriate functional equivalence at all levels. This contention is based on the premise that a company’s commitment to high quality is reflected in its literature and product documentation. Quality-minded industries increasingly emphasize the theory that company quality is only as high as the standard maintained by its least-quality-conscious employees. Translators cannot afford to be an exception to this concern.

## NOTES

1. Alan Melby defines indicative translation as follows: "If the purpose is simply to obtain a rough indication of the source text content, and not a careful, finished translation by human standards, then fully-automatic machine translation may be in order. Raw, low-quality output which is not intended to be edited into a high-quality translation is sometimes called 'indicative' translation." Work in progress, Draft 1990, Jan. 8, *The Translator Workstation*.

2. The four-part criteria used here reflect for the most part the analytical levels used in terminology work. They have, however, close similarities to the seven categories used by the Leipzig School of text typology. For instance, *situationality* and *intentionality* are roughly comparable to situation. *Acceptability* corresponds to the concept of *appropriateness* used here, but I am not citing appropriateness as a separate consideration because it is a common property of all levels of the text. *Intertextuality* corresponds very closely to macrocontextual concerns (which the Leipzig school is inclined to discuss as macrostructural), and *coherence* pertains at this level as well. *Cohesion* is very much a property of the microcontextual level and plays a role with respect to multiword and collocational terminological units. The two approaches do not have to be mutually exclusive, but they do derive from a different emphasis, and the terminological approach, particularly as practiced by translation-oriented terminologists, tends to be very application oriented and less theoretical (See Neubert and Shreve, 1992).

3. I apologize for the fact that the examples used are all in German, but this is my working language. I have tried to represent all texts with both "literal" and revised English in an effort to illustrate points clearly to non-German readers.

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*Section 2:*

*Special Applications*



# *Translation, the Great Pollinator of Science: A Brief Flashback on Medical Translation*

HENRY FISCHBACH

## *Introduction*

The importance of scientific translation in the transfer of modern information and technology is axiomatic, yet few realize that ever since the advent of the written word this has always been true.

The single piece of writing considered by many to be the most influential in the English language was not an original creation, but indeed a translation. Nor was this translation the work of a single translator, but of many—47, to be precise—and it took several years to complete. Those raised on English and many who were not know that I am of course referring to the King James version of the Bible. Daniel Boorstin, the previous Librarian of Congress, characterizes this work as “perhaps the only literary masterpiece ever written by a committee,” adding that “although there was not one towering literary element in the lot, their product overshadowed all the other works of literary genius in the language” (Boorstin, 523). A parallel claim of being a literary masterpiece has been made in German for Luther’s translation of the Bible and in French for Calvin’s.

The tender roots of printing and publishing were also fertilized by translation. It is not entirely fortuitous, just to cite one example, that the early output of William Caxton, England’s first

printer-publisher, who died the year before America was discovered, consisted almost entirely of translations (Boorstin, 512), and so did many of the early books printed by Johann Gansfleisch, better known by his mother's name of Gutenberg.

### *Role of Translation in the Dissemination of Science*

In its broadest sense, science is accumulated and accepted knowledge that has been systematized and formulated with reference to the discovery of general truths or the operation of general laws. Synoptically, it can be classified into: (a) the *abstract sciences*, which deal with things we cannot touch, like numbers, thoughts, etc. (e.g., metaphysics, logic, mathematics); (b) the *natural sciences*, which deal with things, both living and dead, outside ourselves in nature, such as stones, stars, plants, animals (e.g., physics, chemistry) or within ourselves (medicine in all its ramifications); and (c) the *human sciences*, which deal with the way we think and act alone and together (e.g., psychology, economics, sociology).

Before the invention of writing, there could be no science, however, except that which was passed along by word of mouth, most notably, the discovery of fire and the invention of the wheel. We can therefore assert that the birth of science was attended by its first and greatest achievement: the invention of written language itself. This was followed—very broadly speaking—by the beginning of scientific questioning with the Greeks, the advent of experimentation with Archimedes, the age of Copernicus and Galileo, modern experimental science with Newton, the invention of the steam engine by Watt, the discovery of electromagnetism by Faraday, and the age of Einstein with the release of atomic energy. At every milestone, translation was the key to scientific progress as it unlocked for each successive inventor and discoverer the minds of predecessors who expressed their innovative thoughts in another language.

*Full Impact of Translation on Science  
Not Felt Until 100 Years Ago*

Although translation has been the handmaiden of science since earliest times, it was only with the invention of movable type around 1500 that it assumed a major role in the dissemination of scientific information—except in medicine, as we shall presently see, and perhaps religion, philosophy, and astronomy. However, not until the last 100 years or so has the full force of translation been brought to bear on the transfer of scientific knowledge. In fact, since the turn of the century science has become increasingly dependent on the translator for its pollination and development. If we consider only physics, chemistry and medicine, could the following scientists have had the worldwide impact they did if their writings had not been translated? The list is endless and the debt to translation unlimited.

- In physics:  
Planck, Roentgen and Einstein from German; Compton, Thomson and Rabi from English; de Broglie from French; van der Waals and Lorentz from Dutch; Bohr from Danish; Fermi from Italian; Yukawa from Japanese; Jánossy from Hungarian
- In chemistry:  
Urey and Ramsey from English; Semenov and Mendelejev from Russian; Arrhenius and Svedberg from Swedish; Fischer from German; Heyrovsky from Czech
- In physiology:  
Pavlov and Metchnikoff from Russian; Camillo Golgi from Italian; the young Szent-György from Hungarian; Bernard Houssay from Spanish; Alexis Carrell from French; Otto Warburg from German; Henrik Dam from Danish

- In radiology:  
the Curies from French; Lawrence from English;  
Tadeusz Reichstein from Polish
- In bacteriology:  
Pasteur and Calmette from French; Koch and Ehrlich  
from German; Kendall from English; Kitawato and  
Shiga from Japanese
- In pharmacology:  
Fleming, Florey and Waksman from English; Behring  
from German; Christiaan Eijkman from Dutch
- In psychiatry:  
Charcot from French and Freud from German

Would the world's scientific knowledge have been as effectively enriched or the ideas of these great scientists been as rapidly brought to the attention of the scientific world had they been left untranslated?

### *Why Medicine Was the Earliest Scientific Field to Thrive on Translation*

Since this article will focus specifically on the pollinating role of translation in the early days of medicine, it may be useful to list some of the reasons why this particular science was the first to be so richly fertilized by translation.

Medicine is unquestionably one of the three oldest fields of recorded scientific knowledge—theology/philosophy and astronomy/geography being the other two. Perhaps it is because the science of medicine and its language are so universal that it has throughout history attracted greater attention as a subject of translation than the others. The three major factors that made medical knowledge such an appealing candidate for pollination through translation are:

First, the subject itself—the human body and its functions—is of unequalled universality and allure.

Second, lexical equivalence is so extensive that it borders on terminological incest, at least in the Western languages.

Third, the literature is ubiquitous and readily accessible.

These three characteristics were also instrumental in minimizing misunderstanding and maximizing meaning in the transfer of medical knowledge from one language culture to another.

#### UNIVERSALITY OF SUBJECT

Probably the leading factor that accounts for the predominance of medical translation in the ancient world is the universality of the human body and its functions, not to mention man's abiding interest in them. Human anatomy and physiology are the same in Madras, Monaco and Montevideo, and the scientific translators of antiquity may have found their work greatly simplified by the truism that the basic anatomical and physiological elements underlying medical communication are the same the world over.

Consider how immeasurably more difficult is the task of the legal translator, who must come to grips with juridical concepts that are often diverse in the source and target cultures, or that of the translator of agricultural subjects confronted with fauna and flora that may be entirely different in the source and target regions.

*Ce qui se conçoit bien, s'énonce clairement*, wrote Boileau in *L'Art poétique, et les mots pour le dire arrivent aisément*. There is no denying that what the translator understands, he or she can (usually) express clearly, but it does not follow that the words to do so will come readily. For the medical translator, however, the identity in both languages of the object or concept to be translated certainly gives him or her an edge. This lowers the misunderstanding quotient appreciably in the scientific transfer process.

#### LEXICAL EQUIVALENCES

Essentially, the fact that the underlying language of medicine, at least in the Western world, continues to be Latin and Greek is

another windfall for the medical translator. Since the dawn of recorded history, Greek and Latin—and, to an important but lesser extent, Hebrew and Arabic—have served as the languages of international communication in medicine, religion and philosophy. Medicine, however (together with astronomy and geography), is the only science, as we understand the term today, to have spread throughout the Western world in its original linguistic stroma, its terminology resting firmly on the twin pillars of Latin and Greek. The explanation for this is to be found in the history of medicine itself.

That physicians in ancient Greece and Rome (and, to a lesser degree, in Egypt and the Near East) should have communicated with their community in their native languages is obvious. Medieval physicians, however, used Latin as a means of international communication. Even later, the Belgian Vesalius wrote his *De Humani Corporis Fabrica* (1543) and the Englishman Harvey his *Exercitatio de Motu Cordis et Sanguinis* (1628) in Latin because this was the only language universally understood by all Western scientists and scholars of their day and required no translation.

In some cases, Latin thus remained the language of medicine well into the 18th century. For example, the great work on direct percussion by the Viennese physician Leopold Avenbrugger, entitled *Inventum Novum*, is dated 1761, yet it was still written in Latin! By then, however, the printing press had been universally introduced, and scientific advances in Germany, France, Italy, Holland, and England led to greater popularity of the “vulgar” tongues.

Although today English has been replacing Latin as the language of international medical communication—with such expressions as “stress, compliance, screening,” etc. and many acronyms like “ACTH, SGPT, RNA” gaining acceptance everywhere . . . *untranslated!*—medical terminology in both microscopic and macroscopic terms continues to be coined with Greco-Latin prefixes and suffixes.

## WIDESPREAD ACCESSIBILITY OF DOCUMENTATION

Another factor tending to attract medical translators is the wealth and availability of medical documentation. Virtually every major culture with a medical literature requiring translation offers a plethora of medical textbooks, encyclopedias, journals and dictionaries. Nor are there any medical translators who, if not physicians themselves, do not have access to a doctor or hospital librarian they can readily consult. By contrast, how many translators in aerospace, electronics or oceanography—to name but a few sciences—have such ready access to printed documentation or human resources in their fields? For the medical translator, these animate and inanimate references are invaluable tools precisely because of their reliability and widespread accessibility.

To coin a phrase, health and disease are at the very core of our existence and, together with religion, have preoccupied humanity longer and more deeply than perhaps any other concern. No wonder, then, that medicine has had such a long and well documented history. Few scientific achievements have been so extensively chronicled in Eastern and Western cultures. These are the sources that medical translation can tap again and again to enhance accuracy of terminology and aptness of idiom. Few, if any, other scientific translators can mine so rich a lode of documentation.

*Flashbacks to the Translator's Role  
in the Transfer of Medical Knowledge*

## IN GREECE

It is clear from the Homeric poems that medicine already had a history, but there is no sign that it was subordinated to religion, as in ancient Egypt and India. In the "Golden Age" of Pericles, Hippocrates (460?-377? BC)—called "the Great" and later "the Father of Medicine"—became as much a representative of the Greek intellect in medicine as were his contemporaries, the great

philosophers, in the other sciences. Some 400 years later the Hippocratic doctrine was taken up and expanded by Galen of Perganum. The 87 treatises attributed to Hippocrates and the 100 or so still extant of Galen constituted the treasure trove of Greek medicine, the bountiful source that was to nurture several generations of medical translators.

#### IN ROME

As the schools of Alexandria and Pergamum nourished Greek medicine, these early sources of medical doctrine and practice demanded translation primarily into Latin but also into Arabic and Hebrew. There is ample evidence to support the claim that Greek medicine was transplanted to Rome by translators, many of them physicians. Asclepiades (b. 124 BC) was the most prominent of these early Greek physicians in Rome. The whole body of medical literature from Hippocratic to Alexandrian times was summarized in Latin by Aulus Cornelius Celsus (the “father” of medical abstracting?) in the 1st century AD. Called the “Cicero of Medicine” for his fine literary style, Celsus was also the first medical writer to translate Greek terms into Latin.

His graphic description of a surgeon’s qualifications in Rome sounds positively modern: “A surgeon ought to be young, or at any rate not very old; his hands should be firm and steady, and never shake; he should be able to use his left hand with as much dexterity as his right; his eyesight should be acute and clear; his mind intrepid . . .” (Martí-Ibáñez, 87). Another prolific writer-translator of this period was Pliny the Elder, who died in 79 AD while trying to observe at close range the eruption of Vesuvius—the very one that destroyed Pompeii. Historically, it may be of interest to those with an eye for opportunities in medical translation to learn that as late as the 3rd century AD—when licenses to practice medicine were introduced in Rome—Greek was still the language of instruction for Roman medical students. They “were required to obtain good conduct certificates from the local police” (small wonder, considering the role physicians played in supplying the poisoned mushrooms that killed Emperor Claudius, joining the conspiracy that ended the life of Drusus, and becoming

confidential counselors to the evil Messalina); moreover, they “were prohibited from joining illegal societies, visiting brothels, or taking prolonged holidays and they were expected to complete their studies before the age of twenty (Martí-Ibáñez, 90).”

#### IN THE WORLD OF ISLAM

With the rise of Islam in the 7th century and the establishment of a united Muslim Empire in the 9th, the centers of Baghdad and Damascus boasted flourishing medical schools, and the need for translation of Greek works into Arabic was paramount. One by one, the store of Greek medical writings, which the “heretical” Nestorians had rendered into Syriac, were now translated into Arabic, and soon Greek medicine was widely disseminated throughout the Mohammedan world. The noted medical historian and translator Martí-Ibáñez writes: “Never in history have translators played as important a part as they did at the beginning of Islamic expansion,” adding that the heroes of this period were the famous Syrian and Coptic families of translators—the Bakhtishû and the Mehsues—and that “Prince of Translators”, Hunain (known in the West as Joannitius), about whom more below (Martí-Ibáñez, 118).

The Caliph al-Mansur had established a school of translators in Baghdad, directed by the Christian physician Johannes Masawayh (777-857), to translate Greek manuscripts obtained in Asia Minor and Egypt. (An interesting sidelight: When the debauched Byzantine emperor Michael III was defeated by Muslim forces, his penalty was to send to Baghdad a camel caravan laden with the ancient manuscripts from Constantinople’s libraries (Martí-Ibáñez, 127). Masawayh’s finest pupil was Hunain (809-?877), a Nestorian who enriched Arabic with many scientific terms. His school translated many of the Hippocratic and Galenic writings. The most eminent physician of the day was the Persian-born Rhazes (850-923), chief of the renowned hospital in Baghdad and author of more than 140 medical tomes, many of which were translated into Latin by the Hebrew scholar Faraj ben Salim. Another Persian, Avicenna (980-1037), the “Galen of Islam,” composed a great encyclopedia of medical knowledge, the *Canon*,

long regarded as a medical textbook of authority, which was often translated and used by the Latin West even as late as the 17th century. Avicenna is perhaps best remembered as the chief representative of the brilliant period of Arab medicine in Spain (10th to the 13th centuries), to which Rabbi Maimonides and other Jewish scholars made such great contributions.

#### IN THE MIDDLE AGES

After the glory of Greece had waned and the power of Rome was destroyed, there remained only the work of these Arabic translators to bridge the gap until the rebirth of science and revival of learning during the Renaissance. Many of the treatises of the major school of medical writers who flourished in the Arabic-speaking countries between the 9th and 12th centuries were translated into Latin by the Christian Gerard of Cremona (1114-1187) and the Jew Faraj ben Salim—especially fine examples of the translator's art of transculturation. These translations brought about a reawakening of the European intellect and constituted the core of the medieval university libraries in the Western world.

Early in the Middle Ages, the medical school of Salerno acquired a far-reaching reputation (William the Conqueror visited it to restore his health) and its works were later translated into several European languages. This school is regarded as a bridge between ancient and modern medicine, more direct if less conspicuous than the circuitous route through Byzantium, Baghdad, Alexandria and Cordova by which Hippocrates and Galen reached the European world in Arabic and then Latin translation. Arab medicine itself, from Rhazes to Avicenna, was made accessible to Christian Europe by a large class of translators into Latin. It is exhilarating for today's medical translator to reflect on the prodigious cultural contribution made by our professional forebears to the pollination and dissemination of medical science. This great heritage of medical translation was soon to be enriched by the advent of the printing press.

After the conquest of Toledo, where Archbishop Raymond had established a college of translators, Western scholars came into

contact with the learning of the Spanish Moors, as their medical writings were translated into Latin. The Jewish scholars especially active in this work, often under the patronage of Christian bishops, were instrumental in founding the famous medical school of Montpellier early in the 12th century.

In the 15th century, as Greek scholarship made great strides, more accurate translations of the Greek writers were demanded, and the humanists proposed substituting the originals of Hippocrates and Galen to lead medicine back to its sources. Since only a small body of scholars, and still fewer physicians, had a knowledge of Greek, the first task was to translate the Greeks anew into Latin. For example, there is no record that Paracelsus (1493?-1541), who lectured in his native Schwyzertütsch (Boorstin, 340), had any knowledge of Greek. (According to Boorstin, Paracelsus, "the nickname by which he lived in history, . . . perhaps means that he classed himself with the great Roman medical authority Celsus, perhaps simply that he wrote *para*-doxical works that contradicted the common opinions of his profession." (Boorstin, 339))

According to the medical historians Singer and Underwood, "improvement in the medical texts was due largely to the fact that more reliable translations were now available," (Singer and Underwood, 103), which led to wider dissemination of the Hippocratic and Galenic writings. Among these translations were those of the humanist and physician Thomas Linacre (1460?-1524), Henry the VIII's personal physician who was instrumental in founding the Royal College of Physicians in London, and taught such brilliant students as Erasmus and Sir Thomas More.

With the colonization of the New World, many exotic plants, including ipecacuanha, cinchona and tobacco, were brought home, leading to the isolation of new drugs (Singer and Underwood, 103). It is of linguistic interest to medical translation that an important serial work on these drugs by Nicolas Monardes (1493-1588) of Seville was not written in Latin, but bore the title *Historia medicinal de las cosas que se traen de nuestras Indias occidentales* and was translated into English in 1577 (by John Frampton) as *Joyfull Newes out of the Newe Founde Worlde*. Clearly, the vernacular languages had come into their own in medical translation.

### *Conclusion*

At this milestone we conclude our brief flashback to the early days of medicine in the light of translation. This historic background gives us an insight into the genetics of medical translation and the contribution of translators to the dissemination of medical science. Scientific translators can proudly reflect on a long tradition of accomplishment in the transfer of information and technology. Translation has indeed been the great pollinator of science.

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## *Translating for the Small World*

WILLIAM M. PARK

Translators are often forced to stray far from the safe grounds of standard language and hence standard dictionaries. While a number of respected technical dictionaries are available in print for some language pairs, they are too often out-of-date in such fast-breaking fields as computing and aerospace and also lack accurate highly specialized terminology. For some time translators will still have to resort to trade journals, instruction manuals and resource persons to find the right term in the target language. However, both problems may soon be solved by on-line dictionaries through a subscription service by and for specialists.

One field that will probably have to wait a long time for an electronic dictionary, though, is that of toys and models. The traditional distinction between toys and models is that the toy can be used right away without any work by the user, while the model requires some assembly. In recent years models have been approaching ready-made status, while toys have become more complex, so that the line between the two has blurred. While models often have counterparts in the full-size world, a toy—such as a dragon—may be unique to the miniature. The model often has the byproduct of teaching young people (and older aficionados) the craft—and the jargon—of professional fields such as sailing and flying. The toy, on the other hand, may have no moving parts and usually requires little or no instruction, so that language is not as critical.

Here it should be noted that, while the end result is enjoyment, those who make and those who use the products in the toy

and model industries can be very serious about what they do. This is particularly evident in the terminology of the products and processes. The language of toys and models must be treated with the same respect as that of other industries and interest groups.

A case in point: a few years back the German-English ATA accreditation examination included a passage on changed consumer patterns in the toy industry which was possibly not taken seriously by some candidates, who translated with very little regard for terminology. For example, the word *Skaterollers* ("skate scooters") was in several cases rendered as "roller skates," despite the fact that German has the long-established term *Rollschuhe* and in any case the word order would be illogically reversed. In another case, the prefix *Playmobil-* was not recognized as a possible trademark (which would have meant leaving it capitalized and untranslated). Other terms which gave problems were *Hula-Reifen* (translated as "hula tires") and *Mecki-Igel* (the latter a popular traditional porcupine doll, probably as much a part of the German cultural scene as the teddy bear in the English-speaking world).

This paper will describe some of the terminological and stylistic problems involved in translating texts from the toy and model industries, based on my early experience in freelance translating from German to English. I had been a model plane builder for some twenty years and was still active in competition flying in Germany at that time (the early 60's), so that I had the necessary background knowledge in both German and English when asked to translate for Herta Girz und Co. (Hegi), a manufacturer of model kits (mainly aircraft). Later work followed from Schreyer und Co. (Schuco), which produced toys, and then the Metz electronics firm, a division of which made radio control systems for models. While Schuco was the distributor for all three, translation projects were assigned independently by each company. The peak time for my work was around the end of the year, in preparation for the annual Nuremberg Toy Fair in the spring. Since I lived several hundred miles from these clients, I had to depend on the mails, which fortunately were excellent.

I insisted on translator credit, partly for ego gratification but mainly to assure the client of the very best job possible, since I

was known internationally as a model flier and might well run into someone who had built a model using my translated instructions, or bought some equipment based on my converted specifications. Since all of these translations were for publication without benefit of an editor or native English proofreader, I offered to correct the galley proofs at no extra charge in order to maintain quality control all the way to the final stage.

As I indicated above, I felt strongly from the first that accuracy of terminology was important, and not only for the older hobbyist. In fact, youngsters are often far more intolerant of slips in jargon than are their elders. Ability to use the specialized language is an important measure of knowledge of the field. The writer and the translator must be careful at all times to be precise and knowledgeable. One error in terminology can discredit the whole text for the serious hobbyist. In addition, it is important to avoid talking down to the end user, and particularly to eliminate terms such as "tiny," which are perceived as condescending; size is after all relative (model aircraft can range from a few inches in span to over fifteen feet).

Whenever possible I was sent the plans to accompany the text, so that I could "build" the model in my head while translating and thereby resolve any ambiguities. A useful byproduct of this was that I often caught drafting errors in the plans, some of which had over a hundred designated parts, and occasional incompatibilities between plans and text. I would also add explanatory text where necessary, and change the order of procedure to follow the English speaker's tendency to follow instructions one sentence at a time, rather than read and understand the whole text before beginning to build, which the German-speaker supposedly does; this avoided some irreversible situations. A note on all of these changes and corrections would be attached to the finished translation. It is interesting that only now are articles appearing in print to suggest that the translator has a responsibility beyond the words of the original text, although I am sure that other translators have been doing this informally as their expertise allowed (Hollingsworth).

In the case of toys, however, I seldom had as much as a photograph to work with, even in the most complex items. Schuco was

famous for its pre-WW II clockwork car that could be run on a shoebox without falling off the edge, thanks to an ingenious system of mechanical sensors that reversed and turned the car at the right time. In addition to modern versions of this car, the company also had assembly kits for remote-controlled vehicles such as fire engines, and an "Oldtimer" (their term) series of antique cars that would vibrate visibly when the gearshift was placed in neutral. It seemed there was no end to the features the Schuco designers could pack into these products, and sometimes it was difficult to describe them properly in English. However, most of my problems with toys came from the catalogs, which featured many different small items, such as utility vehicles, without contextual material for support. At the very least this slowed down translation production speed, and at times the question of cost-effectiveness arose, particularly where the percentage of uncertain terms was small and a reasonable guess could be made.

Models on the other hand have a more standardized specialized language within each class (planes, cars, boats), so that it is easier to find a comprehensive work (trade or hobby journal, manual, encyclopedia) containing most of the terms that would be considered unusual, at least to the lay person. Lists of parts, of course, are a problem in all fields, because ambiguous terms have no limiting context. Such words as *Verstärkung*, *Grenzstück* or *Auflageeteil* have a variety of translations depending on where they are used. Specifications can also pose problems, particularly in a new field (as transistorized radio control was thirty years ago), since new terms might have to be created.

However, even established terms can present pitfalls. For example, I remember seeing the word *Sitz* ("seat," "mount") rendered in one magazine article as "Chesterfield"; obviously, the translator (a Czech working from German) used the fanciest word he found in a bilingual dictionary without understanding the connotation. This error was compounded by the magazine editor, who decided not to correct the translation "in order to preserve the flavor of the original"!

The question of British versus US usage was little problem for me when dealing with aircraft (since I was at home in both dia-

lects and regularly received printed material in the two versions), but it occasionally posed difficulties with boats (cars did not play a large role in my work). I often consulted an excellent illustrated British boat catalog, then tried to find a compromise term that would be understandable in both the US and British Commonwealth markets.

Advertising language was sometimes tricky because of differing local legal standards. In the Federal Republic of Germany it was illegal to advertise a product or service as “the best” (Law Against Unfair Competition), but all right to call it “the first,” if that could be objectively proved. However, something that was the first of its kind in the Federal Republic might already exist in the English-speaking world; this required research and a certain amount of correspondence with the client; sometimes the claim was translated, sometimes not.

Trademarks could also be problematical. For example, if the instructions called for the use of Styropor or Perlon, the German counterparts to Styrofoam or nylon, would the American versions work? Synthetic materials are designed for specific characteristics, such as melting point, insulation factor, elasticity, imperviousness to certain substances, and so on. One or other of these might render the material useless for a certain purpose. Even if it did not, I preferred to use a generic term, such as “foamed styrene” for Styropor (I believe “nylon” was already householded by that time, which was just as well, since I doubt anyone would know it by any other term). When adhesives were mentioned, it was important to add a generic descriptor, since such adhesives were not always included in the kit, and the wrong choice could result in damage to synthetic materials (e.g., *UHU-coll*, often used with foamed styrene, was described as “PVA-type white glue”).

In one case, Schuco produced a model Disneyland-Alweg monorail hard on the heels of the fullsize versions. This new technology required that terminology be created when translating information and instructions for the model version. For example, in the case of *Stutzpfeiler* (“pillar,” “support”), I finally chose “pylon.” However, railway (railroad) terminology was also used in this case, and the question of usage, British or US, arose. Should it be “points” or “switch” for *Schalter*; “rails” or “tracks”

for *Schiennen*? In this instance I chose the former because market considerations so dictated.

Part of the translation process involved the conversion of metric measurements to the nearest US-British standards. This necessitated knowing that, for example, wood sizes were expressed as nondecimal fractions of an inch (e.g., 1/16", 3/64" etc.), metal thickness in decimals, wire diameter in British SWG sizes (US in decimal) and, finally, that bolt designations were handled differently in Continental, British and US usage. Nowadays, of course, the metric measurements would have to be converted only for the American market, not for the British.

There was a lack of terminological support even from specialized fullsize dictionaries. A handy small bilingual aviation dictionary (Cescotti) which I used at that time while translating for two airport magazines gave only a few entries on model planes—and should probably have ignored them altogether. For example it failed to distinguish clearly among *Modellflugzeug* ("model aircraft," the generic term), *Flugzeugmodell* ("scale model aircraft," a flying or non-flying miniature version of a fullsize plane), and *Flugmodell* ("flying model aircraft," whether to scale or not). By and large this little dictionary was quite good. Unfortunately the compiler exceeded the bounds of his competence and didn't trouble to check with those in the field. Luckily, I never needed to rely on his knowledge; in fact the entries given here were found by chance while I was looking for something else. However, this example stands as a warning that different aspects of a field of activity may have their specialized terminology.

These early experiences taught me a number of useful things: skepticism towards dictionaries, the value of specialized knowledge, the satisfaction of a long-term relationship with a client based on mutual trust, the self-confidence that comes from being thorough. Translating for the small world was often challenging, and sometimes frustrating, but it proved to be a wonderful training ground for translating in the world at large.

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# *Patent Claim Translation*

LEONARD J. MERAW

## *Introduction*

Patent claims succinctly describe inventions, which in US practice may be directed to machines, articles of manufacture, compositions of matter, processes and improvements thereof.<sup>1</sup> Single patent claims may be drafted to cover design patents and plant patents as well.<sup>2</sup> Broadly speaking, in addition to these two types of patents, three general classes of inventions (namely, mechanical, chemical and electrical) are found weekly in the *US Official Gazette*.

USPTO practice requires claims to begin with a phrase such as: "I [or we] claim:" or alternately "What is claimed is:."

Every claim possesses three distinct parts: a preamble, a transition and a body. Every claim is exactly **one** complete sentence. Claims can be written in various forms, i.e., subdivided, utilizing indented paragraphs, etc., while frequently inserting commas, colons, and semi-colons, but never footnotes. Translated text appearing in parenthesis, brackets or between dashes generally is not acceptable either. However, numbers and letters in parenthesis often are used to refer to formulas or embodiments in drawings.

Finally, there are three basic types of claims: independent, dependent and multiple-dependent, plus one additional special type called Jepson claims.

## *Claim Translation Fundamentals*

As previously indicated, every claim possesses three distinct parts—a preamble, a transition and a body. The preamble of an independent claim, i.e., a claim which does not refer back to another claim and which is always claim 1 of an application or patent, typically begins with the indefinite article “a” or “an” while introducing the subject of the claimed invention. Examples of preambles are: “A process for the preparation of . . .,” “A method for . . .,” “A novel . . .,” “An instrument . . .,” etc. Conversely, the preamble of dependent claims, i.e., claims which refer back to one or more previously stated claims, may begin with the definite article, e.g., as follows: “The process of claim 1 . . .,” “The instrument of claim 1 . . .,” or, in the case of a multiple dependent claims, “The novel pharmaceutical composition of claim 5, 6, or 7 . . .,” etc. Yet, dependent claims may also properly begin with the indefinite article, e.g., “An instrument as recited in claim 1 . . .,” or “A process as claimed in claim 1 . . . .”

The preamble of an independent claim may also begin with an expression signifying a plurality condition, e.g., “trivalent,” or “dual.” Obviously, if the subject of the preamble is plural, the indefinite article is omitted. Furthermore, chemical compounds beginning with Greek letters, e.g.,  $\alpha$ ,  $\epsilon$  or  $\omega$ , are not preceded by an indefinite article.

It is important to be consistent in the preamble language of all dependent claims. In addition, the preamble of a claim may also contain introductory information about the subject invention, e.g., “A process for purifying iron ore containing sulfurous impurities . . . .”

A comma generally follows the preamble of a claim before the transitional expression, unless the transition word “wherein” is employed. This will be discussed in detail later.

The transitional portion of a claim separates the preamble from the body, and may be achieved in one or more words. The three most common transitional expressions are: “comprising,” “consisting essentially of,” and “consisting of.” Each transition has a very specific legal meaning—namely “comprising”—is the legally broadest and on the other end of the spectrum “consisting of” is the

legally narrowest. Each of these expressions is usually followed by a colon. "Comprising" as a transition may be accompanied by other words, e.g., "further comprising" (as used in dependent claims), "comprising the steps of" and "comprising in sequence."

If it is difficult to decide on transitional language when translating claims destined for PTO filing, generally it is wisest to use, whenever possible, "comprising," then write a translator's disclaimer which could state in part that such transitional language was used because of the uncertainties in the source language, and most importantly allow the attorney or agent handling the filing of the case to decide on the ultimate scope of the invention, i.e., to use the most proper transitional expression(s).

Another very commonly used transitional word is simply "wherein." This one word, frequently employed in dependent claims, allows for a quick jump from preamble to body, where the invention is further defined. "Wherein" typically is not set off by commas before the body of a claim begins.

The body of a claim defines the subject invention in terms of steps, parts, components, ingredients, etc., each of which are either introduced with the indefinite article "a" or "an," or an expression signifying number, such as "tri-," "five," "a multitude of," or "a plurality of." There is no strict format which the body of a claim must follow. When the body is lengthy, however, for the sake of clarity, spaces may be placed between, e.g., the ingredients or elements of an invention, which in this case are set apart by semi-colons. The body of short dependent claims does not necessarily need to stand apart from the preamble and transition.

A very important legal requirement appearing in the body of claims is establishing and utilizing "an antecedent basis." This means that each element or feature of an invention must first be introduced, as stated previously, with the indefinite article or by an expression denoting number, and then when referring to the element again it is proper to use the definite article "the" or "said." Conversely, it is improper to call a feature "the" if it has not been previously introduced.

Note that it is possible to first introduce an element of an invention without using either the indefinite article or multiple signifier, when the feature is a plural word, as previously

indicated, or when a “means-plus-function clause” is employed. This will be covered more fully below.

Elements or features of an invention described in the body of a claim are properly separated by commas, unless extra spacing is used in, e.g., a chemical process claim, where steps appearing as mini-paragraphs are set apart by semi-colons.

The *Manual of Patent Examining Procedure* [MPEP] in section 608.01 (m), first paragraph, is quite specific on the use of periods in claims: “Each claim begins with a capital letter and ends with a period. Periods may not be used elsewhere in the claims except for abbreviations.”

### *Details of Claim Translation*

#### 1) *Tense*

Patent claims are written in the present tense. Claims containing process steps in the body portion properly begin with the gerundive form of the verb, e.g., mixing, adding, separating, etc. In such claims and where otherwise necessary past-tense expressions may occur, e.g., “the separated material” or “said dried powder.”

#### 2) *Numbering of Claims*

Claims are numbered consecutively in Arabic numerals. When translating always retain the numerical sequence and order of the claims found in the source language. Single claims introduced with the required “I claim:” are left unnumbered. Reference to any claim is always indicated using Arabic numerals, e.g., “claim 7” not “claim seven.”

#### 3) *Numbering and Claim Dependency*

Foreign claims often are written in multi-dependent form, i.e., “Claim 5. The process of claim 2, 3, or 4 . . .” and “Claim 6. The process of claim 4 or 5 . . .” However, in US practice “multiple dependent claims can not serve as a basis for any other multiple dependent claim.”<sup>3</sup> Therefore, when translating such claims leave the dependency numbering intact—never attempt to simplify it,

because this is the job of the patent attorney or agent handling the case.

There are many acceptable ways in which the preamble of a claim may be worded to indicate multiple dependency. Rather than cover all of the possibilities, the following text from MPEP 608.01 (n) is presented for review.

*ACCEPTABLE MULTIPLE DEPENDENT CLAIM WORDING*

- Claim 5. A gadget according to claims 3 or 4, further comprising . . .
- Claim 5. A gadget as in any one of the preceding claims, in which . . .
- Claim 3. A gadget as in either claim 1 or claim 2, further comprising . . .
- Claim 4. A gadget as in claim 2 or 3, further comprising . . .
- Claim 16. A gadget as in claims 1,7, 12 or 15, further comprising . . .
- Claim 5. A gadget as in any of the preceding claims, in which . . .
- Claim 8. A gadget as in one of claims 4-7, in which . . .
- Claim 5. A gadget as in any preceding claim, in which . . .
- Claim 10. A gadget as in any of claims 1-3 or 7-9, in which . . .
- Claim 11. A gadget as in any one of claims 1,2 or 7-10 inclusive, in which . . .

*UNACCEPTABLE MULTIPLE DEPENDENT CLAIM WORDING*

**A. Claim does not refer back in the alternative only**

- Claim 5. A gadget according to claims 3 and 4, further comprising . . .
- Claim 9. A gadget according to claims 1-3, in which . . .
- Claim 9. A gadget as in claims 1 or 2 and 7 or 8, in which . . .
- Claim 6. A gadget as in the preceding claims in which . . .

Claim 6. A gadget as in claims 1, 2, 3, 4 and/or 5, in which

. . .

Claim 10. A gadget as in claims 1-3 or 7-9, in which . . .

**B. Claim does not refer to a preceding claim**

Claim 3. A gadget as in any of the following claims, in which . . .

Claim 5. A gadget as in either claim 6 or claim 8, in which

. . .

**C. Reference to two sets of claims to different features**

Claim 9. A gadget as in claim 1 or 4 made by the process of claims 5, 6, 7, or 8, in which . . .

**D. Reference back to another multiple dependent claim**

Claim 8. A gadget as in claim 5 (claim 5 is a multiple dependent claim) or claim 7, in which . . .

4) *Alternative Expressions and Markush Language*

The best advice here when translating alternative expressions in the body of a claim is to leave them intact, while keeping in mind that in US practice they may not be used properly. However, the alternative expression “or” may be properly used if two features of elements are equivalent parts.<sup>4</sup>

European applications often include the alternative combination expression “and/or,” which is best translated verbatim.

Another permissible alternative expression exists in the use of “Markush” language. (The name is derived from a court decision in 1925.<sup>5</sup>) Markush expressions typically appear in “chemical” inventions, where they define a class of elements in the body of a claim. The bare language itself is “. . . selected from the group consisting of a, b, c, and d . . . .” Note that the expression as a whole denotes an alternative concept, yet must include the word “and” before the last member in the group. (The sample claims at the end of this article illustrate Markush language.)

5) *Negative Limitations*

As a general rule such expressions may not be employed.<sup>6</sup> A source language may or may not contain such expressions and a translator should exercise care so that negative limitations are not included in the target language. The MPEP in section 706.03(d) does permit them if there is *“no uncertainty or ambiguity with respect to the question of scope or breadth of the claim presented.”*

6) *Functional Expressions*

Within the body of a claim, one often will find descriptive text accompanying a claimed element or feature which further defines the invention. Functional expressions are used to introduce the descriptive text and appear in many forms, but they may also be used to introduce other features of an invention as well.

Common functional expressions are: “whereby,” “so that,” “in order to,” “suitable for,” “capable of,” etc. An example would be: “. . .adding a defoamer in order to keep foam formation to a minimal level . . . .”

7) *“Means for” Clauses*

The authority for using such expressions comes from 35 USC § 112—the last paragraph: *“an element in a claim for a combination may be expressed as a means or step for performing a specified function . . . .”* Therefore, it is possible to find an expression “a means for [or to]” in a source language which really is defining an element but not naming the element—although the reader knows what that feature is—and it is proper to employ such an expression in the target language, for example: “a means to separate solids from liquid” or conversely “said separating means,” and “a means for supporting an annular ring.”

8) *“Use” Claims*

Quite frequently in European applications one will find composition of matter claims, e.g., for a pharmaceutical, written literally as “Using pharmaceutical Q having structural formula (I) for treating influenza . . . .” However, in US practice, as indicated in the introduction, it is improper to write a claim with “using” beginning the preamble. Instead, the pharmaceutical, in this

example, would have to be claimed as a “composition of matter” capable of treating influenza. The claim above might now appear: “Pharmaceutical Q having structural formula (I) useful in the treatment of influenza, comprising: . . . .” In this example, one might find another independent claim written to cover “A method for treating influenza, comprising administering pharmaceutical Q.”

#### 9) *Parenthesis, Brackets, Dashes, and Underlining*

As indicated earlier, it is generally improper to include parenthesis and/or brackets in translated patent claims. One may find these symbols used in office actions, reissue patents or other legal correspondence. Parenthesis are often used in official office actions, when claims have been amended and are presented for consideration, indicating the number of amendments to any given claim, e.g., “Claim 7 (twice amended) . . . .”

Brackets are used in office actions to indicate the deletion of text, i.e., one or more words.<sup>7</sup> They also appear in conjunction with reissue application or patents, again to indicate deletions. Conversely, underlining or dashes are used to specify added material. Underlining is generally employed when entire claims or long phrases are added in legal correspondence. Dashes may be used to show the insertion of a single word, number or punctuation mark.

Remember, claims translated for US filing generally do not contain any of the above-mentioned characters, except for using parenthesis to indicate a reference to formulas or embodiments in drawings. For example: “. . . structural formula (IV) . . .” or “. . . beveled gear (5) . . . .”

#### 10) *Jepson Claims*

Jepson claims are frequently found in foreign applications and follow a format prescribed by law in 37 CFR § 1.75(c) as follows:

*Where the nature of the case admits, as in the case of an improvement, any independent claim should contain in the following order: (1) A preamble comprising a general description of all the elements or steps of the claimed combination which are conventional or known, (2) a phrase such as "wherein the improvement comprises," and (3) those elements, steps and/or relationships which constitute that portion of the claimed combination which the applicant considers as the new or improved portion.*

Utilizing the statute above, it is easy to construct a Jepson claim when translating. The preamble of Jepson-type claims may begin with the commonly used prepositional phrase "In a . . . . for, of, etc." For example, "In a method for purifying iron ore . . . ." This style of preamble serves to introduce the background of the invention in accordance with point 1 of the above-quoted statute. Note that the transition in these claims is accomplished nearly always by the expression "wherein the improvement comprises." All other rules for punctuation and style previously discussed apply to this special style of claim drafting.

#### 11) *Plant and Design Claims*

Claims written to cover either plants or designs are by law single claims.<sup>8</sup> The form of each type is very simple and generally includes the same language. Remember here too that single independent claims are left unnumbered when prefaced by the previously discussed proper introductory phrase.

Design claims read:

"The ornamental design for a(n)\_\_\_\_\_ as shown and described,"

or

"The ornamental design for a(n)\_\_\_\_\_ as shown."

Plant claims typically state:

“A new and distinct variety of \_\_\_\_\_ as described and illustrated.”

Principal distinguishing characteristics of the novel plant may be added, as the following example illustrates:

“A new and distinct variety of anise hyssop, characterized by its extreme hardiness, unusual vivid color, and abundant seed production, as shown and described.”

Note that the transition here utilizes “characterized by.”

### 12) *A Working Example*

The following is a properly claimed invention. By studying the four claims, many of the concepts and rules presented in this article will become evident.

#### PROCESS FOR RECOVERING GOLD FROM SEA WATER

I claim:

1. A process for recovering gold from sea water, comprising the steps of:
  - a) isolating a known quantity of sea water;
  - b) treating the sea water with a molybdenum compound, thereby precipitating gold flakes;
  - c) separating the gold flakes from the sea water in a conventional fashion; and
  - d) drying the gold flakes.
2. The process of claim 1, further comprising:  
centrifuging the sea water containing the gold flakes prior to said separating step.
3. The process of claim 2 wherein said molybdenum compound is selected from the group consisting of molybdenum dioxide, molybdenum pentachloride, molybdenum hexacarbonyl and molybdenum disulfide.
4. The process of claim 3 wherein said molybdenum compound is used in a quantity of from 100 to 1,000 ppm.

## *Conclusion*

The foregoing information on claim translation fundamentals and details will be useful to translators working in all languages. The article is primarily geared to individuals translating foreign applications for US filing. It is important to remember those aspects of patent law presented which contribute to an accurate translation, e.g., establishing an antecedent basis or utilizing the proper multiple dependent claims forms, and finally to use one's own discretion on stylistic matters, e.g., spacing and formatting.

Chapter 600 of the *Manual of Patent Examining Procedure* (available from the US Government Printing Office) contains the most detailed information on the subject of "claims."

Finally, I sincerely hope that this article will benefit all professional translators involved in patent and legal translations, and that it will make a positive contribution to the profession overall.

### NOTES

1. 35 USC [United States Code] § 101 and § 100(b)
2. 35 USC § 171 and § 161 respectively
3. 37 CFR [Code of Federal Regulations] § 1.75 (c)
4. MPEP [Manual of Patent Examining Procedure] 706.03 (d)
5. Ex parte Markush, 1925 CD 126; 340 OG 839
6. MPEP 706.03(d)
7. 37 CFR § 1.121(b)
8. 37 CFR § 1.164 and § 1.153 (a) respectively



*Section 3:*

*Training and Autodidactic  
Approaches for Technical  
Translators*



# *Linguistic and Technical Preparation in the Training of Technical Translators and Interpreters*

HENRY NIEDZIELSKI AND  
LEONID CHERNOVATY

## *Linguists or Technicians?*

"A perennial question—comparable to 'which came first, the chicken or the egg?'—ponders who makes the better translator, the scientist, technician or lawyer who also has language skills, or the trained linguist who augments a broad educational background with intensive research into assigned subject areas." (Wright, Berger, Ganser, Gingold, and Thornton 117)

This question not only has been debated over and over again whenever technician/translators have met with linguist/translators, it has also preoccupied some translation theoreticians. Far from diminishing, its importance increases with the amount of technical information that must be translated in the ever-growing international economic and political communities.

When speaking of training, we think of the future. Therefore, when we consider the training of technical translators and interpreters, we should describe the tasks to be performed by translators and interpreters of technical texts in the future. If we agree that technical translators or interpreters work and will work with

technical texts, it would seem clear that an analysis of the needs in the training of technical translators or interpreters could begin with a definition of important characteristics of technical texts. Then we probably should look at specific qualifications needed by technical translators or interpreters in order to perform such tasks with such texts.

A review of text and task typology will be presented in another article because this paper is essentially a comparison of translating or interpreting performance among persons of diverse backgrounds, various ages, and living in different countries. We should first emphasize that technical texts are viewed here in their broadest pragmatic definition and include any text that contains some elements of technical or specialized information, not unlike in the new classification proposed by Nida (1990). The extension of task typology is even less limited. The free-lance generalist interpreter may tackle alone all kinds of texts, settings, and public (Niedzielski 1988); the translator works more and more as a member of a team comprised of auxiliary translators, documentalists, computer specialists, and editors (Larrue 36; Voellnagel 42) in a collaborative process between translators, revisors, terminologists, and often writers and clients. (Newmark 1988:6)

### *A Short History of Approaches*

Various approaches have been used by training centers and employers or recommended by translation theoreticians in their attempt to answer the above question about a preferable sequence. The evolution in these approaches seems to parallel what may be observed in the theories of language and language learning: from linguistic structuralism to full individualization and interaction analysis.

#### STARTING WITH LANGUAGES

Traditionally, training centers for translation and interpreting have selected candidates proficient in at least one foreign language and taught them translation techniques (Cormier; Dzierzanowska 43; Seleskovitch; Voellnagel 83). U.N. agencies and

other employers have hired graduates from these centers, convinced that a trained linguist with a degree in translation will perform better than a technical specialist who knows a foreign language (Chrzanowski and Reid).

To improve this approach, Bowen (62-63) suggests feeding back the results of translation evaluations into the language teaching classes.

#### STARTING WITH TECHNICAL KNOWLEDGE

Radically departing from this traditional sequence, the European Common Market Translation Center in Luxembourg, has recently begun hiring bilingual technicians rather than graduates from translation schools with whose performance it was dissatisfied (Rolling). However, very few translation theoreticians have agreed to the view that bilingual technicians can translate technical texts better than such graduates. Cary (9) emphasizes that a good technical translation is possible only when the translator is technically competent, i.e., when he has a strong background in the technical field, be it metallurgy, chemistry or electronics. Herbert (1968:19) and Newmark (1981:141) likewise stress the priority of a technical preparation.

#### TEACHING LANGUAGES FOR SPECIAL PURPOSES

In the last decade, several translation theoreticians and translator trainers have tried to solve the problem of linguistic or technical priority by combining the teaching of both sets of skills from the very beginning in LSP (language for special purposes) courses. Such courses may begin with a common general scientific or technical trunk and branch off into more narrowly specialized fields (Arntz; Buhlmann; Pecrus; Varantola).

#### TEACHING CULTURAL SENSITIVITY

Realizing that every translator or interpreter is an international "communicator," some writers advocate training apprentice translators/interpreters in intercultural sensitivity (Aizu and Amemiya;

Baoquan; Chrzanowski and Reid; Holz-Manttari; Larose:206,294; Lowe; Nida 1982; Pergnier; Sechrest, Fay and Zaidi; Snell-Hornby; Vermeer; Wilhelm).

Ulijn (1987) has organized a remarkable program on "Intercultural Negotiation and Technical translation" at the Eindhoven University of Technology. Technological subjects are taught in the foreign language and in foreign cultural settings through written and oral communication processes (in short, the best kind of interactional approach to FL teaching). Just as suggested above (on teaching LSP), students may, after a common curriculum in technical communication, specialize as translators or technicians—in this latter case, mostly as international negotiators.

#### RECOGNIZING INDIVIDUAL ABILITIES AND PERSONALITY VARIABLES

It is a well known fact that not every bilingual or even every bicultural person is able to perform satisfactorily as an interpreter. Some authors assert that even linguistic, technological or cultural training cannot compensate for talent, specific abilities or predispositions (Bastin; Cestac; Malone 2; Nida and Taber 99; Niedzielski 1985; Wright *et al.* 117). But what is this talent? This question will be addressed briefly in the conclusion of this paper.

### *Small Scale Research*

#### PH.D. CANDIDATES IN HONOLULU

Having found in the literature so many divergent answers to the above-mentioned "perennial question," Niedzielski decided to do some research himself. A first opportunity came up in 1987, when he assumed responsibility for administering the reading comprehension exams offered by the department of European Languages and Literature at the University of Hawaii for Ph.D. candidates from various departments.

#### *Subjects*

In the 1987-1988 and 1989-1990 academic years, Niedzielski evaluated the translations of 61 examinees and analyzed many

different types of errors. Hoping to find a correlation between translation aptitude and some linguistic or other factors, he asked participants to indicate their age, primary language(s) and dominant language, the length of exposure (in years or courses) to language and field of examination, as well as their opinions about whether it would be more efficient to begin with language training (L→T) or with scientific/technical training (T→L) in order to prepare technical translators.

In addition to English (54 out of 61), the primary ("native") languages represented included Arabic, Cantonese, Hebrew, Japanese, Korean, Pilipino, Thai and Urdu. The major fields of studies covered art history, biology, botany, endocrinology, engineering, entomology, ESL, geography, geology, geophysics, information science, journalism, linguistics, marine biology, mathematics, mechanical engineering, oceanography and plant pathology.

### *Procedure*

With the help of a dictionary, the testees must translate into English a previously unseen text chosen from their own scientific or technical field and submitted by their graduate advisor. The languages they may choose to translate from are: French, German, Latin, Russian or Spanish. Other FL departments at the university administer reading examinations in other languages.

The students are advised to 'translate as accurately as possible and as much as they can since the examiners rate both quantity and quality.' They are expected to translate an average of 400 to 500 words (250 to 300 only in Russian) in the two hours time of the examination. As for quality, they need to demonstrate a good understanding of the source text and to reformulate the general meaning in their translation. Deficiency in quantity is weighed against better than average quality.

For this research, ten grammar errors equaled one informational error. Any combination of errors which amounted to an equivalent of more than two informational errors meant failure on the examination.

## **Results**

Table 1 indicates how many respondents favored various sequences and how they performed on their translations. It might be worthwhile to add some observations not shown in the table.

One T→L student in linguistics translated only 280 French words; his performance is not taken into consideration in the calculations represented in the table. Out of the six students who translated the greatest quantity in the two hours assigned (between 750 and 1000 words), three endorsed T→L, and three favored L→T.

Three of the five LSP proponents suggested a sequence leading to optional branching off into linguistic or technical specializations. Three also indicated T→L as a second choice.

Eighteen students made no informational errors: eight T→L, two LSP, eight L→T (including one bilingual Hebrew/English student in entomology and another student in journalism who advised adding cultural sensitivity training).

Although students who had studied several languages generally performed well, one student—multilingual in non-European languages—passed only after three attempts. Working with a French text in plant pathology, he translated only half of the quantity expected and consistently made more than twice the number of major errors allowed for passing.

All six students above 35 years of age, with many years of experience in their fields, passed brilliantly.

A tentative conclusion that might be reached is that although no significant difference in achievement was found between supporters of either sequence, two factors seem to help in translating successfully:

- age, and magnitude of experience in the technical field
- original and creative thinking (the LSP and the cultural training proponents performed in a more than satisfactory manner)

## SECONDARY SCHOOL STUDENTS IN POZNAN

In a further attempt to verify the hypothesis that individuals with a strong background in languages could learn how to translate a technical text faster than individuals with a stronger technical but weaker linguistic background, Niedzielski conducted a mini-experiment in two secondary schools in Poznan, Poland in the fall of 1988.

*Subjects*

Two groups of secondary school students with different educational backgrounds were compared in their ability to learn translation techniques. One group, made up of 29 seventeen-year-old students in their second year at a general education school, had a curriculum including biology, chemistry, geography, history, mathematics, Polish, physics, Russian, three hours a week of English, and one hour a week of a technical field. The other group consisted of 30 nineteen-year-old students in their fourth year at a technical secondary school. Having previously studied chemistry, geography, history, mathematics, Polish, physics and Russian, they were now concentrating on building technology, documentation, economics and legal aspects. They also had mathematics, Polish and one hour of English per week.

*Procedure*

One of Niedzielski's M.A. students in a class on translation techniques at the University of Poznan chose a text on electric motors from a popular Polish technical journal and selected two passages. This text corresponds to Nida's level 1 (1990). She translated a part of the text and later used this 161-word English translation together with a 115-word Polish passage of the same article.

Both groups of students were given the same list of 25 lexical items and two syntactic structures one week before they were asked to translate the two passages. On that first visit, they were only told that in a week someone would speak to them in English about a fascinating field: "the construction of electric motors."

The actual experiment took 45 minutes. The first five minutes were spent on oral and written instructions in Polish and, after handing in their work, they had twenty more minutes to translate the 115-word Polish text into English.

### *Results*

The level of participation differed greatly among the two groups. Out of the 29 students in general education, 25 agreed to participate in the experiment and executed the task as required, as opposed to only 19 out of 30 in the technical school.

Even a very superficial comparison of the results (Table 2) shows a great difference in achievement. The subject with a linguistic background made fewer lexical, grammatical and referential errors than those with a technical background when translating from English into Polish (see ratio). Furthermore, although "technical" students demonstrated a better mastery of terminology when translating from Polish into English, they encountered greater difficulties with the structure of English and, consequently, produced an English translation which deviated more from the expected norm than the other group.

This mini-experiment can only reinforce the subjective opinions expressed by several respondents to a questionnaire Niedzielski distributed in the fall of 1988 (see "FL students and technicians in Poland" below). This by itself, however, cannot prove that it is preferable to start with a linguistic background and follow with a technical education. Too many variables were left uncontrolled. For instance, the socioeconomic background of the students may have played a very important role: 18 out of the 19 technical participants came from blue collar families while all linguistic participants came from well-to-do families and studied English additionally with private teachers. One more subjective but worthy observation is that the technical participants were, as reported by the university student, more emotionally involved in the experiment than the other group and really tried to do their best. As a matter of fact, the anomaly observable in the lower mean of words translated into English by the linguistic subjects is explainable by the fact that several of them stopped translating as

soon as they heard the bell ring for their usual break and handed in their copy with only a few words translated.

#### FL STUDENTS AND TECHNICIANS IN POLAND

Also in the fall of 1988 and in the same class on translation techniques at the University in Poznan, a team of students sought the opinion of Polish university students (including themselves), technicians, professional translators and interpreters about the "perennial question." The answers to this investigation are reproduced in the questionnaire below, together with some relevant characteristics of the respondents. One may note that the majority of both language students and translators/interpreters agree that a good FL knowledge is the most important and technical translator/interpreter should begin with FL, while technicians split such an importance evenly between a good knowledge of FL and that of technical terminology.

### *Long-Term Research*

Having discussed the "perennial question" with Niedzielski in Poznan in the fall of 1988, Chernovaty decide to elucidate the topic by organizing a four-month-long course for various groups of people with diverse occupational backgrounds. This experiment took place in the spring of 1989.

#### *Subjects*

Six groups of subjects were selected to account for various factors possibly influencing success in learning, such as language proficiency, experience in the particular field, age, and personality variables. They were all either students at or graduates of Khar'kov University. One group had a language background (Language Background Students or LBS), the others had a scientific or technical background (Science Based Students or SBS).

#### **Group A**

Twenty students in their fourth year in the English Department with no experience in any of the fields chosen for the texts used

in the experiment and with an average age of 22 years. Their proficiency in English was on the ACTFL/ETS Superior level.

**Group B**

Six graduate students in the school of Humanities with an average age of 28 years. Their proficiency in English, acquired over 1000 hours in secondary schools and at the university, corresponded to a high ACTFL "Intermediate." Groups B, C, and D had similar experience and proficiency in English.

**Group C**

Four engineers, graduate students in the Department of Radio Physics, with an average age of 26 years.

**Group D**

Five engineers, graduate students in the Department of Mathematics, with an average age of 30 years. They all work with computers.

**Group E**

Twenty third-year students in the Department of Mathematics with an average age of 21 years. They had studied English in a secondary school and at the university for about 800 hours and their proficiency was similar to that of groups B, C, and D.

**Group F**

Five managers and other senior staff members at the research institute with an average age of 44 years. Graduates of the Departments of Physics, Radio Physics or Chemistry, they all had a considerable experience in their field of Physical Chemistry. They had studied English for more than 1000 hours over 13 years in their school days and in a recent four month course in spoken English. However, they had used the language only occasionally and mostly to read literature in their field. Their proficiency could be rated as low "Advanced" in reading comprehension and low "Intermediate" in comprehension and speaking.

***Pre-Test***

An attempt was made to test translation skills of all subjects before the experiment began. Groups B, C, and D claimed they had never had any practice in translating and refused to take the pre-test. Groups A, E, and F were given texts in their own fields. The following means are indicative of their performances:

	Group A	Group E	Group F
Speed/45 minutes:	300 words	120 words	270 words
Informational Errors:	.2	5	12

**TEACHING METHODOLOGY**

Group A had regular classes in translating scientific and technological texts two hours per week and in interpreting texts in Political Science for two hours a week. Groups B, C, D, and F were taught mostly spoken English four hours a week through an audiovisual approach and an interactional design based on role playing and language games. Group E received four hours a week of instruction divided equally between spoken English and reading for translation. It should be noted that, in order to give all participants equal chances after such a limited instructional time, all groups took the end-of-course test with some handicap: LBS had not studied all the technical fields from which the texts were selected; SBS had received little formal training in translation techniques because they first needed to improve their knowledge of English.

**POST-EXPERIMENTAL TEST*****Translation*****Texts**

Four texts representing the scientific/technical fields of the subjects were used.

- Text 1. "The Moscow Soviet Session" (170 words in Political Science)
  - Text 2. Variant 1 "Vacuum Tube Amplifier (160 words in Physics)  
Variant 2 "Radio Waves" (130 words in Physics)
  - Text 3. "Representation of Lie Algebra" (179 words in Mathematics)
  - Text 4. "Induction of a Cholesteric Mesophase in a Nematic Liquid Crystal by Some Optically Active Alcohols: A Possible Method for the Correlation of Configurations" (425 words in Physical Chemistry)
- Group A subjects (LBS) translated all texts for comparison with the translations of SBS. Groups B→F translated only one text in their major fields: B=T1, C=T2, D,E=T3, F=T4.

### **Evaluation**

Five criteria were used by a team of two evaluators—a linguist, professor of English, and a technician, physicist. They are shown in Table 3, together with the ratios between LBS and SBS results.

### **Results**

#### *Translation Speed*

A definite correlation appears in Table 3 between technical field knowledge and translation speed. LBS shows the highest speed (11.3 w/m) in the translation of T1, which did not require any special knowledge, and the lowest speed (4.8 and 5.4 w/m) in the translation of T4 and T5, which required very specific knowledge. At the same time, group F, the most experienced of all SBS, shows the highest translation speed of all SBS (9.4 w/m). Their performance is the second highest of all groups (after Group A in their translation of T1). When translating T4, the same experienced Group F translated almost twice as fast as LBS Group A.

#### *Major Mistakes*

These mistakes are in fact informational errors which impede understanding some important information. LBS produced a more accurate translation than any SBS group.

*Minor Mistakes*

Minor mistakes are those which do not impede understanding the main information in the text. The apparent paradox that LBS made a greater number of minor mistakes than SBS in T2, T3, T4 may be explained by the fact that SBS's errors are mostly major mistakes and only a few may be classified as minor ones.

*Stylistic Mistakes*

Mistakes in style were so numerous that in three cases (T1, T3, and T4), it is impossible to establish any ratio.

*Qualitative Analysis*

The main difference between the LBS and SBS groups is in the nature of mistakes. The main difficulty for LBS was terminology: the more specific the terms, the more mistakes LBS made. Part of this problem seems to have been LBS's unwillingness to look up words in a dictionary or their inability to find collocations. On the other hand, the main hurdle for groups B→F was grammar and many words outside their basic vocabulary knowledge. Virtually any word might cause trouble.

There is a substantial difference in the strategies applied by LBS and SBS in the process of translation. LBS function mostly on the level of the sentence or the passage and experience real difficulties only when they encounter a high concentration of specific terminology. SBS move carefully from one specific term to another, trying to establish some meaningful connections between those terms and, when they fail to perceive meaning, they make informational and grammatical errors.

## INTERPRETING

*Texts*

Only groups A and F were evaluated in the interpreting part of the post-test, as members of the other groups either refused to participate or were unable to perform functionally.

Group A worked with Text 5 on metallurgy, a field they studied during the semester. The 296 word text contained 20 sentences and was divided into 10 fragments, five of which were presented

to the subjects in Russian and five in English. The composition of the fragments is shown in Table 4.

Group F tackled Text 6. This 137-word text was from within the group's special field of Physical Chemistry. Its division into Russian or English fragments is also shown in Table 4.

### *Procedure*

All subjects were tested individually. The teacher read aloud text fragments alternately in Russian and English (Table 4), while the subjects were free to take any notes. Their interpretation of each fragment into the other language was tape-recorded and later analyzed.

### *Evaluation*

The six criteria used by the same team of two evaluators and the corresponding results are shown in Table 5. Criterion 1 is quantitative; the others are qualitative.

The overall qualitative criterion (criterion 6) was calculated as follows. Before the analysis, each subject was given an arbitrary sum of 50 points for each sentence to be interpreted. Thus, each subject in group A got 1000 points (for 20 sentences) and each subject in group F 300 points (for 6 sentences).

Penalty points were deducted from these initial totals, as follows. One point was deducted for a short unmotivated pause, 3 points for a medium unmotivated pause, and 5 points for a long unmotivated pause. Three points were deducted for each occurrence of self-correction. Inadequate interpreting due to an informational error cost 10 points; however, 50 points were deducted for each sentence which could not be understood. Inaccurate interpreting, representing any minor error which caused a certain deterioration in the quality of the interpreting but did not prevent its understanding, was worth 5 penalty points.

### *Results*

#### *Quantity*

All subjects in both groups attempted to interpret all the sentences.

*Unmotivated Pauses*

These pauses were considered as indicative of difficulties experienced by the subjects. They occurred mostly before some specific terminology with LBS but not with SBS for whom they were rather unpredictable.

*Self-Correction*

Self-correction was viewed as a deficiency in the quality of interpreting. A high self-correction rate betrays lower control over speech mechanisms. This low control may be due to a higher feeling of stress. Thus, it would seem that group F (SBS) felt less at ease in interpreting than group A (LBS).

*Informational Errors*

The crucial quality criterion in interpreting is the transfer of information. Informational errors impede such a transfer.

Making about ten times as many informational errors as group A, group F produced a very inadequate interpretation. In fact, it is quite difficult to count all cases of group F's inadequate interpreting, because in most cases the subjects just omitted substantial portions of information.

When SBS did interpret a Russian fragment, the information they conveyed in English was so distorted that it was impossible to understand it. For example, an expected interpretation should have been "We tried to obtain a 105K superconductor as a pure phase, using a starting material with a composition determined by a computer." Instead, a typical interpretation obtained was: "We . . . super . . . conductor . . . conductivity . . . with . . . clear phase . . . using the first material . . . attentive . . . which . . . elements . . . finding the use of computer."

When interpreting into English, it took SBS so much effort to construct the English sentence that they forgot the content of the Russian sentence. They did not avail themselves either of the possibility of taking notes; they seemed unable to understand and write simultaneously.

### *Minor Errors*

As already seen in the translation post-test, group F committed fewer minor errors than group A probably because practically all their errors were informational.

### *Accuracy of Interpreting*

Group A interpreting could be regarded as satisfactory. According to the criteria and the grading procedure described above, the best individual performance was rated as 90% accurate, the worst one, 55%. All LBS managed to perceive sentences up to 40 words long, both in Russian and in English. They seldom forgot any information (only six cases of omission were recorded for the entire group). A subjective impression is that their interpretation would have been accepted as functionally meaningful by a professional interpreter.

On the other hand, the huge number of informational errors in group F resulted in a functionally worthless interpretation. Since their performance on the translation part of the post-test showed that their general command of English improved during the four months of special instruction and reached at least an ACTFL "Advanced" level in written skills, we may assume that their proficiency in the spoken skills also increased and probably reached an ACTFL high "intermediate" level. Their inability to interpret must be explained by factors other than technical or linguistic knowledge.

## *Conclusions*

A study was performed of the best possible design sequence in the training of technical translators and interpreters. First, a brief review of the literature was presented. This was followed by several analyses made by Niedzielski in Honolulu and Poznan and by Chernovaty in Kharkov. Conclusions reached in these experiments are summarized hereunder.

## SMALL-SCALE RESEARCH

Based on opinions and /or translations of secondary school and university language students, technicians, and professional translators/ interpreters in Honolulu and Poznan, two factors were found to achieve success in translating:

- maturity and experience in some technical field(s)
- original and creative thinking

It also appeared that a T→L (Technical background followed by Linguistic knowledge) sequence might ensure better results for translators, while L→T would be preferable for interpreters.

## LONG-TERM RESEARCH

A four-month-long experiment at the University of Kharkov confirmed the latter observation.

- A T→L sequence is more effective for translators while L→T would be advisable for interpreters. This finding sustains Herbert's statement that translators' and interpreters' jobs are entirely different and their qualifications quite irreconcilable (1952:6).

The Kharkov experiment also revealed another important tendency.

- The technical knowledge required of a translator depends on the degree of technicality of the text. A similar assertion was also expressed by Larrue (1988:35). It follows then that technicians should be more at ease than others with highly technical texts.

## IMPLICATIONS FOR FURTHER RESEARCH

Because of great variation shown in the performance of L→T and T→L subjects in Poznan and Honolulu and because physicists and chemists in Kharkov were able to translate functionally but not interpret, it is suggested that further research on a possibly optimum sequence in the training of technical translators and interpreters should investigate the importance of personality variables. These might explain why some individuals may perform best as simultaneous interpreters while others may produce accurate, idiomatic and elegant written translations but find themselves unable to interpret under pressure. Since it is so difficult to change someone's personality, the selection of apprentice interpreters should include multi-phase personality inventories. Research in this area has been started by Niedzielski and preliminary results will soon be available.

## NOTE

All texts and other information are available from the authors upon request.

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TABLE 3

		TEXTS												
		#1: Moscow Soviet Session			#2: Vacuum Tube Amplifier Radio Waves			#3: Representations of Lie Algebra			#4: Induction of Cholesteric Mesophase in a Nematic Liquid Crystal			
		GROUPS		RATIO	GROUPS		RATIO	GROUPS		RATIO	GROUPS		RATIO	
		A	B	A:B	A	C	A:C	A	D	E	A:D	A	F	A:F
1. Ave. time (min.)		15	45	1:3	17.5	35	1:2	37	44	44	1:1.2	40	45	1:1.1
2. Ave. No. words translated — Total		170	124	1.4:1	121	115	1.05:1	178	143	122	1.25:1	216	425	1:2
Per minute		11.3	2.8	4:1	7.1	3.3	2.15:1	4.8	3.25	2.7	1.5:1	5.4	9.4	1:1.7
3. Ave. No. major mistakes — Total		0.27	2.7	1:10	0.6	9.0	1:15	4.3	15	4.1	1:3.5	1.3	11.5	1:9
Per word		0.0015	0.023	1:15	0.005	0.08	1:16	0.024	0.11	0.03	1:4.6	0.006	0.03	1:5
4. Ave. No. minor mistakes — Total		0.07	4.0	1:57	0.7	0.5	1.4:1	3.1	2.25	1.25	1.4:1	0.5	11.5	1:23
Per word		0.004	0.032	1:8	0.006	0.004	1.5:1	0.017	0.016	0.01	1:1	0.003	0.03	1:10
5. Ave. No. style mistakes — Total		0.4	--	--	0.2	1.5	1:7.5	0.46	--	1.5	--	1.3	0.13	--
Per word		0.002	--	--	0.002	0.013	1:6.5	1	--	0.001	--	1:3	0.001	--

Table 3: Results of the post-experimental testing on Groups A-F (written translation)

TABLE 4

Characteristics	Fragment Number										Total words/ sentence
	1	2	3	4	5	6	7	8	9	10	
Group/Text	Number of words/sentence/language (R = Russian, E = English)										
A/Text 5	31/2	33/2	33/2	19/1	40/2	35/2	30/2	26/3	30/2	19/2	296/20
	E	R	E	R	E	R	E	R	E	R	
F/Text 6	19/2	32/1	15/1	29/1	21/1	21/1					137/6
	R	E	R	E	R	E					

Table 4: Post-Experimental Test in Kharkov: Text Fragments

**TABLE 5**

Types of Interpreting Characteristics	English → Russian		Russian → English		Total	
	GROUP A	GROUP F	GROUP A	GROUP F	GROUP A	GROUP F
	1. Ave. No. sentences/words attempted for interpreting	9.8/160	3/82	10/128	3/45	19.8/288
2. Ave. No. unmotivated pauses: total/before the terminology/per interpreted word	13/6/0.08	7.5/1.8/0.09	25/15/0.20	12.5/4.8/0.28	38/21/0.13	20/6.6/0.16
3. Ave. No. self-corrections: total/per interpreted word	5.4/0.03	12.5/0.15	9.2/0.07	4.8/0.10	14.5/0.05	17.3/0.14
4. Ave. No. informational errors: total/per interpreted word	4.4/0.03	24/0.30	6.8/0.05	22.0/0.49	11.2/0.038	46/0.36
5. Ave. No. minor errors: total/per interpreted word	4.4/0.03	0/0	5.2/0.04	1.0/0.02	9.6/0.03	1.0/0.01
6. Accuracy of interpreting (percentage)					72.7%	0%

*Table 5: Post-Experimental Test in Kharkov: Performance Data*

## QUESTIONNAIRE

	Univ. English Students	Technicians	Translators+ Interpreters
Total Respondents	36	9	18
Mean of Ages	24	28	34

1. *Preliminary Qualifications of a Good Translator/Interpreter (write ins)*

Foreign Language	26	6	18
Interest in Technical Field	17	2	15
Interest in Technical Terminology	17	6	2
Access to equipment & experts	-	-	13
Alertness/Quick Decision	3	2	2
Precise Thinking	2	2	-
Memory	2	-	-

2. *Best sequence in Training Technical Translators/Interpreters*

Ling. Studies→Tech.Terminology	26	6	5+11
Tech.Studies→Language(s)	5	4	5+0
(write in) LSP	3	-	2
(write in) Living abroad	3	-	-

3. *Preferable Background for Translators versus Interpreters*

3.1	Language specialists make better technical translators and technicians (engineers) make better interpreters.	2	-	-
3.2	Language specialists make better interpreters while engineers make better translators	21	4	14
3.3	No real difference	10	6	14
3.4	Language specialists can translate into L1 better than technicians	6	4	6
3.5	Language specialists can translate into L2, . . . better than technicians	19	8	14

3.6	Language specialists and technicians have similar abilities	12	2	2
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4. *Comments*

University English Students:

- FL studies prepare better in spoken language fluency: 5
- Language specialists have a better feel for the foreign language: 6
- Language specialists have a better feel for the foreign culture: 2
- Language specialists use the foreign language more creatively: 2

Technicians:

- Technicians have a better knowledge of technical terminology but might have difficulties in the spoken foreign language: 4
- Bilingual technicians are more experienced in interpreting than in translating: 2
- A language specialist, with the help of a technical expert, can perform much better than a technician because it is more difficult to learn a foreign language than technical terminology: 2

Translators/Interpreters:

- Individual performance depends on personal abilities: 6
- Individual performance depends on the level of technical & linguistic preparation: 2
- A language specialist is always a better translator or interpreter: 3



## *Toward an Expanded Pedagogy of Specialized Translation*

CAROL MAIER  
AND FRANÇOISE MASSARDIER-KENNEY

Contrary to a belief widespread among professional translators unfamiliar with university translation programs,<sup>1</sup> an increasing concern in current translation pedagogy is the preparation of students capable of working with highly specialized material. Peter Newmark may be correct when he guesses that “Terminology makes up perhaps 5-10% of a text” (160), but, like their colleagues outside of academia, translator trainers within the university know only too well both the importance of that percentage and the challenge it can present to a translator.<sup>2</sup> For students to become competent translators in fields such as medicine, law and science, they must learn to negotiate rapidly and efficiently in areas where they may have specialized, perhaps even sophisticated, knowledge but where they are not actual practitioners.

In an earlier study, developed from our experience teaching specialized translation at the graduate level, we proposed a pedagogical model to be used in the preparation of specialized texts.<sup>3</sup> Based on the premise that the preparation of a successful translation depends to a large degree on one’s ability to know what to ask about a text, our model comprised “leading questions” concerning four key aspects of translation practice: research skills, technical writing skills, collaboration, and theory. Although we explained that the elements of the model are far more interactive than sequential, we placed research skills first, thus emphasizing

the importance of the specialized components of a text, however small that component may be and however it might be defined.

To judge by the quality of student work and the response of specialized readers who critiqued it, our model has proved to be quite successful. Nevertheless, the fact that specialized translation is a relatively recent offering in the university curriculum reminds us of the model's tentative nature.

Therefore, in order to test the model further and, we hoped, to expand it, we decided to explore similarities we saw between pedagogy in our field and other areas in which an informed non-specialist must learn to write about specialized knowledge.<sup>4</sup> Two areas, law and journalism, came to mind immediately, and in both we found ready confirmation of the parallels we suspected. Since there is no law school on our campus, we decided to pursue the analogy with journalism. As a recent article suggests, however, the parallel with the legal profession could also prove fruitful: "The more science a lawyer knows, the better he will be at asking the clients—and the opponents—the right questions."<sup>5</sup>

The co-incidence with specialized translation could hardly be suggested more clearly. Even so, with respect to journalism we discovered not only professional but also pedagogical links with our practice. "In advanced journalism courses," a recent textbook on reporting recommends, "the student should expect to be taught how to utilize the background and theoretical knowledge acquired all over the rest of the campus" (MacDougall and Reid 22). And in a recent issue of *Newspaper Research Journal* (11.4 Fall [1990]), a special section titled "Educating the Newsroom" featured articles on the training of professional journalists. In one of those articles, the need for new and better research skills among journalists is strongly emphasized (Hart). Moreover, in articles about science writing (Friedman, "The Journalist's World," Lear), specialized interviewing (Dexter), and environmental journalism (Cunningham, Monaghan), we found promise of further parallels with specialized translation. It was thus our expectation that by studying the pedagogy of specialized journalism we would be able to develop the parallels we saw with our field. Our goal was to increase not only the scope of our model but also the strength of

our profession by establishing a tie with another discipline and another department within the university.

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Although journalism is an established academic discipline, the pedagogy of specialized journalism is even less developed than that of specialized translation. Surprisingly, extensive research into the written literature about journalism education provided us with very few leads. For instance, although the ERIC database yielded 846 entries under the subject "journalism education," none of the entries specifically dealt with the training of specialized reporters, and only two or three entries could be used in connection with our topic.

Unlike translators, journalism educators have several journals which are devoted to pedagogical issues (*Journalism Education*, *Journalism Quarterly*, *Newspaper Research Journal*) or which discuss issues relevant to the profession (*Columbia Journalism Review*, *Washington Journalism Review*, etc.). However, for the last five years, none of these journals has contained a single article about specialized journalism.<sup>6</sup>

A few monographs on more general topics do provide indirect information that can be useful for translators. For instance, the widely used textbook *Interpretative Reporting* devotes a whole section to specialized reporting. However, the issues raised by the authors are mostly ethical (what is responsible specialized reporting?) or investigative (how can you check the accuracy of a source?). These questions hardly affect the specialized translator, who does not have to assess the validity of the text he or she has to translate. The textbook does not make any reference to the ways a journalist would gain competence in a specific field of specialty; it simply advises students about choosing a topic.

On the other hand, Curtis MacDougall and Robert S. Reid do indicate the need for discussions of how specialized journalists can improve, by providing a list of professional associations such as the National Association of Science Writers and the American Medical Writers Association. These organizations publish regular newsletters, and are "a forum for the discussion of problems of

scientific newsgathering" (474). Although they do not provide discussions of how one might become a specialized journalist or write about science, these associations provide an example that might be useful for ATA newsletters: translators and translator trainers could be provided with systematic coverage of new sources or of parallel texts for specialized material.<sup>7</sup>

Other works about journalism education relevant to translation pedagogy are those dealing with specialized interviewing and with scientific writing. That science writing in general and science reporting in particular could be improved is widely acknowledged (See in particular John Lear's *The Trouble with Science Writing*, Vernon Booth's *Communicating in Science*, Roger Bénichoux's *Guide Pratique de la communication scientifique*, and many of the articles in *Scientists and Journalists*, edited by Sharon M. Friedman and her colleagues.) But these works focus more on "writing" than "science" and say little about how writers can learn to write knowledgeably about scientific information. The assumption seems to be either that writers already have the conceptual background and the vocabulary needed to write about these topics or that the research skills needed to acquire them are not an integral part of writing practice. Again, however, the bibliographies in these works can be useful for translation pedagogy since they list standard specialized dictionaries and books on international units and nomenclature.

Having exhausted the possibilities offered by published sources, we turned to informants, but they confirmed what we had learned (or rather not learned) in our research. A professor of journalism preparing to teach a specialized journalism course agreed that a replicable methodology for such a course was needed, but that there were no models to follow. A former reporter, this educator said that the training of specialized journalists is important and that the profession recognizes its importance. At the moment, however, there are no systematic efforts being made apart from intensive "crash" courses for working journalists. (The most well-known examples are the Knight Center for Specialized Reporting, which offers two-week courses, or the Danforth Center, which gives four-week intensive workshops).

Another informant, a specialized journalist working for a medical publication, fully agreed that the issue of communicating about science or medicine is very different from *practicing* science or medicine, although it is not properly addressed by programs that train journalists. Interestingly enough, this journalist (who has been working 6 years in her field) was eager to find out what medical publications and bibliographies we recommend that our translation students use. Obviously, then, experienced specialized journalists also need more information. Even joining "Journet," the journalism discussion group on electronic mail did not prove more fruitful than our previous research efforts.

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If the pedagogy of specialized journalism is less developed and less systematic than translation pedagogy, translator trainers can still learn a few things from journalism and strengthen their methodology with these findings.

First, translator trainers can learn how to direct students to be more effective when consulting with experts. As many translators know, asking the right question of the right person can yield answers that no dictionary could provide. Yet little time is spent training students to interview. Therefore, the collaborative component of translation pedagogy that we included in our model could be enhanced by incorporating the extensive research done about interviewing by journalism experts. A more sophisticated approach to selecting consultants and choosing appropriate questions would save translation students much time and would contribute to making the field of translation more respected.<sup>8</sup>

A second, related contribution that the example of journalism can make to translation methodology concerns the use of mentors. As our consultant who teaches specialized journalism explained, pairing students with an experienced specialized journalist or with an expert is one of the main pedagogical tools journalism teachers use to develop collaborative and research skills. A similar systematic mentoring system for specialized translation students is not a dream; current technology makes it readily available and cheap. Many professional translators may work in isolation, but

they do use computer work stations. This means they may well be (or could be) connected to an electronic mail translation discussion group through Bitnet, a system widely used around the world. Students have free access to electronic mail and could place requests for mentors in a specific area. This type of mentoring (or advising) already exists informally in areas such as computer science and literature.

Another area of journalism education which can be helpful to our field concerns the gathering of information which is a matter of public record. Finding parallel documents is similar to digging out information for an article and the investigative techniques developed in journalism could be used to increase the effectiveness and the speed of our students. Similarly, rewriting information to fit a different audience is a skill most translators must now possess. As research in text typology indicates, this process of rewriting information into another "format" is crucial for specialized translation.

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Although journalism may not have theorized the pedagogy of specialized reporting, specialized translation trainers can learn much from systematic consultation with journalism teachers and from their practice. Thus, on the basis of what might at first seem rather negative results, we believe it is possible to draw several not at all disheartening conclusions.

In the first place, we would suggest that as teachers of translation we need not apologize for the absence of a more developed pedagogy. On the contrary, as work by Newmark and Wolfram Wilss (to name just two examples) exemplifies, translators have reflected more on the teaching of specialized practice than many of their colleagues in an area with a far more established tradition within the university.

Second, we have seen that our model holds up well as an approach to specialized translation. After reading our article, a colleague in journalism even observed that a similar proposal would be helpful to the members of her profession. This leads us to feel confident that, in collaboration with the other teacher-

translators whose work we have read and with whom we have consulted, we have outlined the beginnings of a sound pedagogy. Although we will continue to question that approach, we feel we can now intensify our efforts to procure more and better documents for our classes and to find more and better ways to use them with our students.

The comment by our colleague in journalism also leads to our third conclusion, which not so coincidentally concerns one of the elements of our model. The element we refer to here is collaboration, for our final conclusion is that in the face of specialized material, as with any difficult translation, collaboration is crucial. In the case of this essay, we have pursued that collaboration with respect to another profession and a colleague in another academic discipline.<sup>9</sup> We would also like to suggest, however, that our work with pedagogy in journalism and translation encourages us to stress the importance of collaboration within the translation profession itself. If future generations of translators are to be adequately prepared for the increasingly specialized work that surely awaits them, they will need to rely on the guidance and cooperation of translators working both in the field and in the academy. The “more and better documents” we refer to in the preceding paragraph will not come from within the university, as translator-teachers know and professional translators are quick to point out (see Obst). This means that the implementation of our pedagogical model and the cooperation between translators it implies could strengthen working relations in the profession and thereby contribute to the work of the profession itself.<sup>10</sup>

## NOTES

1. See, for example, the special issue of *The ATA Chronicle* devoted to “Translation Education in the United States,” in particular the article by Harry Obst. Letters in subsequent issues by Ben Teague and John Bononno offer pertinent responses to Obst’s comments.

2. For the purposes of discussion, we employ the conventional distinction between translators within (as opposed to those who work outside) the university. That we find this a false dichotomy, however, and propose to counter it should be clear in our essay.

3. See Maier and Massardier-Kenney.

4. We also considered the area of Technical Communication since in the past we had found parallels between the writing skills needed by translators and technical communicators. After consulting, however, with Lawrence J. Starzyk from the English Department, who teaches Technical Writing, we realized that those parallels do not continue the aspect of our model that we were most interested in developing—that of research skills. As our colleague explained to us, his students either have expertise in technical subjects when they enter his classroom or they plan to major in technical fields. He offers them his expertise in English and teaches them to organize their thoughts more clearly, but he provides no instruction or coaching in gathering or comprehending technical material. Conversation with colleagues in other schools indicated that this distinction pertains in general to Technical Communication as taught in the university.

5. With respect to parallels between the work of translators and lawyers, White's recent book offers a provocative discussion and offers many suggestions for further comparisons.

6. Jack Hart's article "The Classroom and the Newsroom" is the closest piece we found on our topic. In her comments about the "Education of Editors and Reports," Friedman discusses the journalist's need for a stronger background in science, but she does not make specific suggestions about either curriculum or classroom practice (32-34).

7. Rogers's "Science in the Mass Media: A Selected Guide" and Dunwoody's "Selected Bibliography" also provide numerous entries that could be of use to translator trainers, in particular Dunwoody's entries under "Teaching Mass Media Science Reporting" (309-310) and "Special Publications on Mass Media Science Communication" (310-311). As Dunwoody notes, however, "many of the citations. . . fall into the realm of commentary" (309).

8. See, for instance, Lewis Dexter, *Elite and Specialized Interviewing*. Dunwoody's comments about the "Scientist as Source" and Rogers's discussion of science information personnel ("The Practitioner in the Middle") also contains possible suggestions for translators and translation students in search of appropriate informants for scientific information.

9. Our thanks to Barbara Hipsman of Kent State University's School of Journalism and Mass Communication for her participation in the discussion that led to our research and for her many suggestions.

10. As Aguirre states with respect to the training of interpreters, "In order for a profession to be well established, it needs to be well equipped with solid academic programs, have a good body of research behind it and must have competent faculty to teach and train the prospective professionals" (5).

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## *“Retooling” as an Adaptive Skill for Translators*

BEN TEAGUE

Sci/tech translators may dream of serving one market sector, doing translations on a narrowing range of subjects (and hence progressively easier ones), becoming more and more valuable to fewer and fewer clients (and choosing, among those, the least vexing), and cocooning themselves in a blanket of job security.

Those lemonade springs and peppermint trees remain just a dream for most. Independents must specialize but not too narrowly, work hard to keep offering high-quality services, seek new clients to replace old ones lost, and face daily uncertainty about work load and income.

Translators manage these conflicts in a variety of ways. Some market their services with great energy, a few set up as bureaus for purposes of load-leveling, others accept work on any “sci/tech” subject (or any subject whatever), and those with a low tolerance for ambiguity look for more stable in-house jobs or leave the field altogether.

Into this pattern of coping mechanisms, every translator must find a place to fit learning processes. Few perceive the knowledge they began with—whether of business practices or of aerospace engineering—as sufficient for a productive career. Clever translators who have discovered the secret of success in this or that endeavor face overflow audiences when they promise to disclose it at conferences.

I would be presumptuous to expect an S.R.O. crowd, and indeed I cannot claim to have a secret to disclose. But a systematic account of one translator's experience in learning to handle new material may find an audience among colleagues whose changing client lists demand that they display ever new kinds of subject knowledge.

### *Becoming (an) Expert*

No translator can be an expert on all subjects; every translator must be an expert on a few. Most recognize that they must *adapt to changing demands* by changing their profile. They need to offer expertise in a limited range of fields, but *not always the same fields*. A translator, for example, who has spent years working on chemical engineering texts may move to a new situation (lose a client, gain a client, attempt to enter a new part of the market) where chemical engineering accounts for few assignments or none.

I will briefly define "expert" and relate some factors that enter into the decisions whether to attempt a learning project and how to judge its success, but neither of those points is central to this paper. Here is what is central: *By applying the method I will propose, a working sci/tech translator can learn enough about a new subject to perform good translations.* I should add the disclaimer that the method has nothing to do with "cramming" for a single assignment in an unfamiliar area.

How well must the translator understand the subject of the text? Some might say not at all; "just write down what the original says." We need not spend much time on that view, for each of us has seen translations produced to this standard. A better answer: The translator must understand the subject well enough to use references effectively, imitate the best writing of specialists, detect nonsense, and with all this produce words enough to make a profit.

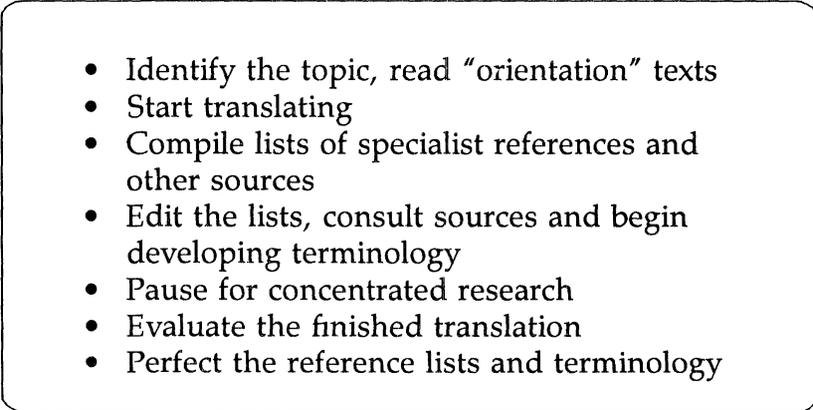
The decision to set out on a program of self-instruction should take account of benefits as well as risks. Benefits will include the *prospect* of clients and income, but it would fly in the face of experience to regard every dollar promised as a dollar in the bank.

Only experience will tell how much weight to attach to promises. Risks may seem negligible at first glance, but any investment (of time in study, of money in resources) carries the risk of waste, and every translator recognizes how one bad job can injure a hard-won reputation. Again, experience will guide the assessment of risk.

The decision depends on another factor that may be even harder to evaluate: The outlook for success. A background of study or work in physics, for example, suggests that the translator can quickly and easily work up optics but may have trouble learning enough law to do an agency contract.

### *A Short Course in Welding*

Recently I had a chance to do a series of translations on welding processes. Because I have the experience fresh in mind as I write this, I draw most of my account from it. The steps I followed to get through the first job (Fig. 1) can serve as a paradigm for the whole method I propose.

- 
- Identify the topic, read "orientation" texts
  - Start translating
  - Compile lists of specialist references and other sources
  - Edit the lists, consult sources and begin developing terminology
  - Pause for concentrated research
  - Evaluate the finished translation
  - Perfect the reference lists and terminology

*Figure 1. Outline of the proposed method (static version)*

I do not claim any basis in theory or educational principles for this system. Indeed, some readers will object to the order of

steps. But translating early in the process has economic, psychological and cognitive advantages: It represents (or at least simulates) progress toward the final bill, it gives a sense of accomplishment that turning pages or dialing the telephone does not, and it serves as a guide for later steps, as I will relate presently.

The user of my translations is an organization with a big research program that deals with all kinds of welding, so that in the end I had to cover more areas than will be evident in the following summary of the field.

To join two parts, one applies heat to the *joint*, adds *filler metal* to fill the gap between parts and unite with the melted portions of the *base metal*, and provides *shielding* (usually an *inert atmosphere*) to promote desired behavior and suppress undesired processes. Heat is supplied by a *torch* or *gun*, which may be guided by hand or mechanically.

In *oxyfuel gas welding*, the torch delivers and controls flows of oxygen and a fuel gas such as *acetylene* from *cylinders*; the gases burn at the *welding tip*. Filler metal takes the form of a *rod*. In *oxyfuel gas cutting*, a *preheat flame* brings the metal to such a temperature that it actually burns (releasing more heat) in the high-velocity stream of *cutting oxygen*, which expels molten metal and oxides from the *kerf*. The *cutting tip* has apertures for both preheat flame and cutting oxygen.

In *gas metal-arc welding*, one of many *arc welding* processes, the base metal is heated by an arc set up between a *wire electrode*, also serving as filler metal, and the *work*. The welding *power source* supplies a controlled electric voltage and current. Wire is fed from a spool through the gun; a *shielding gas* such as argon, also delivered through the gun, domes over the arc and the molten *weld pool*, preventing oxygen in the atmosphere from interfering with the process.

A good weld features complete *fusion* (from the surface of the base metal all the way down to the *root*), a more-or-less small *heat-affected zone* in which the metallurgical properties of the base metal may be altered, and neat appearance and constant width of the *bead* or the *fillet*. Desirable qualities in a *welder* include some knowledge of metallurgy, good *welding safety* practices, and presumably a clear conscience.

### *Identifying the Topic*

I started by scouring my library for welding fundamentals. As usual, the first places I looked were handbooks: *Marks*, *Kirk-Othmer* and others (see "References"). These publications are good for orientation because they give short, linear treatments of many subjects and do not cheat on terms as general books may (*New Columbia* uses the noun "bond" where specialists say "weld").

In this orientation and first reading stage, I learned basic points that I had formerly scanted because they were not central to other assignments. I noted concerns in weld design (e.g., *butt weld*, *strength*) and technique (*plate-edge preparation*, *forehand welding*), miscellaneous terms (*penetration*, *braze welding*), and a reference for future use (*Metals Handbook*). I began to see how welding would shape up as a primary topic and how my client's interests fit with the literature I was discovering.

The arrival of the documents enabled me to check the topic definition, which turned out wrong: The first translation was to be about cutting, not welding. Having begun on welding, however, I found it easy to shift over to cutting, since the operations and equipment are quite similar. (Many references, including the *Welding Handbook*, treat cutting processes as a separate topic, but the chapters on cutting make continual reference to those on welding.)

### *Making a First Stab*

I now began translating the first document. My colleagues may protest that making what amounts to an expendable first translation is inefficient. And so it is. The work will turn out rough and full of holes where dictionaries and references do not give instant answers. The translator may later manage to save a few paragraphs out of this attempt, but only at a high cost in labor.

In my view, the deciding factor is that *new facts are easier to understand if they come as the answers to questions* than if an author has silently chosen which ones to present and in what form.

Reading handbooks and even specialist literature may lead to some questions, but these will not compare—in number, specificity or urgency—with the ones that arise from trying to produce a draft translation.

The first try, covering a few hundred or perhaps a couple of thousand words, should result in as many pages of questions and notes as of translation. In this way it serves its purposes of feeding information back to the learning process and guiding the selection and use of references.

This step does not accord with the structure or the logic of academic courses, but the situation I am describing is not that of a scholar. If time permitted, one might better take courses, or at least set aside a few weeks for study and reflection; but sci/tech translators will say, in chorus, that time does *not* permit.

### *Preparing a Campaign Plan*

With the background reading done and a rough start made on the translation, I looked ahead at the next two steps. Before completing the job, I would have to work up a comprehensive list of references (and possibly acquire some of them), and I would have to “tune” the list and begin consulting sources and developing a terminology base. While Fig. 1 shows no translation going on during stages three and four, this was in fact the time when I did most of the work. The interaction between study and translation in this period was faster and more intense than in the preceding one.

My client gave me three useful items: an annual report, a pointer to the *Welding Handbook*, and a glossary. The report made a good quick read but led nowhere. The handbook proved the key reference; it discussed many aspects of welding processes, included numbers of definitive terms, and provided long stretches of parallel texts.

With these materials and some bilingual dictionaries, I had both the long and the short forms of my list: *Welding Handbook* (I bought two volumes); *Metals Handbook* (fortunately in a nearby reference room); *Kleiber* (on my shelf already); and the glossary.

Other jobs have turned out differently. I began a similar project with a list of three dozen books; examined every one, short-listed four, and ordered the fearfully expensive leader; found even the long list inadequate; and eventually added two or three more. It just depends.

Every reader of this volume has been, or should have been, avidly reading about terminology as a pursuit related to translation but partly independent of it (the *ATA Chronicle* has carried a long series of Sue Ellen Wright's articles on this subject). The glossary supplied for this series of jobs gave me a new outlook on "standalone" terminology. The long (ca. 3500 entries) and carefully compiled list did not afford nearly the help my client and I expected it to, for two reasons: First, because the glossary, in the form of an MTX™ "LxtFile," came without documentation, so that it was not possible to distinguish among the three great classes of bilingual equivalents (unarguably correct; client's shop terms; made up). The records contained markers and what I took to be authenticating notes, but without a key or legend they were all meaningless. Second, for the very reason that the work should have had such immense value: It was made before the translation began and incorporated no effort of mine.

This point merits a little further discussion. A trained terminologist with access to a wealth of resources should, I expected, produce a set of ultra-reliable equivalents. On examining the work, I was forced to re-evaluate my expectation. Many of the terms presented were acceptable; they checked against original-English publications ("arc starting" does correspond to German *Zünden*).

Others, however, seemed "off," as if they had been created in a vacuum—as they had in a sense, if the terminologist needed a quick equivalent and had no translation on which to base it. An example: *Rückstosskraft*, equated to "repelling force"; in arc welding, this is called "anode reaction force" (*Welding Handbook*).

Still others led me into arguments with myself. The lone equivalent for *Auftragschweissen* was "hardfacing." The German word denotes any process in which filler metal is added to the surface of a part. The *Welding Handbook* describes four: "cladding," "hardfacing," "buildup" and "buttering." The document for

translation did not unambiguously refer to just one of these processes—all similar in technique and equipment—and to use “hardfacing” alone would have misled the user of the translation.

If an outsider’s suggestion will not be impertinent, I offer this one to terminology workers: Let bilingual terminology grow from translations (and translators’ research), not the other way around. And to my colleagues, an *insider’s* suggestion: Use precompiled word lists, even client-sanctioned ones, with the same reservations you hold about dictionaries. Good as they have become, and much value as they add to documents, terminologists have not escaped the constraints that we have always known apply to lexicographers.

### *The Research Crunch*

With the first assignment three-quarters done, I stopped translating and went to the library.

In a paper some time ago (*Teague*) I suggested organizing “a list of questions and a thermos of coffee” for this step, but most libraries now restrict users to the first. If everything up to this point has been in an Apollonian vein, Research Day is Dionysian time. The translator has now exhausted obvious sources of information and must look in *nonobvious* places. Everything from *Aachener Blätter für assortierte Gebiete* to *Zhurnal nesvyazannykh tem* is fair game. Books on welding had not yielded what I needed to know about ship-breaking, fabrication by “shape cutting,” etc. But this is not a paper about methodical library research, to say nothing of lucky hits, so I will not dwell on what information I sought and where I found it.

### *Evaluating the Finished Work*

When this project began, I could name two kinds of welding (“acetylene” and “arc”) and tell base metal from filler. Weeks later I had the nerve to send out a translation on oxyfuel cutting. The reader may ask what secret power techniques I used to decide when the job was ready to go.

If the factors in deciding to start the self-instruction were hard to describe, the criteria for judging the first translation are terribly difficult to apply. While a veteran may have little hesitation to do it alone, I suggest that a beginning translator can best perform this task *in company*: with the help of a revisor or an experienced colleague.

This is not to say that the assessment is a subjective one. The tests are as objective as any standards applied to translation. But a list of things to check does not make a welding inspector—that takes experience and practiced judgment—and such a list does not make a translation inspector either.

Still, there *is* a list. Here are the points I checked in my first welding translation:

- Is it complete and presentable? (All paragraphs, equations, tables; neat margins; no thumbprints.)
- Does it use correct language? (Subject-verb agreement; “register”; terminology.)
- Does it feature an authentic style? (Emulation of highest quality of first-language writing on the same topic.)
- Is the text consistent with itself? (Freedom from contradictions between sections.)
- Does the translation accord with first-language references? (Freedom from contradictions and terminological discrepancies between translation and, say, *Welding Handbook*.)
- When the translation seems wrong, is it wrong because the author was? (Freedom from awkwardness in response to difficult writing.)

Most translators will like to have a second opinion on the first assignment. There are two ways to obtain one: Cultivate a specialist, and badger the client for an assessment. It may be cheaper to depend on the client, but it is no doubt

better—especially for the long term—to procure the help of an expert. Many skilled translators routinely hire a hydrologist, a medical technologist, or what-have-you to review translations on new and even familiar subjects. In my welding project, the nature of the relationship (with the techies, not the clerical staff) and the ease of contact led me to work fairly closely with the client for purposes of evaluation.

### *Wrapping Up*

The learning process cannot end when the job goes out the door. More assignments on the same topic will follow, and the translator needs to make sure that the study done, resources collected, and research approaches discovered will pay off again and again. The last step in my procedure, then, is one of perfecting the records.

To wind up the welding project, I reviewed my bibliographic notes and examined the revised drafts to be sure all terminology changes and finds had made it into the glossary files. I then made a quick run through my own glossary to check that all new entries had text locations and supporting context. Finally, I looked at the job just finished and the next ones in the stack, noting how information from the first would figure in the others.

This account may have suggested a static relationship between steps: this, then this, then this. That simplified version (Fig. 1) gives way, in fact, to the dynamic, closed-loop approach outlined in Fig. 2. What is more, the method lends itself to a world of variations. I have already described how two steps collapsed into one in the welding project; other translators may happen on jobs where the entire first stab proves usable, or on monster assignments that require multiple Research Days.

The technique I have proposed—a way of devising an *ad hoc* curriculum and discipline for self-instruction—has proven useful in areas ranging from abstract mathematics to concrete structures.

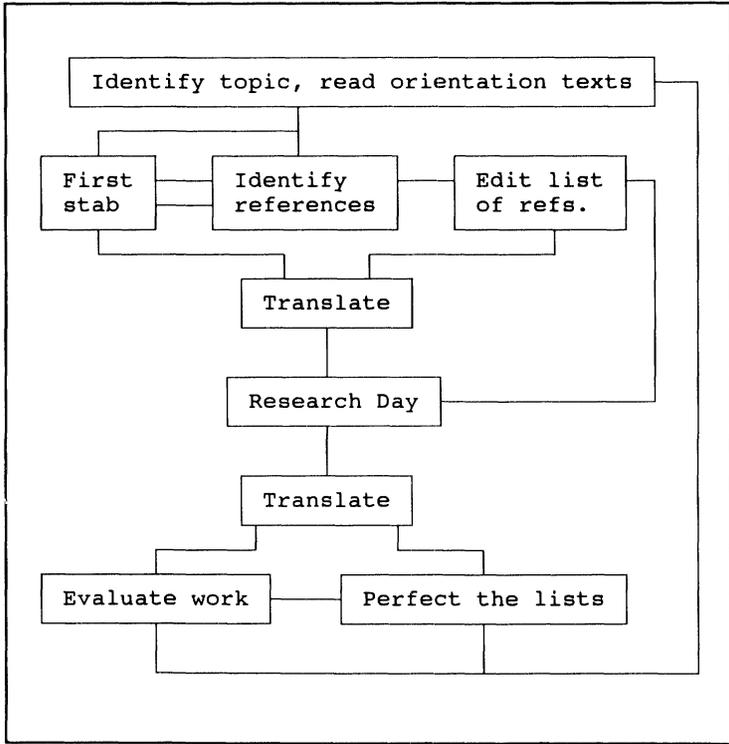


Figure 2. Outline of the proposed method (dynamic version)

The case described in this paper, my course of study in welding, was routine in some ways (closeness of subject to work I had done before) and unique in others (client's large glossary).

What was most typical, however, was a point I have not stressed: This is hard work. Most translators found studying difficult when they were undergraduates, and for many it has become more so in the time since. Nor have I discovered how to computerize the task.

Learning remains a crucial skill for translators nonetheless. None of us lives on that Big Rock Candy Mountain where Monday's knowledge will get us all the way through Friday. I hope my colleagues will find some value in the approach described here for coping with the need to adapt.

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## *Section 4:*

### *Text Analysis and Text Typology as Tools for Technical Translators*



## *Text Typology and Translation-Oriented Text Analysis*

KLAUS GOMMLICH

The phrase “translation-oriented text analysis” has at least two meanings. The practicing translator will understand text analysis as the process of “deciphering” the text to be translated. On another level, however, it can imply attempts to describe varieties of texts for a specific application in translation. The importance of the first interpretation is quite obvious because it clearly reflects the translator’s experience. Since neither linguists nor psychologists provide clear answers as to how text comprehension works, most translators proceed on the basis of intuitive skills acquired and refined through the process of translation itself. They develop an internalized model of textual interpretation and improve on it gradually. In this case, SL-text comprehension is experience-based and expectation-driven. This is the way texts have been translated throughout history, and there is ample reason to believe that it will also succeed in the future. Nonetheless, we also know that this method is not the most effective one. Text analysis in the second sense can contribute to mastering an endeavor that is otherwise almost exclusively experiential. Development of a theoretical framework should yield a model for detailed textual analysis designed to enrich the individual translator’s knowledgebase and understanding about texts in general. Consequently, the character of text comprehension would not change basically, although *experience* and *expectation* will become *model-based* and *empirically supported* instead of remaining just

accidental. What can be expected to change is the influence that model-based analysis has on the selection of translation strategies, i.e., its role in helping the translator work faster and more accurately.

In this paper, I will describe a translation-specific text typology as the basis for both the translator's actual text analysis procedures and for empirical database work.

### *Translation-Specific Text Typology and Text Analysis*

#### TOWARD A TEXT TYPOLOGY

As the linguistic model for text analysis, a typology should be goal-oriented. Its main aim is to describe recurring textual structures in a manner that is appropriate to translation and that allows for simple storage and processing in a database to which the translator should have access while preparing a translation. This means that the analyses produce results capable of guiding a translator's activity at the initial stage of text processing. Several past attempts to produce text typologies have sought to systematize textual features according to different linguistic characteristics of texts, but few included translation procedures (Reiss 1976, Werlich 1976, Reiss and Vermeer 1984, Isenberg 1984, Neubert 1985, Gommlich 1987, Lemke 1988, Schneider 1991). Based on these descriptions, we can infer text-linguistic findings for both variants of translation-oriented text analysis (see van Dijk 1980, Motsch 1983). The text-linguistic model should include universal features that texts either share or that set them apart from one another. There is empirical evidence that the groups of texts with common characteristics are more comprehensive than the number of topics and specific communicative formulas that have been suggested by previous text typologies. Since these formulas often influence global textual organization, they should not be excluded from a typology. Our main purpose is to concentrate on the more general aspects of a translation-specific typology rather than indicating topic-dependent individual text differences.

The text model applied describes text meanings as interactional aims and propositions on both the macro- and micro-levels. In other words, the text type is determined on the basis of the interactional aim and a global evaluation criterion.

I classify texts into two types: (1) *transfactual* texts, whose fundamental interactional aim is to enhance recipients' factual knowledgebase; and 2) *transbehavioral* texts, which influence recipients by stimulating their behavior toward persons, facts, situations.

### TRANSFACTUAL TEXTS

Transfactual texts have the following implications. The originator of a text seeks to enhance his/her reader's knowledgebase about a certain domain of facts.<sup>1</sup> To avoid tautology, the information conveyed must be *new* to the recipient's knowledgebase. In other words, the originator of the text transfers facts or systems of facts to the anticipated recipient. This intention is a very generalized one and leaves open various ways of implementation, of which we can observe at least two sub-types: *transfactual I* and *II*.

*Transfactual I* texts presuppose *expert knowledge*. New knowledge packages relevant to a certain domain expand existing knowledge packages from the same domain, such as in scientific literature (books, articles) or scientific-technical presentations (conferences, reports). The recipient evaluates the possible truth value of the incoming information with respect to either a model or empirical evidence.

In *transfactual II* texts, knowledge packages are also added to existing ones, although on the basis of *non-expert knowledge*. Normally, the speaker/writer provides for new knowledgebases or expands existing ones. In case a similar knowledgebase exists, it differs only in its quality from knowledgebases of *transfactual I* texts.

There is a wide range of situations and possibilities for providing and expanding non-expert knowledge, e.g., literature whose goal is scientific education or elucidation. The difference from the aforementioned type becomes evident in the evaluation of structures involving the second case. Since the recipient does not

possess similar conceptual structures for the incoming information, transfactual II texts are evaluated with respect to their effectiveness, not their truth value.

There is evidence that this typology also covers instances of cross-classification, when, for instance, an educated layman reads a scientific-technical text based on a concept he/she has previously acquired. In this case, the differences between the two text types narrows, although they are never truly identical. Linguistically, this overlap might constitute a borderline case and questions or rules out any rigid classification. We have some empirical evidence for these occurrences, in the form of many publications that meet the information requirements of both specialists and educated laymen, such as *Scientific American*.

Both text sub-types and overlap texts are most relevant for current translation practice and call for further research.

#### TRANSBEHAVIORAL TEXTS

The second fundamental interactional aim characterizes transbehavioral texts, which attempt to influence a recipient's behavior.<sup>2</sup> This general definition requires clarification of what is conceived to be behavior and how to influence it. A recipient's behavior will be specified as behavior toward persons (actual existing persons versus "projected" persons, other persons versus recipients themselves) or towards situations.

This definition also allows for two sub-types: *transbehavioral I* and *II*. The first sub-type comprises a large variety of textual genres. The originator of a text might influence the behavior of a recipient by a personal or business letter, advertisements, a prayer, the lyrics of a song, a novel, or a poem. Transbehavioral II texts influence the recipient's behavior by seeking to control a recipient's actions according to a prescribed or conventionalized routine. These routines are socially determined and are accepted as guidelines for individuals or groups of individuals. Behavior will be interpreted as a rule- or schema-controlled activity, such as might be imposed by laws, patents, standards and manuals. Like transfactual texts, transbehavioral texts might also occur in

cross-classification modes, e.g., when a business letter is written as transbehavioral I but understood as transbehavioral II.

#### TEXT TYPE-DEPENDENT STRUCTURES

The text typology described here forms the model used as the basis for researching translation samples (SL and TL text). The results of this research are designed to contribute to building a prototype text database that will provide knowledge about the characteristics of both SL and TL texts. The database can be used in actual translation-oriented text analysis and in selecting appropriate textual features for functionally adequate translations. To this end, the aforementioned text types and sub-types must be analyzed in both SL and TL, and the corresponding structures that result from these analyses are assigned to each other. The prototype database would comprise three different sub-databases (SL-text descriptions, TL-text descriptions, and SL-TL text assignments), which are of varying importance in the translation process.

So far we have discussed text typology features in very general terms. However, for practical use, text types must be described according to recurrent meanings and typical expressions, both with respect to their *sequential* and *hierarchical* structures. Studies show that there are frequent correspondences between meanings on a certain level and forms of expression, whereas “meaning” implies both interactional aims and propositions. The goal of translation-oriented text analysis in this sense is to investigate SL- and TL-text structures in order to compile databases documenting the meanings and forms on all textual levels in specific text types.

### *Typology-Based Text Analysis*

In an actual translation process, text analysis has several different goals apart from refining the database of prototypical texts. The translator analyzes an SL text as a sub-process of the complete translation process. Model-based analysis uses the typology as a theoretical guideline and the text database as an empirical

means for comparative purposes. These text analyses should increase the speed and accuracy of TL-text production.

Model-based translation-oriented text analysis is determined by a number of type-defining factors: (1) the purpose or aim of the SL text, (2) the purpose or aim of the TL text as a reflection of the client's needs, and (3) the anticipated recipient's knowledgebase for understanding the SL and TL text. Factor #3 is not a tautology, because text aims might be understood differently.<sup>3</sup> These three factors determine the following analytical methods.

#### FUNDAMENTAL INTERACTIONAL AIM

The central feature revealed by the model is recognized as the fundamental interactional aim of the SL and TL texts. On this basis, the translator determines the appropriate text type of the SL text. To this end, the translator matches structures of that text with potential structures indicated by a database of prototypical text features. As a reader of the SL text, the translator arrives at (1) interactional aims on different text levels determining the specific intentions of the text (partial interactional aims), and (2) propositions within the scope of these aims (macropropositions and propositions). In addition to identifying the aim of the text, the translator also decides whether his/her own knowledgebase about the propositional domain of the text suffices to process the propositional content. The goal of the first step of translation-oriented text analysis is to determine at least one text-type classification for the text at hand, which becomes the input for step 2.

#### TRANSLATION OBJECTIVE

In the second step, the translator ascertains the goal of the translation, mainly determined by the client's and/or employer's needs. These needs determine what purpose a translation should serve and hence, who the potential TL-text audience is and what it is supposed to learn from or do with the text, at whatever time and place it might receive the TL text. Answering these questions requires the inductive determination of the aim assigned to the TL text.

## AIM IDENTIFICATION AND TYPICALITY

Step 3 is a logical outgrowth of step 2 and represents the most critical decision in the translation process. The translator checks whether the fundamental interactional aim of the SL text basically coincides with that of the TL text. This decision influences the depth and perspective of the SL analysis.

So far, we have intuitively assumed that all texts representing a given text type are *typical* of that type, but a number of *atypical* texts also exist. Translation might be directed at maintaining typicality if the TL text has the same fundamental interactional aim and if the TL text belongs to a group of texts that exist in that TL discourse community.

However, if the text type changes or if the TL text does not belong to an existing group, the TL text might be viewed as atypical. Thus, *typical* and *atypical* features also become important factors in determining the depth and perspective of SL-text analysis.

The examples given in Table 1 illustrate some options for SL and TL text correspondence. Although incomplete, this table exemplifies potential relationships between SL and TL texts of a certain type, and it shows what translation-oriented text analysis should concentrate on.

Examples (1), (4), (6) and (8) contain typical SL texts and typical TL texts. These examples assume that all SL-text analyses are detailed with respect to the factual knowledge involved and those linguistic items which differ on the various levels representing interactional aims and propositions. For instance, if the typical TL text requires specified organization at the macro- and/or micro-level, the translator needs exact knowledge of the SL text meanings on all levels in order to decide how to typically reformulate meanings in the TL text. SL-text analysis is directed at the micro- and macrostructures and meanings with respect to possible identities and changes in the TL text. A database of prototypical SL-text structures and SL- and TL-structure assignments supports analysis since it provides positive guidance for translation-oriented decision making.

Examples (2), (3), (5) and (7) contain typical SL texts and atypical TL texts. SL-text analysis should also be detailed, but only to explain “interior” factors such as coherence and cohesion on the lowest level and to relate them to the overall macro-structures.

If, however, the SL text is an atypical text, the translator is hampered in producing a typical TL text. Normally, atypical SL texts result in atypical TL texts, and SL-text analysis should assist in formulating TL-text specifications.

**Table 1**

SL Text Aim/Type	Typical	TL Text Aim/Type	Typical	Examples
Transfactual I	+	Transfactual I	+	Scientific article (1)
	+	Transfactual II	-	Historical science book/article (2)
Transfactual II	+	Transfactual I	(+)/-	Popular science article (3)
		Transfactual II	+	University textbook (4)
Transbehavioral I	+	Transfactual II	-	Personal letter (5)
	+	Transbehavioral I	(+)/-	Business letter, novel (6)
Transbehavioral II	+	Transfactual II	-	Patent, political speech, user manual (7)
	+	Transbehavioral II	+	Patent, political speech, user manual (8)

## *Outlook*

Text analysis is important as both an empirical means of establishing text databases and as a model-based process during the actual translation process. Since analysis centers around the notion of text type, a translation-oriented text typology is

required. Not only does the typology describe texts as groups determined on the basis of similar fundamental interactional aims and propositions, the typology also allows for cross-classification.

Text typology-specific analyses classify all possible recurrent text features on the macro- and micro-levels, thus encompassing different levels of expressions from the most complex to the most detailed. Using a text database compiled in accordance with this method and with the aim of the SL text, the translator can more effectively determine the depth and dimensions of SL-text analysis. Empirical work is required to build the database and test out the algorithm. The ultimate goal of this project is provide students of technical translation with a broad knowledge of the kinds of prototypical structures that occur in a wide range of texts and to enable them to apply the knowledge thus gained in their future translation work.

## NOTES

1. Although identical in the fundamental aims, transfactual texts do not fully coincide with informative texts as they are known in literature and translation practice. To demonstrate the slight difference in approach and classification, transfactual texts exclude all texts having a control function, such as patents and standards. It might have been better to have chosen a new term rather than using the familiar one (see also note 2 and table 1).

2. Although transbehavioral texts are very similar to persuasive texts, they cover a wider control component. Unlike persuasive texts, transbehavioral texts also refer to the behavior of groups and institutions toward conventionalized facts like in patents or standards.

3. See in Wright, "The Inappropriateness of the Merely Correct," a treatment of situational and macrostructural heterovalence (p. 74 above).

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# *The Standard Generalized Markup Language (SGML) and Heuristic Textual Resources in Translation-Oriented Databases*

GREGORY M. SHREVE

## *The Structure of Translation-Oriented Databases*

Computer-Assisted Translation (CAT) systems should be designed on the basis of empirical studies of the translation task. Studies of practicing translators, which include serious analysis of the strategies and resources they use during translation, are the only rational basis for CAT software development. These studies should reveal translation strategy and tactics, and should provide valuable information about the nature of the resources translators use.

Translators use a myriad of reference sources. In the course of a translation the translator may consult monolingual dictionaries, bilingual technical dictionaries, thesauri, self-compiled terminology glossaries, background texts, parallel texts, or also interview subject experts. When on-line electronic versions of these translator's resources are created and placed in a *translator's knowledge-base*, it should be with a clear empirical understanding of how the translator uses these resources and what she expects from them.

For the sake of discussion, let us assume that empirical studies of translation support the following general outline of the translation task:

- First, the translator reads or skims a source text, or portion of a source text, for understanding. She attempts to reach a general comprehension of the text segment. A temporary mental model representing the global meaning of the source text segment is constructed. Access to subject or domain knowledge and terminological data is most useful here.
- Second, the translator uses the source text and the mental model of the source text as a guideline for transferring the text meaning to the target text using the linguistic resources of the target language. Both terminological knowledge and knowledge of the linguistic relationships that exist between source and target language structures are needed. In particular, access to translation strategies that have worked in similar translation situations is needed.
- Third, the textual and stylistic conventions applicable to the target text are used to recast the text and make it acceptable in its new text world. Access to parallel texts, sample texts, style-books and other resources that provide insight into the textual conventions of the target language are required here.

A CAT knowledgebase established on this task model would have four key modules: a term knowledge module, a domain knowledge module, a translation-strategy module and a text knowledge module. This paper will focus on the last module, whose heuristic contents should support the translator when she is adapting the embryonic target text to its new textual environment. The text knowledge module of the knowledgebase should provide the translator with all of the information necessary to make the stylistic, organizational and linguistic changes required to ensure the target text's acceptance in the text world of the target language community. The paper will examine the possible contents of the module and mechanisms for importing translation-relevant textual information. In this regard, the Standard Generalized Markup Language (SGML), a language for encoding elements of text structure, will be proposed as a device for encoding

texts in preparation for inclusion in computer-assisted translation knowledgebases.<sup>1</sup>

### *The Target Text as a Locus of Intertextuality*

To understand the nature of the textual component of the knowledgebase it is necessary to think of the target text, developing dynamically at the translator's fingertips, as a locus for a set of *textual relations*. The target text is textually connected to many other texts in the target language community as well as to functionally equivalent texts in the source language community. The target text takes shape as a member of a pre-existing text world, where historic intertextual relationships have helped to define the nature and character of acceptable texts. The relationships which a target text has to other texts in its text world include:

- *intertextual relations* to texts that belong to the same text type as the text and that serve as exemplars of the text type, that is *parallel texts*.
- *domain relations* that relate texts that are on a common subject, though of different text types, that is, *background texts*.<sup>2</sup>
- *heuristic relations* to *special texts* that provide stylistic information, structural information or translation guidance relative to the appropriate rendering of the text.
- *functional-equivalence relations* that connect a source and a target text as a result of the act of translation. Such is the connection that exists between a source text and its target text when the latter is a *model translation*.

The translator can use these textual relationships to guide her when she is involved in what Candace Seguinot has called the *editing function of translation*. A computer-assisted translation knowledgebase can make explicit the textual relationships that the good professional translator takes for granted, or would find

useful if they were available and accessible. A translation-oriented database can use these textual relationships as a model for organizing and displaying textual information in a CAT software environment.

### *Taxonomy of Textual Elements in the Knowledgebase*

Given the textual linkages described above, the following might be a preliminary taxonomy of the textual categories which might be included in a CAT knowledgebase:

#### **I. Translation-Oriented Texts**

- A. Complete texts
  - 1. Parallel texts
    - a. L<sub>1</sub> Parallel
    - b. L<sub>2</sub> Parallel
  - 2. Model translations
  - 3. Background texts
- B. Partial texts
  - 1. Abstracts
  - 2. Summaries
  - 3. Excerpts
- C. Special texts
  - 1. Heuristic prototypes
  - 2. Authoritative texts

All of these translation-oriented texts offer practical guidance to the translator. Background texts, which may also include excerpts, abstracts and summaries, contain domain-specific information which helps the translator to understand and comprehend the subject matter in the text being translated. In addition, background texts can provide valuable linguistic information relating to technical terminology such as collocations and examples of typical contexts. Parallel texts, on the other hand, guide the translator when she attempts to bring the text into conformity with target language textual conventions. Details of register and style, of organization and structure may be derived from parallel

texts and used to improve the acceptability of the target text in its target language environment. Model translations may also be useful for the professional translator, if there is some assurance that the translation being used is, in fact, an optimal one. Such translations function primarily as exemplars of translation strategy, pointing out the equivalence relations that may exist between source and target text. Model translations are particularly useful if annotated to provide reference to translation strategies used to recast the source text.

Special texts include both authoritative texts and heuristic prototypes. Authoritative texts include style guides and editing handbooks. Examples of authoritative texts are Chandler's *Technical Writer's Handbook*, the National Academy of Sciences' *A Guide for Preparing Manuscripts*, as well as the many style manuals and stylebooks published by corporations and professional societies.

Heuristic prototypes are artificial texts. While background texts and parallel texts are naturally occurring *empirical texts*, special texts are prepared or created. They are rendered in machine-readable form for the specific purpose of providing guidance to the translator's text-production efforts. Heuristic prototypes may include a number of heuristic components. The components included depend, of course, on the translation-theoretic and text-linguistic approach that is adopted in the preparation of the text. Possible elements of a heuristic prototype might include:

- a *superstructure*, an outline of the high-level structural and organizational features of a text.
- a *macrostructure*, a representation of the overall logical and semantic relationships underlying a text.
- a catalog of textuality features, including references to typical interactional aims, audience characteristics, and assumptions of mutual knowledge.
- a set of *annotations* providing specific guidance for sentence and paragraph level text production.

The annotations to a heuristic text might include discussion and examples of particular grammatical and lexical cohesion structures, typical mechanisms for providing coherence, usual collocations and usages, and so on. In other words, annotations are heuristic notes attached to created texts. These notes provide stylistic advice, point out typical features (lexical, grammatical) and, when a language pairing is active, may include reference to translation procedures which are appropriate in the recoding from a source language text exemplar to a target language text exemplar. Annotations are a device for the CAT system to provide expert guidance on those features required to produce an *optimal* version of the text type in translation. Each textual feature typical of the text type is annotated to describe the nature and function of the feature and how to recast it in translation.

### *SGML and the Inclusion of Textual Elements in Knowledgebases*

If textual elements such as those discussed in the taxonomy above are to be included in a CAT knowledgebase, they must undergo some kind of pre-processing to prepare them for proper inclusion. For instance, if the textual links that exist between texts, as for instance, between a target text and its parallel texts, are to be actuated as links in a hypertext network, then there must be a mechanism for establishing those links when the text is added to the database. In the case of heuristic prototypes, pre-processing must be used to recognize and distinguish the annotations and other heuristic elements embedded in the prepared text. Clearly some accepted standard for *marking up* the text to indicate structural features and embedded elements within texts is necessary. The Standard Generalized Markup Language (SGML), under the aegis of the Text Encoding Initiative (TEI), is the most likely candidate to serve as a means of embedding this kind of information inside machine-readable and machine-processed textual data.

An SGML-conformant text would be processed by CAT software and the encoded information would be used to appropriately

register the text as a part of the database. SGML codes allow a person preparing a text for entry into a CAT database to isolate and delineate those elements and features of a document relevant for the translator. Here, for instance, the bibliographic reference details of a parallel text have been encoded:<sup>3</sup>

```
<citn>
  <author> Travis, Jack E. </author>
  <title.piece> The Long and Short of Fiber-Reinforced
  Thermoplastics </title.piece>
  <title> Machine Design </title>
  <imprint>
    <publ.date> 1987-12-02 </publ.Date>
    <citn.detail> 193-198 </citn.detail>
  </imprint>
</citn>
```

Other information might also be encoded in the text, including translation-oriented information:

```
<translation.header>
  <text.category lang=en> technical article </text.category>
  <trans.function function=parallel translation=file_name>
  </trans.function>
</translation.header>
```

The Standard Generalized Markup Language delineates the structural elements of the text through the use of a specific syntax and *tags*. The tags provide a mechanism for naming the elements of a text. In the example above the label **translation.header** is a tag. The purpose of SGML encoding for translators is not just to document the bibliographic context of a text, but to capture translation-relevant information and intertextual relationships. Some of this can be done because of SGML's ability to associate *attributes* with its tags. This feature allows the tag to pass important processing information to the CAT software. Attribute information could be used, for instance, to control the way in which a text is added to a database and to set display defaults. The label **function=parallel** is an example of an attribute and an associated value.

To use the SGML representations with CAT software, a *parser-importer* would be required. Such a parser would presume that the translation community has come to agreement on a set of standard tags for encoding translation relevant information. This might be accomplished by involving translators more formally in the Text Encoding Initiative project.<sup>4</sup> A standard and publicly available *encoder-editor* might be developed to assist in the preparation of texts. The parser-importer would use the standardized set of tags produced by an encoder-editor to import the marked-up text into the knowledgebase. During the parsing, specific tags and their attribute values would invoke software procedures to create database entries, establish hypertext links (in a hypertext environment), and add software-proprietary display, processing or formatting codes. Tags and their attributes could be associated with specific databases, fields, values and relations within a proprietary database management system (DBMS). The cycle of preparation would be as follows:

1. Translation-Relevant Text ----->
2. SGML Encoding (with assistance of encoder/editor) ----->
3. CAT SGML Preprocessor / parser-importer ----->
4. CAT Proprietary Database

### *Sample Texts Prepared as Heuristic Texts for Inclusion in a Text Knowledgebase*

Given the limitations of the current discussion it would be impossible to give examples of all of the possible textual elements of a CAT knowledgebase. However, to illustrate the argument, the following examples of "Product Warranties" will be marked-up as heuristic prototype texts:

### Text Example 1 - Product Warranty

*This product is guaranteed to be free from defects in material and workmanship for ONE FULL YEAR of normal use. Retain a copy of your dated sales receipt. This receipt is necessary to obtain warranty replacement or repair.*

*Should you experience any defect in this product return it to your dealer with this proof of purchase for replacement or repair. This warranty does not cover abuse of or damage to the product nor can ABC Corporation assume system integration responsibility, special, indirect or consequential damages, or contingent liability.*

**OUR SOLE OBLIGATION IS TO REPLACE THE PRODUCT AT NO CHARGE WHEN IT HAS BEEN DETERMINED TO HAVE A DEFECT COVERED BY THIS WARRANTY.**

### Text Example 2

*ABC Inc. Limited Warranty*

**What is Covered:** *ABC Inc. ("ABC") warrants that the ABC product enclosed with this Limited Warranty statement and purchased and used in the United States or Puerto Rico will conform to the manufacturer's specifications and be free from defects in workmanship and materials for a period of one year from the date of original purchase.*

**What We Will Do To Correct Problems:** *Should your ABC product prove defective during this period, please bring the product securely packaged in its original container or an equivalent, along with proof of the date of original purchase to your ABC Dealer or nearest ABC Customer Care Center. ABC will, at its option, repair or replace on an exchange basis, the defective unit, without charge for parts or labor.*

**What This Warranty Does Not Cover:** *This warranty covers only normal consumer use in the United States and Puerto Rico. ABC is not responsible for warranty service should the ABC label or logo or the rating label or serial number be removed or should the product fail to be properly maintained or fail to function properly as a result of misuse abuse, improper installation, neglect, improper shipping, damage caused by disasters such as fire, flood and lightning, improper electrical current, or service other than by an ABC Customer Care Center. Postage, insurance or shipping costs incurred in presenting your ABC product for warranty service are your responsibility.*

**THE WARRANTY AND REMEDY PROVIDED ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES AND UNLESS STATED HEREIN ANY STATEMENTS OR REPRESENTATIONS MADE**

BY ANY OTHER PERSON OR FIRM ARE VOID. THE DURATION OF ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE ON YOUR ABC PRODUCT SHALL BE LIMITED TO THE DURATION OF THE EXPRESS WARRANTY SET FORTH ABOVE. EXCEPT AS PROVIDED IN THIS WRITTEN WARRANTY, NEITHER ABC, INC. NOR ITS AFFILIATES SHALL BE LIABLE FOR ANY LOSS, INCONVENIENCE, OR DAMAGE INCLUDING DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OR INABILITY TO USE THE ABC PRODUCT, WHETHER RESULTING FROM BREACH OF WARRANTY OR ANY OTHER LEGAL THEORY.

*Some states do not allow limitations on how long an implied warranty lasts and some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitations and exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.*

**How to Obtain Warranty Service Information:** *You may request additional warranty service information by contacting your ABC Dealer, the nearest ABC Customer Care Center, or ABC Inc. at the address or toll-free phone number printed below:*

The first step in encoding these texts for inclusion in a knowledgebase is to create a *header* to carry information about the text type, the text type variant, the text language, and the function of the text in the knowledgebase. To illustrate the application of SGML to text markup for translation, let us convert the Product Warranties shown above into heuristic prototypes. The header for the prototype might contain the following information:

```
<heuristic.prototype id = P_Warrant_Heuristic >
<translation.header >
  <text.category lang=en> Warranty </text.category >
  <text.category.variant > Product Warranty
</text.category.variant >
  <trans.function function=heuristic prototype
parallel="P_Warrant_Text_1" audience=purchaser of product >
  </trans.function >
```

```

<interactional.aim>
  The purpose of a warranty is to provide the purchaser of a
  product with information regarding the manufacturer's
  liability for repair. It also limits the manufacturer's legal
  responsibility.
</interactional.aim>
<macrostructure>
  ACTOR: (WARRANTER) ACT:(WARRANTS)
  OBJECT:(PRODUCT) IS ATTRIBUTE: (FREE OF DEFECTS)
  FOR DURATION: (PERIOD OF WARRANTY)
  WITH CONDITION OF REMEDY: (PROOF OF PURCHASE)
  WHERE OBLIGATION IS LIMITED TO: (REPAIR OR
  REPLACE)
  WHERE SITUATION OF USE IS LIMITED: (EXCLUDES
  ABUSE OR DAMAGE)
  WHERE RESPONSIBILITY IS LIMITED: (DISCLAIMER)
</macrostructure>
<superstructure>
  1. Warranting Agency          warranter
  2. Warranty Title            warranty.title
  3. Statement of Warranty     warranty.statement
  Warranty Period             warranty.period
  4. Warranty Obligations     warranty.obligation
  5. Limits of Coverage       warranty.limits
  Geographic Limitations     warranty.limits.geographic
  Limitation by Component    warranty.limits.component
  Limitation by Use          warranty.limits.use
  Limitation / Responsibility warranty.limits.disclaimer
  Limitation by State        warranty.limits.states
  Negation of Warranty       warranty.negation
  6. Remedy (Repair,Replace)  warranty.remedy
  Proof of Remedy            warranty.remedy.proof
  Responsibility for Cost    warranty.remedy.cost
  Procedures of Remedy       warranty.remedy.
                             procedure
  7. Exclusion of Warranty    warranty.exclusion
</superstructure>
</translation.header >

```

The **parallel** attribute of the **trans.function** tag has the value "P\_Warrant\_Text\_1," indicating that the heuristic prototype is linked to a non-heuristic parallel text whose file name is "P\_Warrant\_Text\_1." The heuristic text itself has the name given as the value of the attribute **id** in the tag **<heuristic.prototype>**. The **<macrostructure>** tag gives a logical schema for the text. Such logical schemata could also be given for each textual subelement using a **<microstructure>** tag, although no attempt has been made to do that here. The **<superstructure>** tag gives a structural outline of the text.

Once the header has been prepared, the text itself can be marked up. The following text contains superstructural information, annotations and statements of purpose. The mark-ups are for illustration only and no attempt has been made to fully analyze and mark the texts. The complete markup of a text would require extensive empirical study and the collection of a complete corpus of sample texts. The complete markup of a text would also be based on the definition of a Document Type Description (DTD) which would require a cooperative effort on the part of translation-oriented database designers and translation specialists. The presentation of a DTD for heuristic prototypes is beyond the scope of this paper, although clearly the choice of tag names and attributes in the discussion presages such a project.

```
<product.warranty exemplar=1>
<warranty.statement>
<tr.annotation tr.note=H_Warrant_Ann_1> This product is guar-
anteed to be free from defects in material and workmanship
</tr.annotation> <warranty.period> for ONE FULL YEAR of
normal use. </warranty.period>
<partial.interact.aim> The purpose of the Warranty Statement is to
set forth the Warranter's basic claim that the product is free of de-
fects. The Warranty Statement generally includes an embedded
statement of Warranty Period. </partial.interact.aim>
<examples id = H_Warranty_Statement> </examples>
</warranty.statement>
<warranty.remedy.proof> Retain a copy of your dated sales
receipt. This receipt is necessary to obtain warranty replacement or
repair.
```

Should you experience any defect in this product return it to your dealer with this proof of purchase for replacement or repair.

<partial.interact.aim> The purpose of the Warranty Remedy element is to provide the conditions under which remedy will be granted. This typically includes requirements for proof of purchase such as a sales slip, dated receipt, or other document.

</partial.interact.aim>

</warranty.remedy.proof>

<warranty.limits>

<warranty.limits.use>

This warranty does not cover abuse of or damage to the product

</warranty.limits.use> nor can

<warranter> ABC Corporation </warranter>

<warranty.limits.disclaimer> assume system integration responsibility, special, indirect or consequential damages, or contingent liability. </warranty.limits.disclaimer>

</warranty.limits

<warranty.obligation> OUR SOLE OBLIGATION IS TO REPLACE THE PRODUCT AT NO CHARGE WHEN IT HAS BEEN DETERMINED TO HAVE A DEFECT COVERED BY THIS WARRANTY

</warranty.obligation>

</product.warranty>

</heuristic.prototype>

Once this text has been imported into the knowledgebase via the parser/importer it would be possible to use the information provided in the tags to control the display of the text. For instance, by using the tag names as a filter mechanism one could display the superstructure of the text on demand (Figure 1).

Given the requisite empirical work the superstructure display might also indicate whether or not a particular structural element is mandatory or optional, or must appear in a specific location or sequence in the text:

Warranty Statement MANDATORY [Position: first element after Warranty Title]

Tag names could also be used to display the fundamental aims of the text and its component parts. By filtering out the **<interactional.aim>** and **<partial.interact.aim>** tags the software could generate a functional-pragmatic outline of the text (Figure 2).

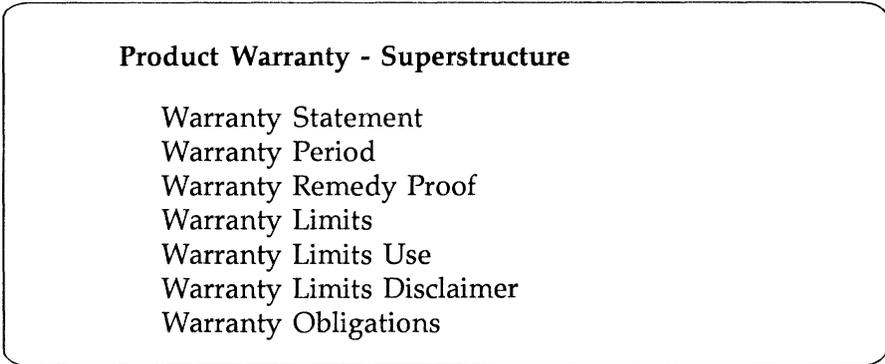


Figure 1: Screen Display: Superstructure

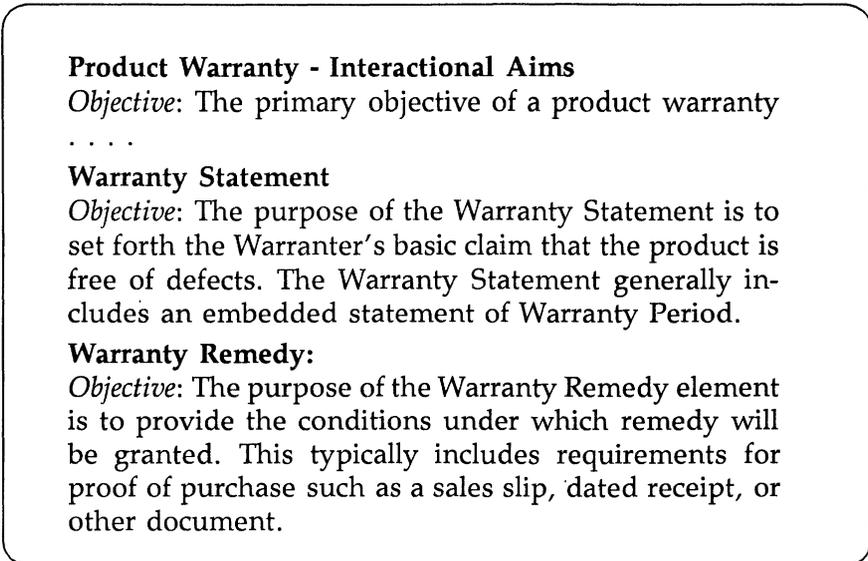


Figure 2: Screen Display: Functional-pragmatic Outline

The `<examples>` tag and attribute give the name of a set of examples that could be displayed on a screen if the user wanted to see examples of *Warranty Statement* subelements of a product warranty:

```
<examples id = H_Warranty_Statement >
<example.list> This product is guaranteed to be free from defects
in material and workmanship . . . .
<example.list> ABC warrants to the first consumer purchaser for a
period of ONE YEAR from the date of purchase that this ABC
CD-ROM DRIVE AND INSTALLATION KIT, when shipped in its
original packing, will be free from defects in manufacture and mater-
ials.
<example.list> ABC Inc. ("ABC" warrants that the ABC product
enclosed with this Limited Warranty statement and purchased and
used in the United States or Puerto Rico will conform to the manu-
facturer's specifications and materials for a period of one year from
the date of original purchase.
<example.list> "For a period of ninety (90) calendar days from the
date of the sales document received upon purchase of the Equip-
ment, ABC warrants to the original CUSTOMER that the Equipment
is free from manufacturing defects . . ."
</examples >
```

The second sample text could be similarly marked-up, even though it is a longer and more complicated example:

```
<product warranty exemplar = 2 >
<warranter > ABC Inc. </warranter >
<warranty.title > Limited Warranty </warranty.title >
<warranty.statement >
What is Covered: <warranter > ABC Inc. ("ABC") </warranter >
warrants that the ABC product enclosed with this Limited Warranty
statement <geographic.limitations > and purchased and used in the
United States or Puerto Rico </geographic.limitations >
<tr.annotation tr.note=H_Warrant_Ann_1 > will conform to the
manufacturer's specifications and be free from defects in workman-
ship and materials </tr.annotation > <warranty.period > for a
period of one year from the date of original purchase
</warranty.period > .
```

</warranty.statement>  
<warranty.remedy> What We Will Do To Correct Problems:  
Should your ABC product prove defective during this period,  
<warranty.remedy.procedure> please bring the product securely  
packaged in its original container or an equivalent along  
</warranty.remedy.procedure>  
<warranty.remedy.proof> with proof of the date of original purchase  
</warranty.remedy.proof> to your ABC Dealer or nearest ABC  
Customer Care Center.  
</warranty.remedy>  
<warranty.obligation> ABC will, at its option, repair or replace on  
an exchange basis, the defective unit, without charge for parts or  
labor.  
</warranty.obligation>  
<warranty.limits> What This Warranties Does Not Cover:  
<warranty.limits.use> This warranty covers only normal consumer  
use </warranty.limits.use> <warranty.limits.geographic> in the  
United States and Puerto Rico. </warranty.limits.geographic>  
<warranty.negation> ABC is not responsible for warranty service  
should the ABC label or logo or the rating label or serial number be  
removed or should the product fail to be properly maintained or fail  
to function properly as a result of misuse abuse, improper installation,  
neglect, improper shipping, damage caused by disasters such  
as fire, flood and lightning, improper electrical current, or service  
other than by an ABC Customer Care Center.  
</warranty.negation>  
</warranty.limits>  
<warranty.remedy.cost> Postage, insurance or shipping costs incurred  
in presenting your ABC product for warranty service are your  
responsibility. </warranty.remedy.cost>  
<warranty.exclusion> THE WARRANTY AND REMEDY PROVIDED ABOVE ARE  
EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS WARRANTIES AND UNLESS  
STATED HEREIN ANY STATEMENTS OR REPRESENTATIONS MADE BY ANY OTHER  
PERSON OR FIRM ARE VOID </warranty.exclusion> .  
<warranty.limits.disclaimer> THE DURATION OF ANY IMPLIED  
WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE  
ON YOUR ABC PRODUCT SHALL BE LIMITED TO THE DURATION OF THE EXPRESS  
WARRANTY SET FORTH ABOVE. EXCEPT AS PROVIDED IN THIS WRITTEN

WARRANTY, NEITHER ABC, INC. NOR ITS AFFILIATES SHALL BE LIABLE FOR ANY LOSS, INCONVENIENCE, OR DAMAGE INCLUDING DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES, RESULTING FROM THE USE OR INABILITY TO USE THE ABC PRODUCT, WHETHER RESULTING FROM BREACH OF WARRANTY OR ANY OTHER LEGAL THEORY.

</warranty.limits.disclaimer>

<warranty.limits.states> Some states do not allow limitations on how long an implied warranty lasts and some states do not allow the exclusion or limitation of incidental or consequential damages so the above limitations and exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

</warranty.limits.states>

<warranty.remedy.procedure> How to Obtain Warranty Service Information: You may request additional warranty service information by contacting your ABC Dealer, the nearest ABC Customer Care Center, or ABC Inc. at the address or toll-free phone number printed below: </warranty.remedy.procedure>

</product warranty>

</heuristic.prototype>

Both of these heuristic texts contain more than just structural and functional-pragmatic information. Both have heuristic annotations. The tag name **<tr.annotation>** has an attribute whose value is the identifier of an annotation. Several texts may share the same annotations. The following annotations have been marked up with a set of tags which assume that the annotations will be displayed as hypertext notes activated by pressing software buttons on a display:

<annotation id = H\_Warrant\_Ann\_1>

<button id = verbs> Warranty Statements use a restricted range of verbs to describe the act of warranty. GUARANTEE and WARRANTY are most typically used. Typical verbal constructions include:

<button.list> "This (product) is GUARANTEED . . ."

<button.list> "WARRANTER WARRANTS that this (product) . . ."

<button.list> "WARRANTER WARRANTS to the (original customer / first consumer purchaser) that the (product) . . . </button>

<button id = product reference>

The product in a hardware Warranty Statement may be referred to indirectly as in:

<button.list> This PRODUCT is guaranteed . . .

or more directly as in:

<button.list> This ABC PRODUCT is guaranteed . . .

<button.list> ABC Inc. warrants that the ABC PRODUCT

or very directly as in:

<button.list> ABC Inc. warrants . . . that this ABC CD-ROM  
DRIVE AND INSTALLATION KIT . . . </button>

<button id = stated claim>

The Warranty Statement has the basic partial interactional aim of claiming that the product is free of defects. This aim is explicitly stated in typical language:

<button.list> "WARRANTER warrants that the product WILL  
CONFORM TO THE MANUFACTURER'S SPECIFICATIONS AND  
BE FREE FROM DEFECTS IN WORKMANSHIP AND MATERIALS  
. . ."

<button.list> "WARRANTER warrants . . .that this product . . .  
WILL BE FREE FROM DEFECTS IN MANUFACTURE AND  
MATERIALS."

<button.list> "Product is guaranteed to be FREE FROM DEFECTS  
IN MATERIAL AND WORKMANSHIP . . ."

<button.list> "WARRANTER warrants the product IS FREE FROM  
MANUFACTURING DEFECTS"

</button>

<button id = embedded elements>

The Warranty statement typically includes the ACT OF WARRANT (warranting, guaranteeing), the PRODUCT REFERENCE, and the STATED CLAIM OF WARRANTY. However, other elements may be embedded in this statement, including the PERIOD OF WARRANTY:

<button.list> For a period of ninety (90) calendar days from the  
(date of purchase)

<button.list> (free from defects . . .) for a period of one year from  
the date of the ABC sales document . . .

<button.list> (ABC warrants to the . . .purchaser) for a period of  
ONE YEAR from the date of purchase.

</button>

</annotation>

The display shown in Figure 3 assumes that the marked-up text will be read and processed by a hypertext program which can convert SGML codes into hypertext instructions. An example is shown with the **Product Reference** and **Verbs** hypertext buttons activated. The text beneath the **Stated Claim** and **Embedded Elements** buttons is hidden until the user activates them by selecting them with a mouse.

### *Caveats and Conclusions*

Little work has been done on standards for the exchange and inclusion of textual material in translation-oriented databases. SGML and the Text-Encoding Initiative are being used as a general standard for encoding texts for electronic transmission and interchange and should be adopted as a coding mechanism for translation-oriented texts. The success of this endeavor depends on translation professionals acting together to represent their interests in the Text Encoding Initiative. A working group should be established to develop a semantically complete tag set for a variety of translation-relevant texts, including parallel texts, background texts and the heuristic texts discussed here.

There will be difficulties. Much of the information that could be captured by tagging translation-relevant texts needs to be established by empirical research. Further, there is no general agreement on the methods and techniques of textual analysis. While this discussion has utilized tag names like **<superstructure>** and **<macrostructure>**, the choice of these tags represents a particular text-theoretic approach based on text-linguistics and the text-based translation theory of Albrecht Neubert and the Leipzig School. Still, translation studies is a developing discipline, rapidly creating its own theoretical concepts.

By working closely with practicing translators it should be possible to formulate text-encoding procedures and tag sets that are theoretically coherent and of practical use for incorporating text in computer-assisted translation knowledgebases.

**Verbs**  
Warranty Statements use a restricted range of verbs to describe the act of warranty. GUARANTEE and WARRANT are most typically used. Typical verbal constructions include:

- This (product) is GUARANTEED . . .
- WARRANTER WARRANTS that this (product) . . .
- WARRANTER WARRANTS to the (original customer / first consumer purchaser) that the (product) . . .

**Product Reference**

The product in a hardware Warranty Statement may be referred to indirectly as in:

- This PRODUCT is guaranteed . . .  
or more directly as in:
- This ABC PRODUCT is guaranteed . . .
- ABC Inc. warrants that the ABC Product . . .  
or very directly as in:
- ABC Inc. warrants . . .that this ABC CD-ROM DRIVE AND INSTALLATION KIT . . .

**Stated Claim**

**Embedded Elements**

Figure 3: Screen Display: Activated Hypertext Buttons

**NOTES**

1. The Standard Generalized Markup Language is fully defined in the International Standards Organization (ISO) Standard 8879.

2. This usage of the terms *parallel and background texts* varies from that used by terminologists, where the parallel text is an L<sub>1</sub> or L<sub>2</sub> text in the same domain as the term being researched, which may or may not be of the same text type (the background text from the standpoint of text typology).

3. Mark-up conventions used here approximate the status of the TEI P1 document (McQueen and Burnard, 1990) and incorporate some ele-

ments of transitional documents that have appeared in the interim between the TEI P1 document and the P2 document, which is slated for publication in spring of 1993. Markup used for translation text reflects TEI conventions, but is purely theoretical because, as noted below, TEI does not include a Working Group for translation markup at the time of this publication.

4. The Text Encoding Initiative (TEI) is an international research project whose long-range goal is to develop a format for the exchange of electronic texts. The TEI includes a number of institutions and organizations among its membership, but the ATA is not among them.

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*Section 5:*

*Translation-Oriented  
Terminology Activities*



# *New Trends in Translation-Oriented Terminology Management*

CHRISTIAN GALINSKI AND  
GERHARD BUDIN

## *Introduction*

The translation of technical texts requires considerable specific knowledge, i.e., not only knowledge about linguistic rules and structures, but also knowledge about the topic of the text to be translated. Knowledge about just one of these two aspects does not suffice to produce a correct translation. The main advantage of terminology management can be seen in its crucial role in the process of acquiring, storing and applying both linguistic and subject-specific knowledge related to the production of the target text.

## *Development of Translation-Oriented Terminology Management*

The term "terminology management" can be considered a special kind of "information management" that focusses on structuring, storing, exchanging, disseminating and using terminological information for text production (including dictionaries, etc.). It is thus a wider and more complex activity than terminography, *viz.* the recording of terminological information.

The term “terminography” was coined some time ago as an analogy to “lexicography” with special reference to terms, concepts, etc. Both activities, however, are basically descriptive in nature, whereas terminology management also includes the active handling of different kinds of information.

The application of these methods in translation work is rather new and requires the solution of many problems both on the theoretical level and in practice. Since the translation process is currently being analyzed from different points of view in translation studies, the position of terminology management in the process of target text production is constantly changing.

One aspect of the integration of terminology work into translation processes can be called “multilingual comparative terminological text analysis” (Hohnhold 1990, 64ff). This special type of text analysis focusses on concepts and propositions, their intertwinement into something we usually call “content” and their expression on the communicative level (i.e., the concrete textual manifestation of this “content”). The aim of this comparative analysis—in source language and target language(s)—is to generate specific text *and* terminology documentation, leading to a “special kind of reference system” (nowadays usually created on a computer), unrivalled by any dictionary because of its tailor-made structure designed to satisfy the needs of the translator.

### *Trends in Translation and Terminology Work*

It is possible to identify several major related trends that affect the interactive activity of translating and doing terminology work. First and foremost, knowledge is developing faster and changing more fundamentally than is language. The formation of new terms is impeded primarily by the very limited number of term elements available in any language for naming new concepts. The number of concepts, on the other hand, increases more or less at the same pace as knowledge grows.

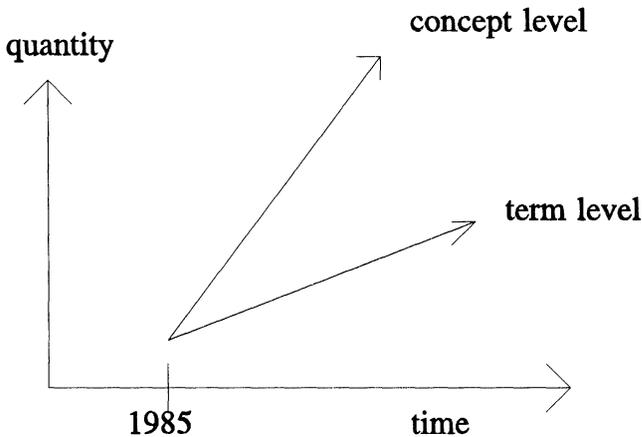


Figure 1: Trends in the Growth of Knowledge and Terminology

Therefore, the quantitative development of concepts diverges considerably from that of terms. Some concepts vanish while most new concepts undergo changes and often become genus concepts for entire new concept systems, sometimes with and sometimes without a preceding change of meaning. These concept dynamics are not reflected and represented by the terms, which—as linguistic symbols—show much more stability than the concepts for which they stand. This state of affairs could also explain why efforts to achieve automatic knowledge acquisition by means of a reliable recognition of terms within specialized texts has failed so far.

This problem is particularly serious in terminological databases if many slightly different concepts are designated by the same term. Where is one to draw the line between *one* record in a database integrating different “meanings” of a term (i.e., variations of one concept) and *several* records that have one term in common but are based on several concepts that differ from each other? The answer again is: human intervention via comparative terminological text analysis.

Another aspect concerns the different ways of presenting knowledge in vocabularies and dictionaries, etc. If we disregard

the glossary type of dictionaries that contain little more information than just terms (representing concepts in one or more languages), there are many different types of specialized vocabularies and lexicons geared towards different needs and user groups. Systematic terminological vocabularies that provide complete definitions can also present terms (representing concepts) in such a way as to indicate the relations between the concepts, thus representing the respective concept system(s) of the domain or sub-domain in question. In this kind of vocabulary, knowledge is represented in its most condensed form at the level of conceptual logic *completely and without any redundancy* of terminological information.

Specialized lexicon entries that provide information on one or more concepts representing the same object can formulate this information in a more terminologized way (i.e., closer to the condensed form of the terminological vocabulary and geared towards subject specialists or other experts, such as specialized translators) or in a more de-terminologized way (i.e., comprising much additional information on the object in question and—as a rule—geared towards less specialized users).

In encyclopedias designed for the general public, the most important characteristics of water are given in a rather unstructured manner, whereas specialized dictionaries for science and technology (cyclopedias) usually concentrate on the chemical, physical and biological aspects. In monodisciplinary dictionaries only system-specific characteristics are given. Such highly specialized concepts usually tend to be very theory-dependent.

As a result, the “ideal” terminological vocabulary consists of concepts (and their interrelations) represented by terms and definitions (or other kinds of determinations) and is characterized by completeness as regards terminological information and by lack of redundant information. Highly specific lexicons (cyclopedias) also contain a certain amount of redundancy of information in order to make the lexicon more “communicative” to the user. Such works, however, still retain the (more or less explicit) system of knowledge of the respective subject field.

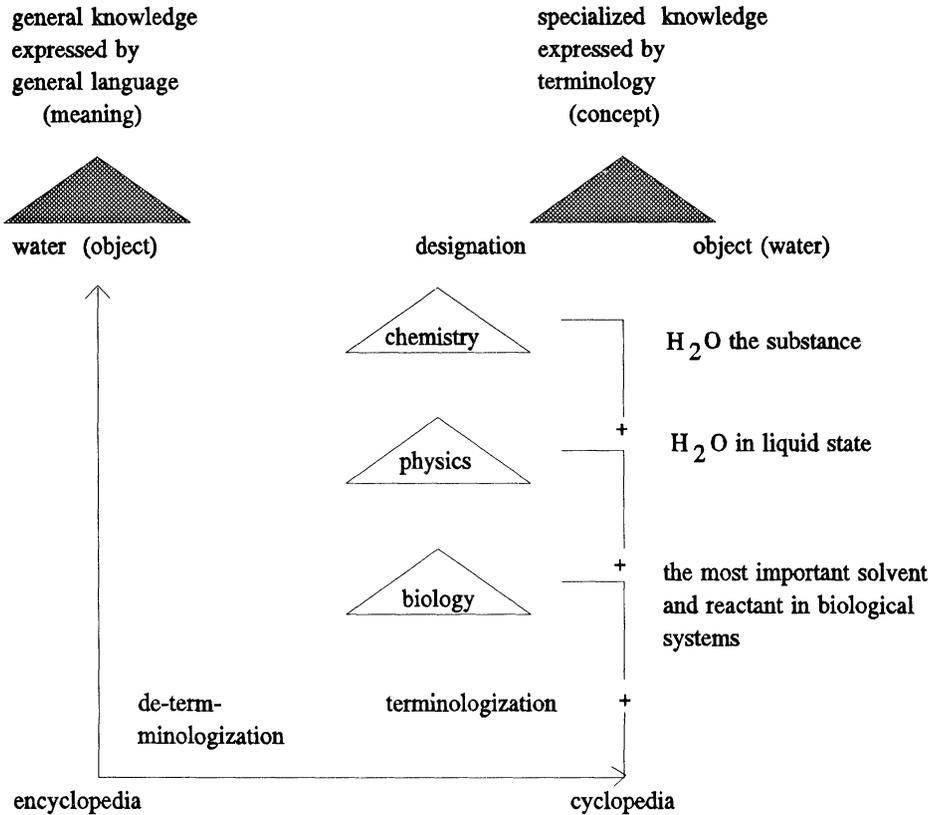


Figure 2: Encyclopedic vs. Specialized Lexicons

This diversity in lexicon style dictates that databases tailored towards the real needs of a translator should integrate as many different types of information as possible in order to provide a multifunctional system.

### Outlook

Translation-oriented terminology management is a crucial activity in the flow of information between subject-field specialists speaking different languages. The translator often has to perform

terminology work "out of necessity." His/her competence lies predominantly in the transfer process of translating an LSP text from a source language into a target language. On the one hand, the terminologically necessary activities are of such a complexity as to necessitate a systematic approach. On the other hand, however, the translator is unlikely to achieve the precision of the terminology work performed by committees of subject-field specialists established in order to unify, harmonize and standardize or otherwise regulate terminologies, because the amount of work involved and the concentration of subject field knowledge are neither practical nor economical for the translator.

Cooperation between specialized translators and subject-field specialists would, therefore, seem the obvious solution, and is, in fact, quite common practice. But cooperation must develop beyond this bilateral collaboration on an individual basis. Today, several international organizations strive to organize and coordinate international cooperation in the field of terminology management. The awareness of the need for new and concentrated approaches to help specialized translators is increasing.

The translation of specialized texts requires new and more precise tools for translation-oriented terminology management. The need to develop comprehensive terminology systems coupled with a strong knowledge component has, therefore, been recognized by software developers and will become an increasingly important translation tool in the future.

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# *Bibliography of Polish Terminology Resources*

ANNMARIE MITCHELL

## *Introduction*

To begin any scholarly pursuit, the researcher needs first of all to identify sources from which to work. Similarly, "word-smiths" such as translators need to have available those tools that will assist them in performing their task. Translators will find it useful to have access in some way to the guides in the language and subject at hand. There is an implied prior step, similar to the first instruction in a recipe for rabbit stew: "First, catch a rabbit." Our first step is usually to find or compile a bibliography of resources. In fact, it may suffice just to know what is available and where. With the telephone, extended by facsimile machines and modems, it is sometimes possible to gain a great deal of information without interrupting the work in process to make a trip to the library, once we have identified the source.

Because Polish is one of the lesser-known languages and there are not a great many sources available from which to choose, a bibliography seems useful, particularly for people who are not intimately familiar with that language. There have actually been a goodly number of compendia of Polish terms. No attempt has been made to list them all here. The starting point would be the annual *Bibliographie der Wörterbücher - Bibliografia słowników* (Warsaw, 1945-1978), which contains a subject index and continues to be useful for all Eastern European languages.

In this bibliography, a choice has been made in favor of a larger number of shorter citations. A subject index appears at the end of the bibliography.

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***Subject Guide to Authors***  
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Agriculture & animal husbandry Barska-Antos, Horodyska, Gadkowska, Judycka, Pelcowa, Prost, Smulkowa, Wieczorek	Bibliography Borys, Kucharzewski, Wojtan	Education Wolowik
Anatomy <i>Human</i> Krawczyk-Tyrpa, Krysiński <i>Veterinary</i> Pilarski	Biochemistry Morawiecki	Electrical engineering International electrotechnical ...
Animal husbandry SEE: Agriculture & animal husbandry	Botany Barska-Antos, Budziszewska, Habrajka, Wajda-Adamczykowa <i>History</i> Budziszewska, Spolnik	Engineering International electrotechnical ... , Gajda, Gierdziejewski, Tomaszewski
Architecture & fortifications Mały słownik . . .	Carriages Prus-Niewiadomski	Ethnology & folklore Staszczak
Art & art conservation Słownik polskiej terminologii sztuk ... , Słownik terminologiczny sztuk . . .	Chemistry Bieniewicz, Szlesinski, Mierzecki, Morawiecki <i>History</i> Szlesinski, Warszawski	Foreign influences Gajda, Karwatowska, Luczynski, Objaśnienia wyrazów . . . Elementy, Rybicka
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Ballet Jakovicka	Cooking (History) Bochnakowa	Geography Nitsche, Polskie słownictwo geograficzne, Tolstoj
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- Grammar  
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Gajda
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Bojar
- Motor transportation  
Techniczny słownik  
. . ., Słownik  
encyklopedyczny  
. . ., Starzec
- Motor vehicles  
Blok, Lesniak,  
Techniczny  
słownik . . .,  
Zydek-Benarczuk  
*History*  
Szydelski
- Music  
Habela, Szydłowska-  
Ceglowa
- Naval & marine  
sciences  
Luczynski, Skibicki
- New words  
(Neologisms)

- |   |   |  |
|---|---|--|
| Nowe słownictwo<br>polskie,<br>Objaśnienia<br>wyrazów . . .<br>Neolog.,<br>Smolkowa | Standards<br>Normalizacja<br>terminologii . . .,<br>Wytyczne . . .  | Transportation<br>Blok, Prus-<br>Niewiadomski<br>(SEE ALSO: Motor<br>transportation,<br>Naval science &<br>navigation) |
| Occupational health<br>Klonowicz  | Synonyms<br>Leski   | Trees<br>Wajda-<br>Adamczykowa   |
| Occupations<br>Wróblewski   | Temperature<br>Chernysh   | Veterinary medicine<br>SEE: Medicine   |
| Pharmacy (History)<br>Spolnik   | Terminology, History<br>of<br>Walczak,<br>Warszawski  | Weaving<br>SEE: Textiles   |
| Physics<br>Chernysh   | Textiles<br>Falinska<br><i>History</i><br>Poppe   | Woodworking<br>Basara  |
| Physiology<br>Klonowicz   | Theater<br>Bujanski<br><i>History</i><br>Rutkowska  | Zoology<br>Barska-Antos<br>(SEE ALSO:<br>Agriculture &<br>animal husbandry)  |
| Political science<br>Bralczyk   | Thesauri<br>Leski, Tomasik-Beck   |  |
| Printing<br>Bugajski  | Time<br>Kupiszewski,<br>Umińska-Tyton   |  |
| Prison argot<br>Orynska   | Translation<br>Dzierżanowska,<br>Kielar,<br>Lebiedzinski,<br>Nauchno-<br>tekhnicheskij<br>perevod,<br>Słownictwo<br>techniczne . . .,<br>Tomaszczyk |  |
| Proper names<br>Skubalanka, Warchol   |   |  |
| Quantity<br>Malec   |   |  |
| Slang, Prison<br>Orynska  |   |  |
| Sports<br>Ozdzyński,<br>Wieliczko   |   |  |

*Selected Elements from a Theory of  
Fractal Linguistics:  
Possible Implications for Machine  
Translation, Terminology Management,  
and Other NLP Applications*

ALEX GROSS

*Apologia, Premise and Methodology*

It must be emphasized from the outset that this treatment has been described as "Selected Elements" from a theory of fractal linguistics and under no circumstances constitutes the entirety of such a theory. In fact, this article examines the possible applications of chaos theory and certain aspects of fractal geometry to the study of linguistics. A detailed treatment is provided in a longer work still in progress. It has in some cases been necessary to assume that the reader has fully absorbed and digested the basic technical principles of fractal geometry, which can only be referred to in passing. Those readers who have experimented with various fractal-producing programs on their computers will perhaps enjoy a certain advantage in understanding these ideas.

An attempt has been made to focus more light on the earlier phases of the theory at the expense of the later ones, as the only other workable method would have been to leave all phases equally obscure. The author would rather his readers were tantalized than mystified and hopes that they will accept his

assurances that the later sections of the theory have been worked out in adequate detail.<sup>1</sup>

Since it is customary in learned circles to define one's terms at the outset—and since the term “fractal” has been subject to some loose and trendy exploitation lately—the following basic definition is now offered, though it is likely to expand somewhat in later sections. A fractal phenomenon is an apparently simple pattern or process that goes beyond anticipated limits in an irregular manner and becomes transformed into one or more further levels of complexity. As will be seen, this definition furnishes an excellent model for language itself as well as for the theory presented in this paper.

With only a few exceptions, most recent linguistic speculation has proceeded from the assumption that language can best be considered as a linear or one-dimensional entity, defined by lists of words, rules for the linkage of such words, parsing diagrams of one sort or another intended to illustrate these rules, and in the age of computers “if-then” procedures meant to bind these rules to an electronic matrix and/or assign them to specific memory or storage addresses representing a linear structure. Some apparent exceptions to this linear character would appear to be the aforementioned parsing diagrams of conventional grammarians and some more recent theorists. These occasionally appear to expand into page-filling two-dimensionality, but as we shall see this is not a true planar surface but rather the somewhat amplified expansion of a linear base.

Depending on one's point of view, a theory of fractal linguistics can be seen either as a radical departure from recent work in this field or as a natural outgrowth of certain earlier approaches to linguistics.<sup>2</sup> It has been noted that fractal approaches to other fields of study have tended to possess a “counter-intuitive” quality, at least on first presentation.<sup>3</sup> What some may regard as a “counter-intuitive” element in this treatment is the basic notion that *language occupies some kind of space*. Such an idea will perhaps strike a certain intuitive resonance among translators, terminologists and others predisposed to believe that epistemology is an

applied rather than a theoretical science, but it may be necessary to spell this notion out somewhat more clearly for the sake of other readers.

Towards this end, both here and in the longer work, readers will first be guided through a series of visualization exercises, each one leading them to a more advanced level of conceptualizing the “shape” of language. By so doing, the question of “linguistic space” will be broached somewhat painlessly and discussed in some detail, as will the question of what its physical or mathematical properties can possibly be.

These exercises are crucial if the reader is to grasp what is meant by a “fractal dimension,” an extremely basic concept in this field, and how such a dimension can apply to language. Once this primary notion has been mastered, the rest of the theory becomes more or less inevitable. An attempt will then be made to demonstrate the many rich parallels between such a concept as it applies to language and the well-known but less than widely understood subtleties of fractal geometry in its many applications. Considerations linking mathematics with linguistics and the precise relationship between the two fields will be discussed, and some surprising conclusions will be suggested.

What would appear to be certain specific linguistic laws arising from these exercises will also be presented, and possible applications of such laws will be indicated. A section contrasting the functionality of a fractal approach to linguistics with other well-known theories of language will also be undertaken in the longer work. Where appropriate, drawings and diagrams will be used to illustrate some of the points being made, though to a far lesser extent than in the book. As noted, readers will be rewarded by a deeper understanding of these matters to the extent that they are already familiar not only with some of the more technical material but also with such increasingly wide-spread experiences as creating and color-cycling multicolored forms at home on their computers.

### *Visualization Exercises*

#### “THE GROSS GLOSS THEORY OF LABEL LINGUISTICS”.

As promised, the reader will now be escorted through a series of visualizations related to the size and shape of language, each one more complex than the preceding one and each dependent on the previous one for some of its properties. This is essentially an exercise in “mapping,” whether viewed as a purely cartographical exercise or as a mathematical one—it is perfectly licit in either cartography or mathematics to project any shape or data onto any other shape or formation, and the sole criterion of success or failure for such a projection is whether or not the original shape or data (in this case, “Language”) becomes more comprehensible as a result.

The first visualization exercise was written before the author’s exposure to fractal geometry and was originally intended as a partly tongue-in-cheek but nonetheless serious explanation of linguistics using the simplest possible terms. In many ways it was a sequel to the images and analogies considered in the earlier piece (Gross, 1991b), and its first goal was to reach as many people as possible with a clear, simple and meaningful explanation of how language works, uncluttered by the dense terminology associated with many texts on linguistics. Perhaps its second goal was simply *pour épater les épatables*, to provoke as much opposition as possible from “responsible” linguists, and the author only dimly sensed—if at all—that it might serve as a *Vorstufe* to a larger theory.

The burden of this section is as follows. Glosses and labels are two different ways of saying something rather similar, that humans tend in their minds at least to explain things that happen in the real world by placing little notes, glosses or labels next to, or upon, those things or events. This is at least one useful way of explaining how humans use language, presented as a first level during this early stage of our account. Since people cannot in fact place such notes or labels on the objects, entities or processes of the real world, they tend to do so within their minds and project them onto the real world beyond them.

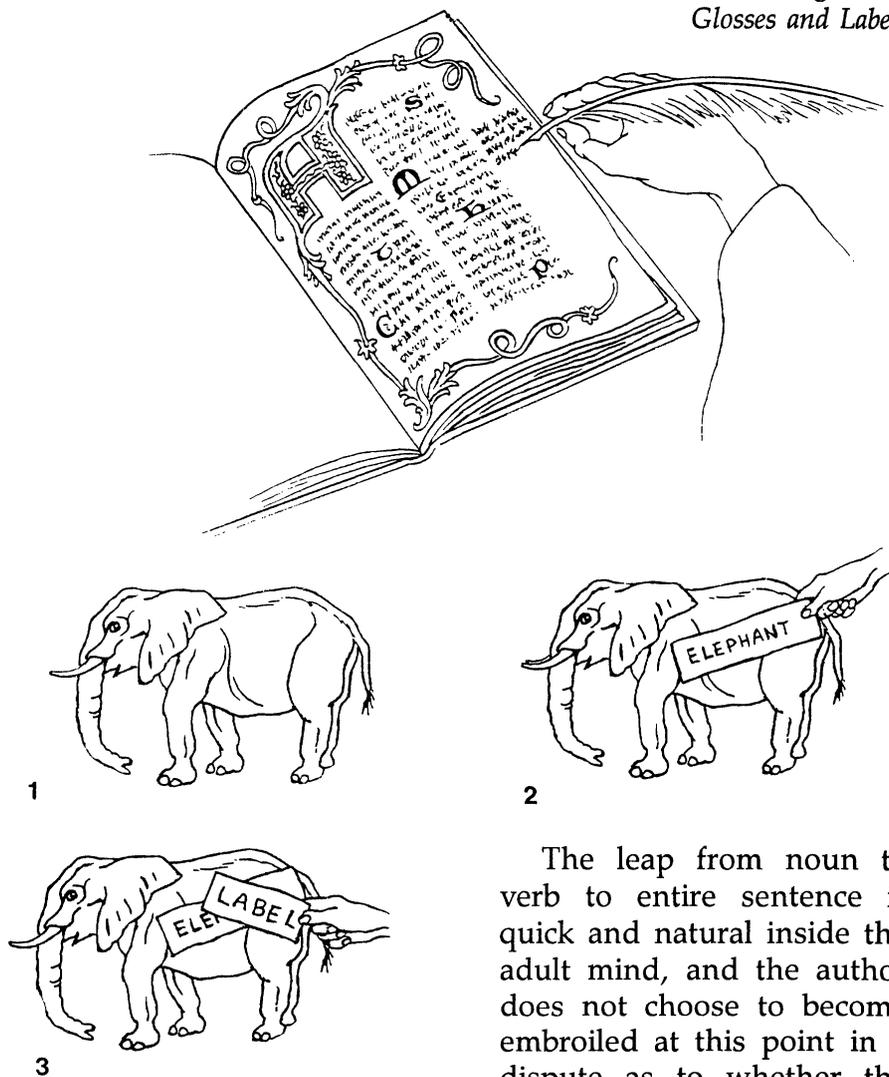
Such a claim is completely independent of any findings or lack of findings by cognitive psychologists or neurobiologists, since it is intended as merely the first of a series of quasi-mathematical mapping processes. These will culminate as a means of portraying how language tends to operate, though it cannot be excluded that research may one day inform us that the human brain and its cognitive processes function roughly in this manner.

These notes are referred to as both *glosses* and as *labels* for a reason. Glosses are written notes which scholars—perhaps most typically medieval monks—might inscribe in the margins of manuscripts to explain the meaning of words, phrases, or references in the original text. Thus, these glosses resound with ancient, literary overtones. Labels are quite modern devices which—in the form of post-it notes, for instance—are pasted in many places and for many different purposes, including those intended by medieval monks. Thus, by providing two related images—one associated with high literary culture and one rooted in everyday life—it is hoped that some degree of approval may be won from even the most elevated defenders of our culture. Granted, glosses and labels also differ in some ways both in form and function, but they can satisfactorily be considered as a single concept for the purposes of this paper.

Some will interpose at this point that the gloss/label analogy overlooks the origins of language as a spoken rather than a written medium. This objection is easily dealt with: a labeling or glossing process—or some form of analogous oral heuristic—will necessarily be all the more important for those who have not yet developed writing.

To reiterate, these are glosses or labels we place on persons or processes, as they appear in our mind's eye. They help us to identify what it is we are looking at, and they make it possible for us to verbalize whatever has been so annotated. If a cat swings into view, we can suppose that a gloss or label reading "CAT" is projected at that hapless animal. An elephant gets ticketed with the label "ELEPHANT." The same thing may happen for "RAIN" or "SUNSET" or even for "THERE'S UNCLE ED GETTING DRUNK AGAIN." (*Figure 1*)

Figure 1:  
Glosses and Labels



The leap from noun to verb to entire sentence is quick and natural inside the adult mind, and the author does not choose to become embroiled at this point in a dispute as to whether the

mind is capable of making these observations without actually using words and scribbling them on glosses or labels, even the mental kind. Nor does it make much sense to be drawn into millennial carping contests over whether words or reality trigger the mainspring of our minds. These labels can be quite simply and cogently built up over the years of our education from words to phrases to full sentences to entire culture-related complexes of

ideas. It is, however, possible that by the end of this work this theory may be able to offer some novel input into both of these debates.

Most of us have collected vast stores of these labels or glosses to fit most of what we see or otherwise encounter during our lives. Depending on the person and the purposes, they can be composed of words, phrases, entire sentences or paragraphs, or even be based on books, historical events, or folklore. Before we start to argue about their precise content or their grammar and syntax, let us first simply try to visualize them. In fact, many of us spend much of our time exchanging these labels with each other or arguing about the words on them or deciding to make some slight changes in their phrasing, shape, or color.

It can in fact be satisfactorily argued that each and every one of us has a slightly different set of such labels or glosses, that no two of us share exactly the same ones. It can also reasonably be argued that some of these labels are indeed our very own and personal ones, while others have been more or less pre-manufactured for us by our families and neighbors, by our cities, or by our regions and nations. And it can also be quite legitimately maintained that other nations speaking foreign languages have remarkably different sets of labels from our own. Not only are the words not the same, but the styles of label or gloss creation, along with their sizes, shapes and colors, are also quite different. Here we are merely describing well-known divergences in grammar, syntax, idioms and the like.

In other words, it is possible for two people, even in our own country and culture, to call up quite different labels when encountering measurably similar entities or events. Where two distinct languages or cultures are involved, such differences may become staggeringly unlike. Perhaps the most interesting stage for all of us begins when we encounter something or someone in our own lives for which (or whom) we have no pre-existing labels. When this happens, many of us will start by simply applying the closest possible matching label, or even more than one match: "Well, it looks like this one, but it looks like this one too." Some of us will simply insist that one of our pre-made labels fits, whether it does or not, others will hesitate and declare themselves

uncertain, and yet others will attempt to create a new and more suitable label on the spot. I call such instances “Confusion Nodes,” and discuss them at some length in the longer work. We all encounter them regularly—they are built into our very lives, even though we have not as yet, either as a species or as individuals, developed any consistent way for dealing with them.

The importance of this gloss or label image is that it shows us that up to a certain point language can satisfactorily be represented by using a two-dimensional model. It also demonstrates that different people may place different labels on the same reality. Even we ourselves may on occasion apply two different labels to the same reality, at different times in our lives, for different purposes, in order to conform with different individuals or groups, or simply because we are not sure.

Even a two-dimensional model represents an advance over the past. This labelling process is our first step upward in mapping terms, since the maps of language we studied in school are all arguably one-dimensional or stuck in a “fractal dimension” somewhere between “one” and “two,” as we will explain in a later section.

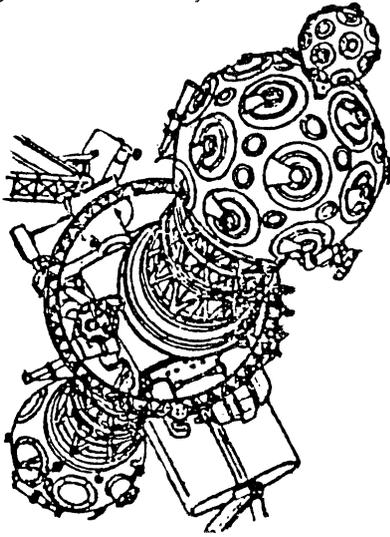
To reiterate, nothing new has been added to the data being represented—we are simply looking at them from a new vantage point. It is therefore altogether possible that may see different relationships between them. At the same time it is only fair to warn the reader that new maps of familiar terrain have through the ages possessed the power to induce a kind of metaphysical—and sometimes even physical—vertigo within the minds of those totally wedded to older styles. Thus, what has started out as only a slight change in our mapping procedures could just turn into a major determining principle in the way we see both language and reality.

#### THE ZEISS LEVEL OF VISUALIZATION

We now take our gloss and label image one step further, or one dimension outward, if you prefer. We have already mentioned the notion that we are in a sense projecting these glosses and labels onto the outside world. Let us take that concept one

stage further and imagine that each of us has a Zeiss projector mounted inside our heads, or perhaps attached to our shoulders where our heads normally rest. Zeiss projectors are of course those remarkable devices which sit at the center of planetariums and project stars, planets and other astronomical objects upon a domed roof. (*Figure 2*)

*Figure 2: Zeiss Projector*



Let us now visualize the glosses and labels we place upon our entire environment as projected versions of those same glosses and labels we earlier saw as slightly more tangible entities. Here we have a few new viewing advantages, for if we wish to change a gloss or a label, we have only to switch off the old one and project a new one in its place. We can also add or subtract our projected little notes as fast as we wish,

or at least as fast as we can write new ones.

Once again, we are looking at a two-dimensional model of our language (or arguably of our world), but we are seeing it against the three-dimensional backdrop of an imagined planetarium dome. In other words, our view now measures more than two dimensions but as yet less than a full, rounded three dimensions. But as we look out at this oddly shaped world from our central niche, let us now throw caution to the winds and do away with the planetarium roof altogether. Let us imagine all of our projected labels instantly converted into spinning three-dimensional planets and near-by stars.

Some of these planets and stars—those standing for whatever we consider to be the more important words or concepts—have hosts of tiny associated words or sub-planets or moons revolving around them. For instance, the great star “GET” might in one

instance be surrounded by such adjectives as “angry,” “hungry,” “impatient,” “ready,” or “greedy.” Nearby, a perfect starry clone of “GET” might be circled by “over,” “on,” “by,” “through,” “in,” “past,” “up,” and other prepositional or adverbial planets. And yet a third “GET” might play sun amid “to bed,” “to sleep,” “to work,” “to bat,” “to score,” and other pseudo-infinitive phrases.

And as we shall see, there are many, many more. But who are we as we generate these intricate 3D images, are we still a Zeiss projector, or have we in fact become one of the many new orbs in this vast new galaxy of galaxies? Whichever we choose, we should not be afraid of losing our balance but simply relax and enjoy the view. Perhaps if we continue to see ourselves as a projector—though this time capable of generating myriads of three-dimensional holograms, we will feel most at ease. The other image—that we ourselves are but one of many millions of orbs—will be examined at a later phase.

Let’s look at a few of the planets and satellites that happen to be closest to us. Nearest at hand, appropriate to our learning stage, is the “Kiddie-Talk Star,” whose planets display adjectives young children are just beginning to learn: as these planets circle the star, we can see that their names are ‘good,’ ‘naughty,’ ‘mischievous,’ ‘friendly,’ ‘playful,’ ‘ugly,’ ‘cute,’ ‘sneaky,’ ‘mean,’ and more besides. These words are conveniently grouped in a category corresponding to the stage when they are likely to be learned. We notice that the planet labeled ‘mean’ is projecting several lights out further into the system, but before we can find out why, just a bit further on we find a whole series of stars surrounded by what would appear to be high level adjectives as planets.

Each star is distinguished by the sound of letters with which its planets begin. For instance, one labeled “VI-” has as its planets ‘vigilant,’ ‘vigorous,’ ‘vindictive,’ ‘virile,’ ‘vitriolic,’ ‘vituperative,’ and ‘vivacious.’ We then realize that each planet in turn has various moons, or rather several distinct orbital paths through which various moons pass. One of these paths around ‘vivacious’ has a path labeled ‘synonyms, where the moons ‘lively,’ ‘ebullient,’ ‘animated,’ and ‘vital’ all circle. Another path labelled ‘usage’ contains the planets ‘vivacious feeling,’ ‘vivacious mood,’

and 'vivacious blonde.' Still other paths surround each of the adjective planets for 'antonyms,' for related words, and for words whose sound or spelling might be confused with each one.

Suddenly we enter that part of the galaxy devoted to Math and are almost immediately confronted by two stars revolving around each other, one labeled 'mean' and the other 'median.' To our surprise, we realize that the star labelled 'mean' is exchanging that ray of light we saw before emerging from the Kiddie-Talk planet named 'mean,' just to make sure that both meanings are kept in mind and neither one is confused with the other.

And it is just now, as we recognize that we are still only at the very edge of this system, that we begin to realize how enormous it must be, how many stars, planets, moons and orbits or connecting paths it must contain, and how incredibly old and yet young it must be, since it will go on living for as long as there are languages anywhere. Can it be that after all this description, you have not begun to see and feel this world around you?

If you are in fact so hard-headed and so hard-hearted as not to respond to this remarkable image, then would you be willing to consider a perfectly practical multi-tiered, three-dimensional, relational database of the kind that may be running things where you work? Oddly enough, the structure of such a system is not very different from that of the system I have described, though of course the latter is infinitely larger. (In the longer work, parallels between this image and advanced relational databases, such as lexical term banks, are cited at some length and with specific examples.)

Others stars and/or planets stand more or less alone or revolve slowly around each other in intricate and seemingly unpredictable orbits. As our vision rises into the realm of philosophical or political disputes, we can see some of the stars and planets buzzing angrily around each other, as term replaces term and word wages war with word. One advantage of this in-depth view is that a star or planet can contain one label on one side together with its opposite—or an otherwise closely related term—on the other: if we are not satisfied with what is written on one label, we can just wait for it to turn around and show its other side. Alternately, we can view these planets as polygonal solids showing related words

or terms, one side at a time. Or we can simply flick on the words we deem appropriate—after all, this is our own world, yours as much as the author’s, and we have in a very real sense created it.

#### RECOGNITION OF THE LEXIVERSE

What we are looking at—with all the awe of explorers crossing a totally new frontier, a neo-Keatsian “stout Cortes” allegedly standing at the Isthmus of Panama—is nothing other than the Lexiverse, which we can now see at least tentatively as the true form of the world of language (or perhaps a truer form of that world, an ambitious thesis whose validity may nonetheless turn out to be subject to proof). We have never been able to see the Lexiverse until now, because we have been hopelessly blinded by one- and two-dimensional preconceptions of language. We will soon enough consider what these preconceptions have been and how they have come to afflict us, for our entry into the Lexiverse will before long bring us into the outer reaches of the study of fractal forms and how they apply to language.

We have given one example in the word “vivacious,” which the brain stores under its overall sound, its initial letter or syllable, its synonyms and antonyms, and the words it most often accompanies. How many of these linkages different people carry around in their brains will of course be a product of their education and experience with words. Here again the analogy with a multi-faceted relational database is a useful one. The award-winning program *IdeaFisher*, a database of this type, concentrates on the associative side of words and provides all doubters with a working model of at least a small subset of this construct.<sup>4</sup>

But what precisely is the “Lexiverse”? Let us first and foremost conceive of it as a vast, floating, interlocking system of molecular models, planetary and/or galactic replicas or “orreries,” along with interrelated three-dimensional mappings of weather systems, all of these intended to represent not only all our linguistic orbs but the distances between them. However we may define life, in at least some sense the Lexiverse appears to be alive—it is constantly moving, evolving, and perhaps even growing. It is not in the least linear, and it is not tree-like, though virtually all representations

of it in the past have taken this form. It is composed primarily of two elements, nodes or named elements, and links, which are the connections between the nodes. Such links may also take the form of orbits or trajectories.

But even more important than visualizing the form of the Lexiverse, let us understand its function with regard to language. For those who may still require the visual equivalent of a crutch, it can be seen as a total extension in space, time and linguistic complexity of that multi-tiered multi-dimensional database we have briefly described. No computer now known or contemplated can begin to plot its complexity, just as no computer has proved capable of representing the full complexity of the weather. For those who find such an enormous construct difficult to envision, let them start by imagining the totality of all the glosses, labels and projections we have described and go through the various stages we have presented once again, until the final leap of logic becomes more comfortable.

In ultimate terms, the Lexiverse is composed of everything that is now named or described in words—or capable of being named or described in words, or at the very least the labels that represent them. It not only contains everything that is named but everything that ever has been named or will be named, including discarded or forgotten words, phrases and terms. It furthermore contains all such words or their equivalents in all languages, dead, living and yet to live.

To visualize this property, it may be helpful at first to posit separate Lexiverses for each language, since each language will be found to have its own quite distinct laws and formulas governing the nature and movement of its constituent stars and planets. Eventually we can at last envision them as being all contained in the larger Lexiverse, perhaps superimposed on one another through some prodigy of advanced projection techniques. An extremely primitive drawing, appended later in this section, hints at such a projection. Finally, the Lexiverse also necessarily contains all possible and permissible translations to and from all of these languages, including such relatively absurd examples as Sanskrit into Aleut Eskimo, Talmudic Hebrew into Koranic

Arabic, or modern Russian political speeches into the Aeolic Greek of Sappho's era.

As strange as it may appear at first glance, the Lexiverse is a useful construct which can help us understand a great deal about language. As the ultimate database connecting all languages, it can be of great practical worth both for translators and for the construction of any ultimate theory of human knowledge. Furthermore, the Lexiverse is no more outlandish than many mathematical models, especially those dealing with "infinities," with which it shares some characteristics. It can also play the same role as some of these mathematical constructs in providing us with a model for the structure of language and linguistics as a whole. As already noted, in some ways it is merely a continuation, though in highly visible terms as a molecular-meteorological-cosmological model, of the "Glossematic" theories of Hjelmslev and Uldall. It is no more absurd to state that the Lexiverse exists than to claim that it does not exist.

It is the author's hope that readers will do their best to visualize the Lexiverse and even attempt to see it as occupying a real space directly continuous and co-existent with our own. Granted, it is an intellectual construct, but as already explained it is perfectly valid as a mapping procedure. It is in fact no more unreasonable than the linear processes employed in the past to represent language and may be capable of containing a great deal more information. The best way of envisioning the Lexiverse is within one's imagination—no two-dimensional drawing can do it justice (even the one included in this section), though film, video and computer animations or simulations may one day provide a somewhat accurate illusion as to part of its space and structure. If the claim that "language can occupy space" still strikes some readers as odd, they may prefer to think of it as a kind of intellectual space, perhaps as what some Californians might term "virtual space." But there are a number of reasons why this form of space may in fact be eventually seen as a "real" one.

One excellent reason is that the Lexiverse is the largest and most detailed construct ever envisioned by the human mind. This seemingly grandiloquent assertion can easily be proved by reflecting that the Lexiverse not only contains all possible words in all

possible languages but also, by implication, all possible numbers and mathematical expressions in their verbal forms in all possible languages. Thus, the number 103,478 is simply another way of expressing one hundred and three thousand four hundred and seventy-eight, and the latter form is necessarily a part of the Lexiverse.

It is frequently forgotten that mathematics is a specialized shorthand form of language, not a language in its own right, and that all mathematical assertions can also be phrased in verbal terms. Mathematics is a subset of language, and language is not a subset of mathematics. All complex mathematical concepts and expressions, to the extent that they can be couched in words—including all attempts at expanding, multiplying, or infinitising the Lexiverse by various means—are also a part of the Lexiverse itself, and yet its mathematical component can only form one section of its ultimate size. Since some mathematicians may balk at the idea of language containing mathematics—and had been rather inclined to believe the reverse was true—we will reserve further discussion of this theme for our chapter on Linguistics and Mathematics.

In the longer treatment of this subject, three further aids are provided in visualizing the Lexiverse. One is a detailed description of the widely available commercial program *IdeaFisher*, which represents a simulation of a reasonably large cross-section of the Lexiverse in a single language.<sup>4</sup> The author also hopes to provide, either as an integral part of the book or as an available supplement, a computer program he has written attempting to simulate an extremely small cross-section of this construct, once again in a single language, namely the various ramifications of an extremely complex verb, “to put,” in its many uses with prepositions and particles. It quickly becomes clear that this hypertext simulation by its very structure provides insights into usage which a paginated reference work cannot fully match.

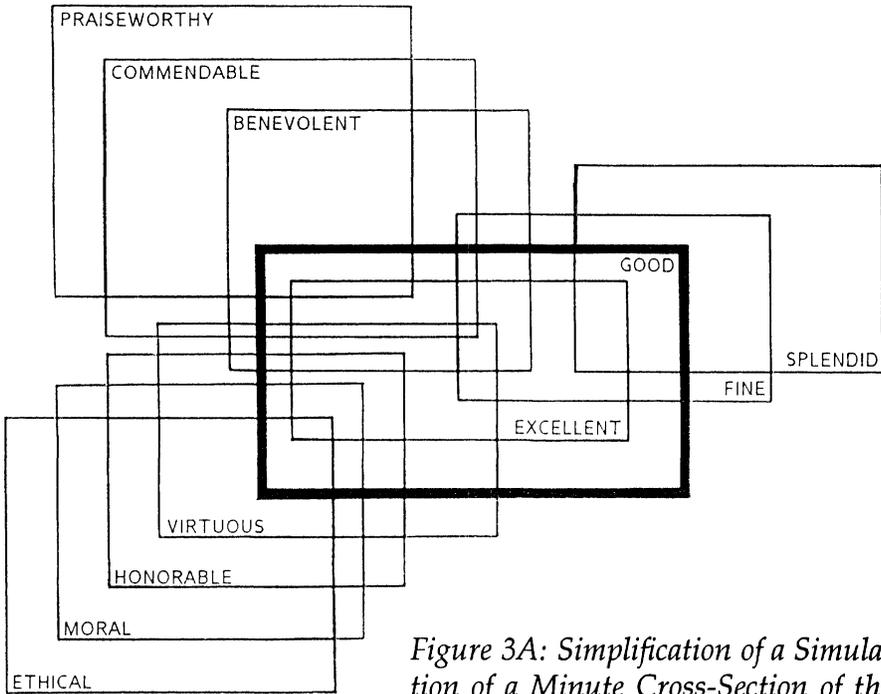
Finally, a simulation of an even more minute cross-section of the Lexiverse contrasting a similar domain of terminology and knowledge in two languages is presented both in the book and here (*Figure 3*). Since folklore has it that all comparisons are odious, and since comparisons between two languages can be

especially misused to justify claims that one language is “superior” to another, it is important to stress that this is one of several relationships this comparison is *not* designed to illustrate. The knowledge domain chosen for this comparison is that surrounding the word “good” in English and its alleged translation into French, the word *bon* (*bonne*, etc.).

It should be emphasized at the outset that this comparison has also not been designed to show all possible words in this domain but only as many as can be illustrated without causing visual clutter. It should also be stressed that the rectangles surrounding the various words are not in any way precise semantic demarcations but are subjective impressions of where those borders might lie. No attempt has been made to list or fully elaborate possible subdomains in either language, nor do these diagrams serve as a “score card” as to which language has more words to express this semantic realm (further words could easily have been added for either language). I am grateful to my colleague Jean Lachaud for the French section of this comparison.

What we have before us, as the caption shows, is a simplification of a simulation of a minute cross-section of the Lexiverse, shown for English, for French, and finally in merged bilingual form. What this comparison demonstrates most compellingly, despite all our disclaimers, is that these two closely related languages do not really merge, correspond, or delineate the same distinctions, whether in the meanings of strikingly similar words or the structure of conceptual subdomains, or even the basic meaning of this “simple” word *good/bon*. So great are the divergences between “good” and *bon* that they have been enclosed by differently shaped rectangles. Perhaps the most striking difference is the emphasis the French place on *bon* as an adjective describing food, where this would only be of secondary importance to more morally fixated English-speakers.<sup>5</sup>

This simplified cross-section hints at the multi-dimensionality which lies behind the simplistic parsing diagrams of some grammarians and linguists and also provides some justification for comparing linguistic structure with a weather system. Even though our computers may soon have prodigious speed along with nearly infinite memory and storage capacity, it is difficult to



*Figure 3A: Simplification of a Simulation of a Minute Cross-Section of the Lexiverse: English Projection*

imagine that humans for their part will ever create a detailed algorithm capable of representing this potentially infinite rabbit warren of meaning.

As noted, these drawings represent only a partial depiction of this semantic area, one that can be conveniently placed on a printed page. But no matter how complete, large and elaborate such a drawing might become, it would never overcome its essential characteristic of non-convergence between the words of the two languages. If we were to add a third, a fourth, or an  $n$ th language, we would certainly see this non-convergence expand rather than contract.

The problems such cross-sections create for machine translation and other natural language applications are discussed in some detail in the longer work. It should be clear from these drawings, however, that even in their present primitive state these rectangles could be converted to denote storage addresses in a text analysis system. But it is also clear that there could never be

Figure 3B: Simplification of a Simulation  
of a Minute Cross-Section of the Lexiverse:  
French Projection

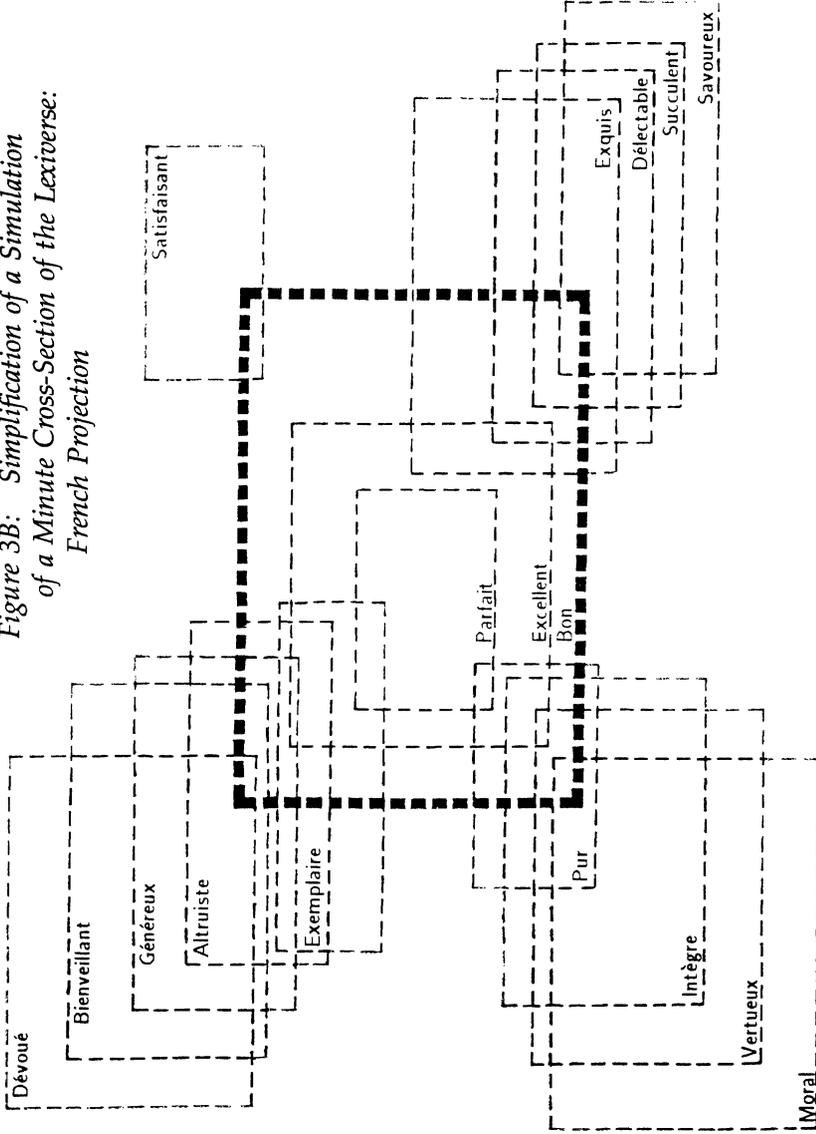
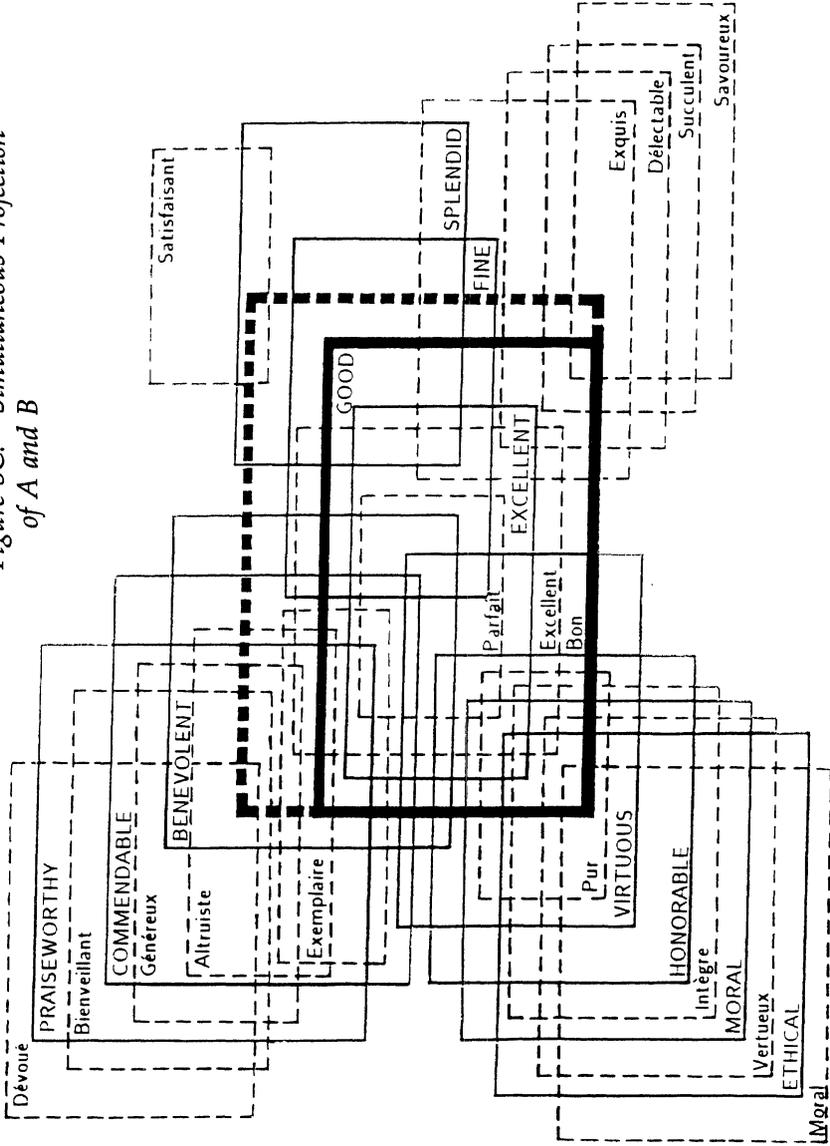


Figure 3C: Simultaneous Projection of A and B



absolute certainty as to which word in French denotes which word in English, or vice versa. This degree of arbitrary bilingual displacement of meaning is a given of most randomly chosen texts and in some cases, depending on their difficulty, will play a role in determining how successfully MT or other NLP techniques may be applied. The author hopes to present this relationship in terms of a mathematical function in the completed work.

#### OTHER THREE-DIMENSIONAL MODELS

Since we have now succeeded in at least launching this vast galactic vision of the Lexiverse, let us next turn to a few more modest models for representing these multi-dimensional aspects of language. Some readers may still not have fully assented to the abstractions of the Lexiverse, and with a subject as large and difficult as language, we need every possible insight and image we can bring to bear. Since we have now envisioned language as enveloping the entire extent of space and time, let us next return to earth and think of language in more humble terms as a suit of clothing covering everything about us. Or at least as a kind of fabric wrapping reality—if visualizing this fabric as being rubbery, supple and flexible can help us in our exercise, then by all means let's include that as well.

Or let's take another tack altogether and describe language as a medium in which we are enveloped, as fish are enveloped in water. Or perhaps as a thin film of fine sand or fluid covering the world around us. And while we are considering a film or a fluid, let us further imagine that we have personally sprayed this film over everything we encounter. After finding so many potential parallels with molecular, meteorological and planetary systems, we now discover yet another scientific parallel, this one less flattering to our egos: animal biology.

It is well known that many creatures mark their domains by a spray of scent, which they indefatigably lay down all about them from special nether glands. These animals are quick to sense the intrusion of a foreign scent in their domain and will reject, chase off, or kill interlopers who bear such an odor.

Let us not mince words and simply enjoy the irony that the root of the English word "speak" has an "r" in it (as in German/Dutch *sprechen/spreken*) and is indisputably linked with the root "to spray." In fact, many words in Indo-European languages which have to do with spreading something around (including "spread" itself) tend to begin with "spr-" or "sp-": English/German *spread, sprawl, spray, sprinkle, sp(r)eaK, spit, spurt, spout, Spreu, spritzen, Sprudel, Spucke, sprühen*, Italian *sprazzo, spruzzo*, Russian *распространять*, Latin *spargo*, Ancient Greek *σπένδο* (*spendo*), *σπείρο* (*speiro*), etc. Even in Chinese the words for spurt, spit, language and speak all contain the "mouth" radical. Thus, since speakers of entire families of languages have over the ages from primeval times sensed a resemblance between spray from the hindquarters and speech from on high, this comparison would appear to enjoy a certain confirmation transcending time and culture.

### *The Question of Linguistic Space*

#### THE FRACTAL DIMENSION

One highly crucial factor related to fractals is the so-called "fractal dimension." Once we have come to accept that language can occupy any kind of space at all, even conceptual or theoretical or "virtual space," we are ready to discuss what dimensions this space may occupy and how the "fractal dimension" may apply to it. What follows is a brief discussion of this issue.

All geometry students have learned that there are essentially three dimensions: the first one called linear or one-dimensional and typified by a straight or even a curved line; the second one termed planar or two-dimensional and typified by a simple surface, such as a sheet of paper; and the third or "solid" or three-dimensional construct visible in so many entities around us. To this explanation is usually added the claim that an entity possessing no dimension also exists, namely the classical geometer's "point." We are reminded by our mentors that no truly two-dimensional form may exist in nature, as even a sheet of paper

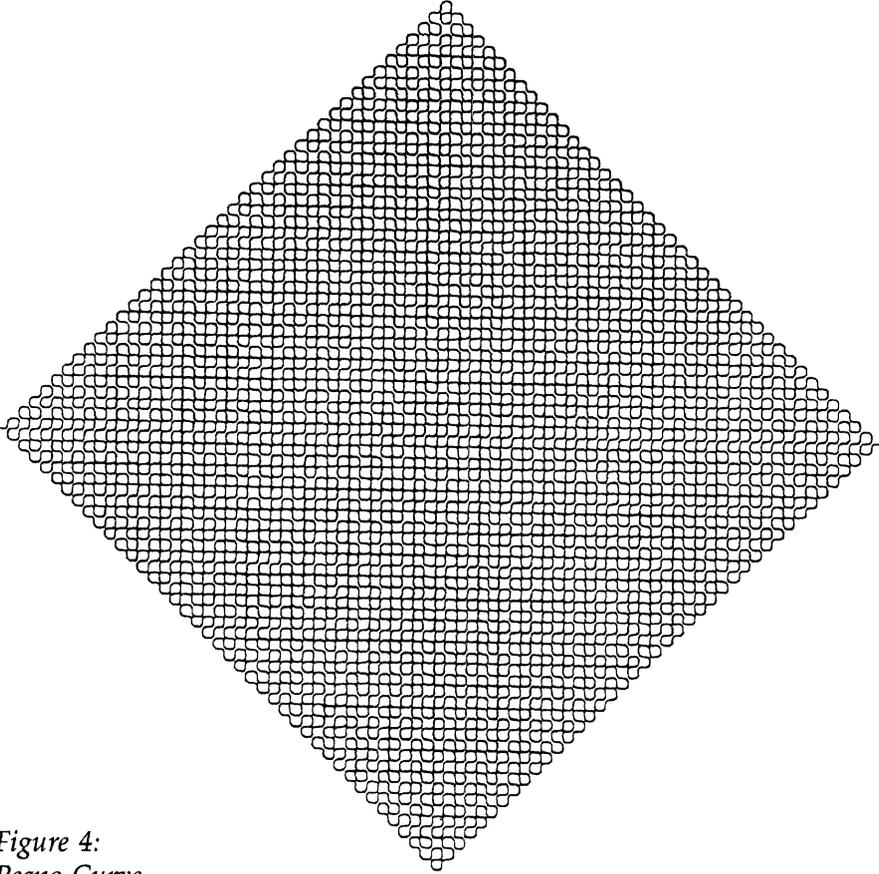
has a depth or third dimension, but this is about the whole of the theory as it is usually presented.

Fractal geometry goes further and advances the claim that some very real entities may in fact be caught in the middle and possess a fractal dimension located between two of the other dimensions. One often-cited example: consider again our sheet of paper, and let us grant that it possesses only two dimensions, length and width. Crumple the sheet of paper into a ball: how many dimensions does it now possess? Many will argue that by crumpling it we have transformed it into a three-dimensional object. But it is still a sheet of paper and as such still possesses two dimensions, wherever they may now be located. None of the points on its surface has been destroyed, and it has not miraculously been transmuted into a true solid. Fractal geometers have solved this problem by evolving a means to compute its "fractal dimension," in this case somewhere between 2 and 3. By their means of calculation it comes out as approximately 2.2.

Now consider the line shown in *Figure 4*. It is known as the Peano Curve. It is definitely a line, yet if its underlying formula continues to be traced, it will end up intersecting every point on the two-dimensional shape it occupies. By analogy it occupies a fractal dimension somewhere between 1 and 2.

A more homespun example of a Peano-like form found in the literature is the continuous crayon line drawn by a small child in a finally successful effort to fill in a square or other two-dimensional outline. A phenomenon called Cantor Dust, created by continually subdividing the fragments of a line into ever smaller point-like segments, provides an example of a fractal dimension more than 0 but less than 1: not a true line but not a mere set of points either. A less exalted example would be an ordinary dotted line. One simple way of defining the fractal dimension: "the space actually occupied by something normally considered to occupy one or more of the conventional dimensions but which trespasses or obtrudes on the next one up."

Finally, it is possible to visualize such three-dimensional entities as a fire or an explosion as projecting outward toward the dimension of time as well. A fire cannot be represented by a mere photograph or even a solid plastic replica—it truly exists only in



*Figure 4:*  
*Peano Curve*

time, as its tongues and forks continually dart and change. The same can be said for an explosion, though a much smaller interval of time is needed here. Either of these events can be said to occupy a fractal dimension of between 3 and 4.

Now let us consider whether language may be said to occupy any fractal dimension, and if so which one it will prove to be. As long as we use linear Chomskian or neo-Victorian methods as our sole tool for mapping language, there is no likelihood that we will believe this is possible. But as soon as we rub the sand from our eyes and experiment with more advanced two-, three-, and (as

explained in the book) four-dimensional methods of mapping, we will almost immediately be able to reach the opposite conclusion.

Since we have already seen our glosses and labels as linear notes affixed to a planar world, and since we have also experienced these labels both as projections on a three-dimensional dome and as actual three-dimensional orbs and planets in their own right, we have already seen how they can be viewed as impinging on and conjoining with both the second and the third dimension.

There is yet further evidence tending to confirm the fractal nature of language arising from language itself. Fractal surfaces are often characterized by physicists as 'pitted,' 'jagged,' 'fragmented,' 'sharp,' 'torn,' 'cutting,' 'irregular,' or 'broken up' and typified by such examples as tire treads, concrete, or rough fabrics. It should scarcely come as a surprise that casual remarks or passages of text are often similarly characterized by ourselves as any of the following: piercing, penetrating, trenchant, sharp, caustic, stinging, edged, cutting, pointed, spiked or spiky, needle-like (hence the verb 'to needle'), biting, pricking, razor-sharp, rough, slashing, incisive, pungent, or mordant.

Literary style is frequently described in any of the following terms: prickly, bristly, jagged, craggy, snaggy, rough, broken, choppy, rutted, bumpy, knotted, or gnarled. Styles, stories and characterizations we do not like are frequently dismissed as flat, thin, lean, slim, slight, pinched, one-dimensional, paper, cardboard, etc. Also relevant is one German word for expertise, *Fingerspitzengefühl* ("finger-tip-feeling") along with the Spanish expression *es algo que he tocado con los propios dedos* ("it's something I've touched with my own fingers," meaning "it's really real").

It had been my hope to discuss many other aspects of this theory, but this has not been possible. For instance, the existence of a linguistic equivalent for the famous "butterfly effect" can be demonstrated and the concerns of Shannon and Weaver for the integrity of telephonic signals can be shown to have measurable analogues in natural language. Based on these parallels, some viable laws of human communication can be posited together with their corollaries and seeming exceptions, and techniques for quantifying some linguistic processes can be evolved. Because of

the intrinsic ambiguity of most human speech and writing, it can also be demonstrated that the apparent weaknesses of such an approach also constitute a form of robustness and validity.

Returning to the fractal dimension, when we come to consider language and time, we will offer even more convincing proof in the larger work that language occupies a part of that dimension as well. In some cases it may even be possible to recognize brief, staccato, point-like utterances as a form of human communication, in which case language can also be located between dimensions 0 and 1. Thus, we have prepared the groundwork for substantiating that language can lay claim to at least three and possibly four separate fractal dimensions. There is in fact no dimension impervious to language—it lies athwart the surface of our lives like the lines of a Peano Curve, it folds and rumples into the nooks and crannies of our most convoluted and secret places, and we will see that it fills and occupies time as surely as does sand an hourglass. Once we have concluded that language not only occupies space but can also possess a fractal dimension, and once we have seen in a subsequent section how many other properties language shares with fractal geometry, we will at last be in a position to make some truly meaningful statements not only about specific computer applications but also to lay the groundwork for a deeper understanding of some larger linguistic topics.

## NOTES

1. Although the author has noted in a recent paper that “writing about language or linguistics or translation ought by its very nature to qualify as an absolute model of good and clear writing,” (Gross, 1991b), this ideal has been to some extent sacrificed here for the sake of brevity.

2. The primary forerunners of a fractal approach to linguistics may be Hjelmslev and Uldall of the Glossematics school. Although they made no use of fractal imagery—and of course could not have done so—they did posit the notion of a structure encompassing all languages that have ever been—or could ever be—spoken. The Whorf-Sapir Hypothesis, while it in no way supports such a speculation, also does not exclude it and in some ways provides a fertile womb for its development, as do Bloomfield’s speculations on “Secondary Responses to

Language," both of these aspects being summarized in Gross (1992). Another relevant figure is George Kingsley Zipf, the originator of Zipf's Law, to whom Benoit Mandelbrot pays tribute in passing (*Mandelbrot*, 1977). Though Zipf went far afield in some of his speculations, as Mandelbrot also points out, he was clearly headed in the direction of a theory unifying mathematical and linguistic principles. The Stewart volume attempts to break free of one-dimensional theories but contains little beyond a few suggestive sketches. Beyond these examples, since embarking on this work, some of my colleagues have attempted to persuade me that members of the Prague school or advocates of Functional Grammar long ago prefigured a fractal approach, but it should be obvious that the intellectual climate and the mathematics were both lacking until recently.

Particularly encouraging is recent work by two scholars, who would appear to be moving towards the formation of such a construct. One of them (*Wright*, p. 14) suggests that fractal geometry "would probably provide the most realistic representation of chaotic linguistic relationships if it were indeed possible to implement an equation formalism for such a system" (a direction this paper is attempting to initiate). The other (*Sager*, *passim*) suggestively entitles three of his chapters *The Cognitive Dimension*, *The Linguistic Dimension*, and *The Communicative Dimension* and seems deeply concerned with developing a unified theory of terminology and applied linguistics.

3. See Gleick, pp. 21ff *et passim*.

4. Gross (1991a).

5. The point is not that one cannot refer to a "good meal" or a "good steak" in English, but that this is not the first meaning which comes to mind. In creating semantic categories, most English-speakers would tend to think of "good" in this more sensual meaning as a subgroup of "delicious" rather than belonging to the main sense of this word. I have provided a similar example of this phenomenon elsewhere (*Gross*, 1989), where I have taken the English word "table" and the French *la table* and shown that even these two arch-cognates are by no means interchangeable between the two languages. Concerning other uses of good/*bon*, Jean Lachaud and I have determined that four separate categories are needed to classify English to French translations of this word.

- 1) Cases where "good" can simply be translated as *bon/bonne*, etc.: "good friend," "good book," "good road" become *bon ami*, *bon livre*, *bon chemin*.
- 2) Cases where such direct translation is permissible, but a different translation is possible or preferable: "good teeth" becomes *de bonnes dents* or *des dents saines*, "good reaction" becomes *une bonne reaction* or *une réaction positive*.
- 3) Cases where direct translation is not permissible, but the overall noun-adjective structure is maintained: "a good man," "a good door," "a good press" become *un brave homme*, *une belle porte*, *une critique favorable*.
- 4) Cases where direct translation is not permissible and the overall structure is totally altered: "it has a good taste" becomes *c'est bon*, "it's a good smell" becomes *ça sent bon*, "it's a good fit" becomes *ce vêtement me va bien*.

Analogous but contrasting categories would also be required to classify French-to-English translation of *bon*. In the midst of such complexity, the engineer's assumption that there must be some simple statistical approach to provide accurate translations is stretched rather far.

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*Translators and Interpreters as  
Adopters and Agents of Diffusion  
of Planned Lexical Innovations:  
The Francophone Case*

LAUREL BENHAMIDA

*Introduction*

When language policymakers undertake the planning of terminology in a language that is not only their own national tongue, but that is also an international language, sociolinguists are concerned about the communications networks of individuals and institutions through which the voluntary acceptance of their policy will possibly be accomplished. The French government has given its language policy, in particular the diffusion of planned lexical innovations, the force of law. While they can be reasonably certain that the fear of legal penalties will result in a certain degree of success for the policy within France, they may also want to know which communications networks will be receptive to their policy in the international arena. These networks are composed of individuals, whether working independently or in institutions. A basic goal of investigating the diffusion of linguistic innovations is to determine the characteristics of individuals and institutions who adopt, variably adopt, or reject linguistic innovations. Both Cooper (1979) and Eastman (1983) concede that we know very little about individuals who adopt or reject communicative innovations. Equally little is known about institutions.

However, translators and interpreters, the schools that train them, and their employers and clients form a communication network that has long been recognized as an important avenue of linguistic change. In the 1930s the Prague Linguistic Circle stressed that cooperation with "the practical agents of language cultivation," among them translators, was essential if the efforts of language planners were to be successful (Eastman 1983: 109).

Nevertheless, little if any research has been done to determine to what extent translators and interpreters and their network in the twentieth century actually participate in the diffusion of planned lexical innovations by adopting neologisms. Historical description of the role of translators in creating and spreading linguistic innovations provides a basis to work from. The challenge today is to use the methods of sociolinguistic research to build upon this base.

The francophone world was the locus of the present study. The French government's Bas-Lauriol legislation proscribes the use of certain words, usually anglicisms, and prescribes substitute innovations for use in a wide variety of communicative and domain-related contexts within France. While the government can dictate written usage inside France through this law and its penalties, the situation in the francophone world at large is not directly controllable from Paris. The author conducted a sociolinguistic study treating the adoption of prescribed terms by francophone translators and interpreters, the policies of the schools which train them, and term banks serving them. This investigation addressed the following questions:

1. Are there relationships between certain sociocultural, sociolinguistic and socioprofessional variables and adoption, variable adoption, or rejection of planned lexical innovations in French?
2. Are francophone translators and interpreters, the schools that train them, and the term banks that serve them functioning in voluntary contexts as agents of diffusion for innovations supported by the French government?

### *The Surveys*

Three mail surveys were conducted using questionnaires. The first was sent to individual francophone translators and interpreters outside France, the second to translator-training schools, and the third to term banks and closely related organizations that serve as terminology resources for francophone translators and interpreters. For various reasons, the terms included in the questionnaires were taken from the fields of computer and data processing. Computer terminology is an area covered by several decrees issued by the French government in conjunction with the Bas-Lauriol legislation (Goudaillier 1982: 29). Therefore, lists of prescribed terms exist for use in the design of the research tools. Computer terminology is contemporary and growing universally. Furthermore, not surprisingly, France has not extended to computer technology its traditional foreign-policy strategy that the French language be the language of access for developing nations to the benefits of technology transfer (Pendergast 1976).

The population employed was professional translators and interpreters who are or were members of professional organizations. The sample from Canada, Switzerland and Belgium was chosen from lists obtained from professional organizations. Duplications were eliminated, and a computer was used to draw a random sample of ten (10) percent, stratified by country and profession. The sample from Luxembourg differed in that the names were obtained from the EEC and the AIIC list. A list of 48 names of interpreters in other francophone countries, primarily in Africa, was compiled and all were used because a very low response rate was anticipated. Of the approximately 400 persons contacted, 370 were valid names and addresses; of these, 193 questionnaires, representing a 52% response rate, were returned.

The data were analyzed to determine whether a relationship existed between reported adoptive usage of planned lexical innovations and certain sociocultural, sociolinguistic and socio-professional variables. Especially those variables associated with the sociolinguistic profile of the individual were found to be related to reported adoptive usage. There was a significant negative correlation ( $-.258, p < .01$ ) between respondents who reported

adoptive usage and those who have French both as an institutional variety and as a mother tongue. In contrast, there was a significant positive relationship (.203,  $p < .01$ ) between reported adoptive usage and having French only as an institutional variety in language communities where some other language or languages prevail as the mother tongue(s). The number of respondents reporting categorical adoption, categorical rejection, or variation in adoptive usage was determined with respect to sociolinguistic context. Almost all respondents reported variable adoption. Of the 193 respondents, only one did not report any use; 176 reported variable usage; and 16 reported categorical usage of the official terms. The chi-square one sample test yielded the following results:  $\chi^2(2, n=193) = 292.487, p < .001$ . Intercorrelations were examined to identify indicator variables for the sociolinguistic profile of individuals. Multiple regression analysis identified the following indicator variables related to the sociolinguistic profile as significant ( $p < .001$ ) predictors of reported adoptive usage:

- the language spoken in the family
- the sociolinguistic environment of the place of birth

Feminine gender and age between 25-29 were also a significant ( $p < .001$ ) predictor of reported adoptive usage.

The data were further analyzed to determine whether there is a relationship between reported change in usage, i.e., variable usage, depending on the distance of the sociolinguistic context from the regulated contexts; analysis also involved sociocultural, sociolinguistic and socioprofessional variables. The number of respondents reporting no changes and some changes in usage was determined. Approximately 40% reported no changes and 60% reported some changes. Scores ranged from a low of 0 to a high of 10 (out of a possible 10), with a mean score of 1.7, a standard deviation of 2.04, a median of 1 and a mode of 0. A histogram of the scores indicated a J-curve rather than a normal curve. While 60.1% of the respondents reported change in usage, a large number (39.9%) reported no variability.

There appears to be a large group of people who use the terms with the same frequency, regardless of the sociolinguistic context, while a second group reports change in usage for a few terms depending on the distance of the sociolinguistic context from the regulated contexts, while frequency of usage for the remaining terms remained stable in all contexts. Correlational analysis found few variables related to change in usage, indicating additional variables need to be specified and tested. Multiple regression analysis was not useful in identifying good predictor variables from among those specified, indicating that other variables need to be tested or the relationship needs to be probed differently.

Data given by respondents indicating competing alternatives to official French terms were organized and tabulated. They range from a high of 55 alternatives for *société de services et de conseil de informatique* to a low of 15 for *numérique*, with a mean of 29.8 alternatives for all ten terms. Thirty respondents preferred the official *en ligne*, while 28 preferred *en direct* and 11 "on line." Only one preferred *visu*, while 10 would rather use *écran*. This is clear evidence of a dynamic situation and indicates why the French government and language planners are concerned about losing control of the French lexicon that they are attempting to implement.

Respondents were grouped according to the role they believe francophone translators and interpreters outside France play in the diffusion of terms officially approved by the French government. Most (76.4%,  $n = 107$ ) believed their role was to be active in the diffusion process. Relationships between sociocultural, sociolinguistic and socioprofessional variables and role were investigated. The variables of mother tongue and years of experience were found to be moderately useful discriminators. Other variables need to be tested. Status as a freelance was also a good discriminator, although missing data associated with this status made it important to view this result with caution because it indicates that the question was controversial or sensitive, especially for freelancers.

The francophone translators and interpreters who participated in this study are clearly adopters to some degree of some of the planned lexical innovations promoted by the French government

from Paris. Nonetheless, the findings show that they do not necessarily adopt these neologisms wholesale and invariably. Lack of opportunity to use terms, objection to certain terms, and large numbers of competing terms may have somewhat depressed the scores for reported adoptive usage. The large number of respondents who believe that they should actively support the French government's efforts may encourage language planners in France. The independent streak manifested by the Canadians in some of their comments may be discouraging to those who believe that French ought to be different from other living languages, regulated and invariant, or dead, like ancient Greek or Latin. It will also be discouraging to those who view Paris as the center of authority or parent locality for planning the French language. Actually, the comments of the Canadians emphasize that they believe that they are the soldiers in the trenches who are preserving French in the face of the realities of the North American context.

While the indicators associated with the sociolinguistic profile of the individual vis-à-vis French are good predictors of reported adoptive usage, the task of predicting change in usage by sociolinguistic context will need further research to determine which variables might be useful. The results of this study indicate that further research is needed into the attributes of existing innovations and the attributes that users of French value, as well as on attitudinal variables and psychological traits and constructs that might influence variable usage.

There appear to be good reasons for distinguishing different groups of non-mother tongue French speakers, rather than considering them as a single entity. The correlations of some mother tongues with reported adoptive usage were negative, while some were positive. It is also important to consider francophone usage viewed from the perspective of the role French plays in the society—i.e., whether it is a foreign language, an institutional variety, or an institutional variety but also the mother tongue of an indigenous group. The strengths of the correlations did differ somewhat among these variables, but the directional changes from positive to negative are more interesting. In addition, all the respondents who were born in towns where French was an

institutional variety but not the mother tongue of any indigenous group fell into the group favoring an active role in the diffusion of innovations. How the researchers or language planners choose to group the non-French mother tongue subjects will vary according to their perspective. Simply grouping subjects by mother tongue, i.e., Spanish or Wolof, may be of use to some, but it will probably not be adequate for those who wish to analyze the data from a sociolinguistic perspective. When attempting to determine good predictors of adoptive behavior, the latter will want to incorporate sociolinguistic knowledge about differences among Spanish, Wolof and Swiss German speakers in their relationship to the French language, the French government and French culture. The concepts of heterophyly and homophyly may be of use. Is it possible that the effects of the French educational system and its "civilizing mission" have created a long-lasting homophyly between the French and their former subjects, at least as regards the source of authority for and the desirability of the standardization of French? The results of this survey suggest that the francophone world may have at least three groups of second-language speakers of French: those for whom French is a foreign language and performance variety; those for whom French is an institutional variety but not the mother tongue of any indigenous group in their country; and those for whom French is an institutional variety and the mother tongue of an indigenous group in the nation. The search for good predictors of adoptive behavior may benefit from further research describing these groups.

The second survey was sent to academic translator- and interpreter-training programs in francophone countries outside France. The actual number of usable questionnaires returned (33) was divided by the number of possible usable questionnaires obtained (35), yielding a response rate of 94%.

Few schools have received or possess lists of French official terms and even fewer have policies requiring their students to use the legislated terms in all contexts. More than three quarters of the programs ( $n=26$ , 78.8%) do not have the lists at all, while 21.2% ( $n=7$ ) have acquired them in some way, whether actively or passively. The chi-square one sample test indicated that it was not probable that this distribution could have happened by chance

( $\chi^2(1, n=33) = 10.939, p = .001$ ). More schools obtain the lists on their own initiative than receive them from language-planning agencies. Most schools permit and counsel students to use terms variably. 84.8% do not require students to use only official French government terms. 84.3% permit translation students to use non-official variants of official terms and expressions in their work. 84.2% permit interpreting students to use non-official variants of official terms and expressions in their work. 78.1% of the schools surveyed permit translation students to use non-official variants when their readers might not be familiar with the official terms, indicating a lack of support for the diffusion of the official terms by translators to those who may be unfamiliar with those terms. 64.8% of the interpreter-training schools do allow use of non-official variants when their listener might not be familiar with the official terms.

Schools were asked about policy for three communicative contexts: spoken language with colleagues and clients, written language with colleagues and clients, and conversation outside the workplace. 66.7% of the schools do not advise their students to use official terms exclusively in spoken language with their clients, and 75.8% do not advise their use in conversation outside the workplace. There was more support (48.4%) from school authorities for the use of official terms in written contexts than in these other contexts. The difference in the proportion of responses among these three contexts was tested using Cochran's Q and found to be significant ( $p < .001$ ).

The *a priori* variables of sociolinguistic environment and institutional affiliation were not helpful in predicting school policy on usage, but the *post hoc* variable of language identity/affiliation did prove to be a good predictor variable. Interestingly, French identity/affiliation correlated negatively ( $r = -.416, p < .05$ ), and Dutch ( $r = .388, p < .05$ ) and English identity correlated positively with the criterion variable of school policy.

The schools with French identity were less supportive of the official French terms than the Dutch or English schools. For the respondents as a group it was determined that the schools are not functioning as active agents for the diffusion of official French lexical innovations. Out of a possible 5, the mean score of 1.181

(SD=1.57) on school policy is low. The mode of 0, with 17 schools, or 51.5% receiving that score, is striking, as is the result that the median score is also zero.

Respondents were given the opportunity to answer an open-ended question. Their answers centered on the sources of authority for lexical innovations. Canadian sources of authority were mentioned 39 times, but only by Canadians. French government sources were mentioned only 5 times.

It appears that academic programs have not been the target of French government efforts to encourage diffusion and adoption of planned lexical innovations. Nor have many of the programs attempted to support French efforts independently. Why are the programs with a French identity the least likely of all to support the French government's language-planning efforts?

At the same time, French identity is the best predictor of school policy, albeit not a policy that is supportive of or even consistent with French government language-planning efforts. One hypothesis might be that there are unresolved conflicts about who ought to be the authority—if indeed there should be one, or none, or more than one—for the planning and standardization of the French language on a worldwide scale, and these conflicts are reflected in the negative relationship. Any study that would seek to explain what is happening would have to consider who should be the authority but also where the locus of authority ought to be.

The positive correlation of Dutch-identity schools with school policy may be a sign that their receptiveness to the French government's efforts is not complicated by the issues described above. Some may not be concerned or even aware of issues involving France and its authority relationship to the francophone world. They may be quite content to accept Paris and the French government as the source of authority on French language matters. Canadian programs expressed a strong sense of loyalty to their national and regional sources of authority on the French language. It seems that Montréal and Ottawa are the *loci* of linguistic authority for Canadian programs, while others look to Paris.

The third mail survey was sent to term banks to determine whether they are providing their users with data files that

incorporate variability, i.e., planned lexical innovations and existing alternatives. An examination of Infoterm publications revealed 48 possible respondents with French-language files. The letter accompanying the questionnaire requested photocopies, printouts or translations of the entries for terms on the first list of terms that appeared in the *Journal Officiel* on January 12, 1974. In addition, it asked for a statement about the term bank's policy or practice for handling cases where more than one lexical alternative is available. Information of one kind or another was received from 28 of the 40 organizations polled; however, usable data were received from only 23 of those organizations, yielding a response rate of 57.5%.

It was found that 21 of the respondents function as agents for diffusion of lexical innovations to several thousand francophone translators and interpreters. They do not, however, restrict themselves to the diffusion of official French terms. Only two of the respondents (9%) provided official French terms exclusively on their lists, and these were located in France. All of the respondents outside France included competing lexical alternatives. It was also found that, in addition to the kind of geographical and social variability with which linguists and sociolinguists are familiar, these organizations incorporate information into their databases about the source of authority for a lexical innovation. Presumably, this information would be of assistance to those who wish to avoid breaking French law within its jurisdiction.

### *Conclusion*

The suggestion by Milroy and Milroy (1985) that weak links might well be the focus of diffusion research in the area of language change provides a useful starting point for integrating this study's findings. Due to the very nature of their work, translators and interpreters have many weak links through which they can diffuse innovations. These links are much greater than those of the ordinary person, whose links are with his or her interlocutors. They can even be broader than those of a writer or a speech writer because they cross language boundaries. The number of

readers or listeners to their translations or interpretations is approximately equivalent to the number of their weak links. Some language mediators work in numerous locations, and they are likely to have audiences whose members will return to every corner of the francophone world. Thus, translators and interpreters are in an ideal position to act as innovators, introducing innovations to others who may then be early adopters. Translators and interpreters may themselves have few strong links to any one language or cultural group because of their bilingual and bicultural status. Consider, however, their audiences. It is likely that if a text or speech is important enough that someone will pay to have it rendered into French, it will be read or heard by someone who has some sort of power or central role in a group of educated francophones. For example, when a speech at the United Nations is interpreted into French, the listeners are members of the educated francophone elite in their countries. If a popular movie or television series is rendered into French and shown to francophone audiences, then the weak links of the translator can be measured in the millions.

While from the point of view of French language planners it is fortunate that members of these professions appear to be ready to assist in the diffusion of planned innovations, the degree of variability and number of competing variants may be discouraging. Goudaillier (1987) has suggested that the planners spend more time making sure that French speakers approve of their innovations *before* they are selected, which might ameliorate this situation. It is unlikely, however, that any mechanism will be found that would eliminate variability resulting from geopolitical and sociolinguistic context. Paris is not longer the sole locus of authority for French norms.

Terminological resources provide the weak links by which terminologists diffuse innovations to translators and interpreters. Because their links can be measured in the thousands, these resources are potentially powerful agents of diffusion. In contrast, the schools are not functioning as agents of diffusion, nor does it appear that they have been part of any plan for implementing the official language policy. These schools have almost nine thousand students and over 800 faculty members. They could be influential

in shaping the attitudes of the students. While it is unrealistic to expect that they would require categorical adoption of terms in a marketplace and in sociolinguistic contexts that may demand the use of competing innovations, they could encourage the adoption of official innovations where appropriate. Such a conscious effort could result in a continuing and increasing diffusion of these innovations via their thousands (potentially millions) of weak ties.

Sociolinguistic research on translators and interpreters, especially in their role as adopters and agents for the diffusion of planned lexical innovations, is in its infancy. It is hoped that this study will encourage others to focus on these two professions. Continued research in this field will be of value to sociolinguists, language-policy makers and language planners, including terminologists and translator and interpreter trainers.

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