

Was heißt hier Fernerkundung? Translation of Technical-Scientific Concepts

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„Human beings do not live in the objective world alone, nor alone in the world of social activity as ordinarily understood, but are very much at the mercy of the particular language which has become the medium of expression for their society. It is quite an illusion to imagine that one adjusts the reality essentially without the use of language and that language is merely an incidental means of solving specific problems of communication or reflection ... We see and hear and otherwise experience very largely as we do because that language habits of our community predispose certain choices of interpretation.“.

Edward Sapir

Abstract

Although English is on the best way to become the „Lingua Franca“ in science and technology - or perhaps precisely due to this reason - there is a growing demand for technical-scientific translations, either from English into other languages or vice versa. Thus both translators and readers are faced with difficulties which sometimes interfere with straight forward communication. By means of examples the authors discuss in this paper some of the challenges posed on translators and readers and stress the importance of adopting common criteria.

Zusammenfassung

Es existiert eine gesteigerte Nachfrage nach technisch-wissenschaftlichen Übersetzungen, und zwar vom Englischen in andere Sprachen wie auch umgekehrt. Dabei sehen sich sowohl Übersetzer als auch Leser in Schwierigkeiten, die manchmal das Definieren von Begriffen und die direkte, einfache Kommunikation erschweren. Anhand von Beispielen aus Photogrammetrie und Fernerkundung diskutieren die Autoren einige der Herausforderungen, welche sich Übersetzern und Lesern stellen, unter Betonung allgemeingültiger Kriterien.

1 Introduction

Words, like human beings, are born into a society and shaped by their cultural environment. They must conform to preestablished grammatical, phonetical, orthographic, etc. patterns and rules in order to be accepted by their language community.

When words or whole concepts are translated into other languages or from other languages into our own, a new birth occurs: the lexical item or lexeme (word) must now be submitted to other linguistic rules and patterns, i. e. those pertaining to the language into which its meaning is to be transferred. This process is frequently disregarded and therefore so many synonymous expressions flourish whenever a new concept makes its appearance. It is at this point that some training in Linguistics helps „translators“ to scrutinize with true objectivity both the foreign language and their own so as to preserve, by applying common criteria, terminological precision without „polluting“ language.

How words are created and translated will be analyzed and different approaches will be forwarded for further discussion.

2 The Creation of Technical-Scientific Words and Expressions

Whenever a machine is devised or a novel technique or method is developed, when scientists discover yet another unknown phenomenon, it must be given a name and it is the privilege and the responsibility of the scientist or technician to coin the appropriate term. Rarely, if ever, he invents a completely new word: he reaches back to his old friendly linguistic background, to lexical items he is familiar with, and he manipulates them resorting to various mechanisms.

a. He uses Latin or Greek elements (morphemes) or words to form compounds, adding appropriate endings:

PHOTO-GRAM-METR-IC (English ending which marks an adjective)

PHOTO-GRAM-METR-ISCH (German ending which marks an adjective)

PHOTO-GRAM-(M)ÉTR-ICO (Spanish ending which marks an adjective)

PHOTO-GRAM-METR-IQUE (French ending which marks an adjective)

PHOTO-GRAM-(M)ETR-IA (Spanish ending which marks a noun and denotes a discipline)

b. He uses Latin or Greek morphemes or words and adds them to words in his own language:

PHOTO-APPARAT (German)

HALB-QUANTITATIV (German)

SEMI-ONDA (Spanish)

INFRA-RED (English)

INFRA-ROUGE (French)

INFRA-VERMELHO (Portuguese)

c. He uses foreign words and combines them with words in his own language:

DESKTOP-OBERFLÄCHE (!) (English + German)

RESEAUPLATTE (French + German)

RESEAUSCANNER (French + English)

IMPRESORA OFFSET (Spanish + English)

d. He combines words in his own language:

HARDWARE (English)

AEROESPACIAL (Spanish)

FERNERKUNDUNG (German)

SENSOREAMENTO REMOTO (Portuguese)

OCCUPATION DU SOL (French)

e. He uses already existing technical words and transforms them to suit his needs:

PIXEL ... MIXEL ... VOXEL

HARDWARE ... SOFTWARE ... FIRMWARE

COMPUTER ... TRANSPUTER

f. He uses a „string“ of words to describe as closely as possible his invention but, finding it too long, he shortens it using different methods and these abbreviated versions become words:

Radio Detection and Ranging = R.A.D.A.R = radar
Light Amplification by Simulated Emission of Radiation = laser

Picture element = pixel

Modulator-demodulator = Modem

g. He coins acronyms and uses them as nouns

GIS	DTM
SPOT	GPS
I/O	AP

h. He combines acronyms and abbreviations with existing words:

CCD cameras - radar emission

IR pictures - pixel analysis

GIS technology - laser printer

I/O devices

	L or G morphemes	Words in m-tongue	Foreign words	Modif. Process	Abbreviat
Latin/Greek morphemes	a	b			h
Words in m-tongue	b	d	c		h
Foreign words			c		
Existing techn. words				e	
Strings of words					f
Acronyms and Abbreviations		h	h		g

Table 1 Different approaches in the creation of words.
The letters correspond to the listing above

And what happens once he „emits“ these words? They begin a life of their own, unfolding their multiple semantic potentialities, all of them open, unexplored.

At its infantile stage a word is used and abused. Sometimes different versions coexist:

workstation - workingstation

gray scale - tonal scale - step wedge

It expands its meaning as the field it covers becomes wider; it is adopted by other disciplines and its meaning is transferred, assimilated or adapted. In summary: everybody feels free to bend it to whatever his needs may be.

„LINGUISTIC“, coined by Ferdinand de Saussure to be used in the context of human oral and written language, and „SEMANTICS“ has been adopted by image interpreters (INTERPRETER: person who gives an immediate translation of words spoken in another language - Oxford University Press Dictionary) referring to patterns and rules that govern the conveyance of meaning in digital photogrammetry. Thus, instead of creating a new word (in Medicine the concept is covered by the word „SEMOLOGY“) a new field of meaning has been added to the old one.

As time goes by and the word acquires more status (more and more people use it) the convenience of defining clearly its semantic range makes itself felt. Scientists and technicians approach this problem in different ways.

a. Some give a concise and clear definition:

„Die Geomorphologie untersucht die Oberflächenformen der Erde, das Relief, studiert und analysiert Prozesse, die zur Ausformung des Reliefs geführt haben bzw. es derzeit überformen und versucht eine zeitliche Einstufung des realen Reliefs und seiner Teile“.

F. Wieneke (ZPF 2/91)

b. Some, clarify concepts which, in spite of being erroneous, have been generally accepted:

„Si bien la designación **imagen digital** parece un contrasentido desde el punto de vista lingüístico, su uso se ha generalizado en lugar de **imagen digitalizada** que sería una expresión más correcta“.

H.-P. Bähr, 1991

c. Some just give some synonym to guide the reader and avoid confusions:

„... simulierte Buttons oder Schalter ...“

M. Gross (ZPF 5/91)

d. or they give incomplete definitions which merely serve the purpose of the moment:

„... Aliasingeffect (Falschberechnung der Farbvalenz ...)“

M. Gross (ZPF 5/91)

„... Lacken (Löffler) = salzhaltiger Flachsee ...“

Csaplovics and Senftner (ZPF 2/91)

At this point of evolution, a word can be considered to have attained maturity and with it the right to appear as an entry in our technical dictionaries and glossaries. Its meaning becomes fixed and so does its spelling as well as its grammatical, phonetic and syntactical features.

3 The Translation of Technical-Scientific Words and Concepts

So far the history of created words but what happens when a word or an expression is to be translated into another language? Who translates in the first place? Sometimes a professional translator is appointed; sometimes scientists and technicians attempt the job themselves. It should be borne in mind, however, that to fulfill the task satisfactorily a thorough knowledge of the subject is not enough: some linguistic criteria are also welcome.

A foreign language is the expression of another cultural environment. It segments reality in a different way and conveys meaning through a set of conventions and rules which are not necessarily similar to those we have internalized with our own cultural patterns. Thus, we may force meaning upon certain descriptions of events because of the difficulty of standing aside from our mother tongue which is a habit and a cultural *non-est-disputandum* (Whorf, 1949).

If we translate GIS as „Geographisches Informationssystem“ (German) or „Sistema de Información geográfica“ (Spanish) readers will be misled because what is meant by „geographisch“ in the German language covers a different semantic range than „geográfico“ in Spanish. Perhaps „Geoinformationssystem“ and „Sistema de Geoinformación“ would bring both concepts closer to the original.

Without some linguistic knowledge we are unable to see the foreign language objectively and are thus liable to be influenced by language habits of which we are not even conscious due to an unavoidable pattern of habitual thought.

A furniture advertisement in a large store in Karlsruhe (Germany) offered „Bad Design“ referring to bathroom arrangements.

On the other hand, a translator without thorough knowledge of the subject he is translating produces his own layman's interpretation of the original text and translates it cloaking concepts in words furnished by dictionaries, which are not always capable of providing him with the correct lexical item. Thus he may miss the point generating confusion and/or misunderstandings:

hardware - mercadería dura (Spanish) instead of using the same word or the technical equivalent „soporte físico“

scoria - cagafierro (Spanish) which is the obsolete synonym for „escoria“ and sounds absolutely ridiculous

Sometimes words are given different translations and these different versions coexist as synonyms during a certain time until one of them attains supremacy

while the other(s) fossilize, fall out of use and are finally forgotten (see Table 2).

Other words which originally shared a common semantic field gradually adopt different ranges of meaning within that semantic field until they cease to be synonyms (see Table 3).

English	obsolete	in use	coexisting	another language
Remote Sensing	Remote Sensing Sensoramiento remoto	Fern-erkundung	Teledetección Percepción remota	German Spanish
Work(ing) Station			Workstation(s/en) Workingstation(s/en) Arbeitsstation	German
Gray scale Tonal scale Step wedge			Escala de grises Escala tonal Valores de gris Tonos de gris	Spanish
Cluster			Cluster Nube de puntos Grupo homogéneo Cluster Kluster Punktwolke	Spanish German
Range marks			Marcas de alcance Marcas de intervalo	Portug.

Table 2
Examples of Temporary Synonyms (by obsolescence)

English	Former Synonyms	Present Meaning	Another Language
Scanning	Barrido Muestreo	Scanning Nature Scanning a picture or image	Spanish
Data processing	Procesamiento de datos Tratamiento de datos	Mechanical, electrical, computational or any other transformation of data from one form into another Systematic manipulation of data by means of a computer so as to obtain information	Spanish

Table 3
Examples of Temporary Synonyms (by divergence)

4 Photogrammetry and Remote Sensing

„Remote Sensing“ was first used in American English during the early 60's in the context of military reconnaissance systems. Specialists of different nationalities picked it up and used it as a borrowed expression in their own language for many years. In the early 70's Prof. Schwidfsky coined the German equivalent „Fernerkundung“, a creation which was generally accepted and soon made its way into the German technical vocabulary. The corresponding term in other languages was created and, so to say, „promoted“ by administrative and governmental agencies at latest with the foundation or renaming of the respective National Societies of Photogrammetry: „Société Française de Photogrammétrie et Remote Sensing“? Unthinkable!

And in almost every language we would arrive to the same conclusion. Thus, many equivalents for „Remote Sensing“ flourished in an attempt to mirror the semantic content of the expression:

Fernerkundung (German)
Télédétection (French)
Teledetectão (Europ. Portuguese)
Sensoreamento Remoto (Bras. Port.)
Teledetección (Spanish)
Percepción Remota (Spanish)
Taverzekeles (Ungarian)

„Remote Sensing“ was rejected or only reluctantly accepted by very few languages. Spanish linguists rejected the proposed „Sensoramiento Remoto“ in favour of Teledetección or Percepción Remota. „Photogrammetry“ however, entered the vocabulary of almost every language without difficulty and was easily adapted. Why is it that these two lexical items arose so different reactions?

5 Towards a Common Terminology

There will probably be general assent to the proposition that a common terminology would contribute considerably to the understanding among scientists all over the world. But he who assents often sees in such a statement nothing more than a platitudinous admission of translation difficulties on the one hand or an intent to subvert the efforts of those who try to preserve the purity of a particular language on the other. To see only thus far is to miss the point, to be blind to one of the important nodes of interconnection between language, culture, science and technology.

Scientists in the Middle Ages communicated in Latin. Nowadays they mostly communicate in English but Latin still impregnates very much scientific language and an ever growing tendency towards using words of Latin origin in learned speech is evident, not only in English but also in other languages. Therefore, a return to the sources when seeking for a new word or expression seems an interesting approach, worthy to be taken into account: scientific-technological language should not be tied to any nationality but contribute universally to the straightforward transference of knowledge.

Faced with the necessity of expressing new words or concepts, those who translate technical and scientific texts resort to different approaches:

a. They try to find words in the target language (the language into which the text is to be translated) that mirror the semantic content of the original

bit	octeto (Spanish - Spain)
computer	ordenador (Spanish - Spain)

Should new words be translated into other languages? Should the language be „scanned“ in order to find among its terminological wealth a suitable word and, eventually, expand the meaning of that word (or phrase) to embrace the new concept? Wouldn't such an approach lead to unnecessary misunderstandings? Can the linguistic characteristics of a language be preserved by rejecting foreign words?

b. They import (incorporate) words without modification into the target language

bit(s) - bit(s) (Spanish - Argentina)

pixel - pixel(s) (Spanish - Argentina)

drive - drive (Spanish)

scanner - scanner (German, but „Abtaster“, too)

Should new words be assimilated the way they come from the language that gave them birth, including the original plural forms? Should the original morphology (spelling) be transferred running the risk of mispronunciation or misspelling? Can the semantic aspect be preserved by using the same word?

c. They try to assimilate the word (or concept) to the linguistic characteristics of the target language.

bit bite(s)

pixel scannérisation

Should the new word be assimilated to the linguistic characteristics of the target language giving it a grammatical function, syntactic order, gender, plural, tense forms, etc.? Should its spelling be modified in order to conform it to the rules of the target language? Should the correct utterance of the original word be transferred by writing it according to the phonetic rules of the target language?

d. When using acronyms, they transform them according to the initials letters of the words in the target language

DTM Modelo Digital del Terreno (MDT)
 Digitales Geländemodell (DGM)

CPU Unidad Central de Procesamiento (UCP)

Should acronyms be translated?

e. they maintain the original acronyms but when writing out the expression it is translated

CPU Unidad central de Procesamiento (CPU)
PC Computadora Personal (PC)

6 Conclusion

We believe that science and the language that communicates it should be aseptic, devoid of national feelings; it should not bear the stamp of a particular country but be, like mathematics, universal. Definition and translation of words and concepts is highly correlated as we have seen. The new ISPRS Multilingual Dictionary, which is presented at the Washington Congress, therefore includes a voluminous glossary for Photogrammetry, Remote Sensing and related fields (G. LINDIG et al.)

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