ABSTRACT

The properties of German as a special language of mechanical engineering are examined on the basis of a newly compiled corpus including samples from all important disciplines and discourse styles. The syntactic, semantic, and pragmatic aspects of passive voice are the chief research goal, necessary in order to evaluate the existing and to develop new courseware. Other linguistic and metalinguistic features of the sublanguage will be investigated and transferred into teaching theory and practice.

LSP — TRANSLATION — TEACHING, CALL

What is LSP (Language for Special Purposes)? Why should it be a subject of linguistic research? How does that affect teaching? What are the implications for CALL? Research goal: To transfer the intuitive knowledge of an LSP specialist into linguistic ten-ns and make it common.

INTRODUCTION

In our world of specialization and subspecialization with partly still existing traditional division into arts and sciences with sacrosanct and institutionally defended barriers between them, we desperately need bridges. Objective reality is one, and so should be the knowledge of it. The walls that were raised between areas of knowledge were maybe necessary at a certain stage of development, but they should always be subject to the centrifugal and centripetal motion of dialectic change. The structure of knowledge is easier to change than the structure of institution.
The people who start the change have to reckon with resistance toward it. CALL people made an attack at institutional thinking, and some of them still feel the bitter consequences. In that relentless fight they have, however, learned to build bridges, to unite their efforts with other brave people from different fields in order to integrate that magnificent flow of free thought into the institution itself.

At the same time LSP people were fighting their own isolated fight until they discovered CALL. An obvious drawback of this liaison was that they were both equally ignored by the institution. An advantage was that they were able to build so many bridges to a vast number of sciences as to make them invincible forever.

In support of that I would like to tell a true story of a bridge between LSP and CALL.

LSP teachers are desperately courageous people who wander in no man’s land between language and a vast diversity of scientific disciplines to be described by the kind of language they are supposed to teach, which - both the sciences and their means of expression - they mostly do not know. They, the teachers, are a free target for both, the so called serious linguists and the specialists in those fields of knowledge whose language is at issue. As if that were not enough, LSP teachers prefer to use the computer as a teaching or learning medium. They add one more discipline to the whole lot, as if to show that they are highly aware of the interdisciplinary status of their particular subject. Indeed, the fact that they have crossed the border of traditional science divisions and faced another world of ideas makes them ready to look even further and possibly in another direction.

The question what Language for Special Purposes really is, remains yet to be answered. So far, every LSP teacher has had to develop his or her own approach, which is not only a terrible waste of time, but also a waste of many brilliant ideas that come up from teacher intuition. Unfortunately, stiff institutional frameworks have suppressed the research which has been badly wanted for years, ever since the teachers have been forced to teach LSP without having been given a fair chance to find out what it is.

My story does not differ very much from the mainstream. I started as a technical translator with very good general education and specialization in languages. Soon I discovered that my knowledge of language does not help me very much in LSP, if at all. What I could rely on was my high-school knowledge of physics and chemistry and my
colleagues, technicians who with lots of patience on both sides, tried and succeeded in teaching me the basics of technology. This is how I was able to do my job in a satisfactory way.

After several years of practice as a translator I became a lecturer of LSP at a technical university. My subject was German for mechanical engineers. With students LSP was the most detested subject, not without reason. The educational authorities of the country decided simply to make it a compulsory subject at all universities. The educational goal was to train students to read the publications in their domain. There was no serious research behind these goals. It was primarily a political decision.

The teachers found themselves in trouble. The method seemed to be dictated by the set goals: grammar-translation method. The language teachers were not trained to make more out of technical texts. The texts were selected to promote reading comprehension, and comprehension was what most teachers desperately wanted themselves.

I found the knowledge I gained as a translator most useful in this matter. I was able to pick out relevant texts which even I understood. That made interaction between me and the class possible. I did everything in my power to arouse their interest and they responded. At that time I discovered the fascination of the computer. I discovered the potential it had as a challenge for my students. So I started using it. We all had lots of experimenting with new ways of teaching and learning. The miracle occurred spontaneously as a result of interaction of different powerful factors.

I decided to use the computer where everything else failed. It was a very special and clearly definable problem. The passive voice is a grammatical structure that occurs ceaselessly in German technical texts. Contrastively, the passive voice is very difficult for Croatian learners since in Croatian there is no language immanent passive structure. The semantics as well as the pragmatics of passive had never been taught to my learners. Their teachers were instructed to follow the structuralist views, so they were under the impression that passive was equivalent to active. Having a choice between what they thought were two semantically and pragmatically equal structures they preferred of course, the active, the way of expression in their native language. Another difficulty was the fact that German passive voice is formed with the same auxiliary verb as the future tense. Add to this the particularity of the German sentence which puts a
lot of lexical information at the end, e.g. the main verb in case of either the passive voice or the future tense, and there you have complete failure to recognize the passive voice at all on the part of an intermediate stage Croatian learner of German.

After numerous failed attempts to teach them the passive voice I decided to write a computer program which would get their minds working on it. It was a neat little program based on principles of programmed learning, pragmalinguistics, and some psycholinguistic theories. As if by miracle, it did the job for me. I had enormous success in my attempts to teach the passive voice. My learners seemed to have understood what it was all about. From total lack of pattern recognition they moved into voluntary attempts to use the passive voice whenever it seemed plausible. We were all in a frenzy. The affective element played of course an equally important role. They were highly motivated, not only by the new medium, which no doubt had the charm of novelty, but also by the enthusiasm of their lecturer who made it all possible for them.

Wishing to explore that success and eventually get some support for my good work I applied and was funded to do some research into the matter. I observed a population of German learners, tested their performance before and after having worked with the program. I also tested the general language proficiency and retention. The attitude of students towards the medium was explored through questionnaire and interview. The research goal was unfortunately somewhat restricted to the efficacy of the program use. This kind of research orientation belongs to an early CALL era where the chief goal of research was to justify the costs and persuade the authorities to put some more money into it for the sake of enormous time saving, individualization, and adjustability.

I was aware of the fact that there was more to it than just the stated and generally known facts. There was for instance an implied hypothesis on the nature of LSP and the passive voice as a true element of it in that software. The computer as a medium helped me present it in an acceptable way and immediately. I did not have to wait for new linguistic ideas to influence language teaching methodology and consequently learning materials, which would have lasted at least ten years. I could transfer my intuition directly into a powerful learning device. That was the beauty of it.

Since I was to pursue my ideas about special language anyway, I decided to try and find out in what way the success of the program was connected with a linguistic hypothesis, and through that indirectly with teacher intuition.
WHAT IS LSP?

According to experts (Hoffmann, Fluck, Littmann) the research into LSP is still on the pre-scientific stage. Much research work has been done in the scope of word statistics, but all the carefully compiled corpora and sometimes even manually derived frequency lists could not replace a hypothesis on the true nature of LSP and the testing of it.

The result of this state of affairs is that there is no plausible and, in the sense of formal logic, no valid definition of LSP. A valid definition has to contain certain indispensable formal and structural elements: it is a statement which subsumes the term to be defined under a whole class of terms which have something in common with it. Not just any class would do. It has to be the closest related class, the so-called genus proximum. The second constituent element of definition is the differentia specifica, the specific difference of the defined term in relation to the class, the feature that no other element of the same class possesses.

Lothar Hoffmann, the most persistent explorer of LSP, came closest to fulfilling these stipulations. He defined special language as language used by specialists in a certain field of knowledge in order to communicate with their fellow specialists on the issues of their special field of knowledge. What we learn from Hoffmann is that special language belongs to the class "language." He does not tell us what its specific difference is. In that he makes it an attribute of intradisciplinary communication, he only determines the scope of LSP, he does not tell us anything about the essence of it. What is it then that differentiates special language from anything else that falls under the category language?

Everyone agrees that LSP is more than language itself, because the knowledge of language is not enough for an outsider to understand an expert text. What is it then that makes a familiar natural language appear so strange and incomprehensible. What prevents us from understanding the message even with the aid of a dictionary?

Semiotics teaches us that within culture we have to do with systems of signs. Culture itself is a an overall system including various subsystems like language, religion, commerce, art, science. Culture also implies interaction between the different systems, relations of superordination, subordination, and coordination. Sign systems have their evolutions, they live so to speak according to their own immanent laws of dialectic
change; they interfere with each other, superimposing a new organization method on the already organized, which is how structures of vast complexity are called into being. That we would call multiple encoding.

From the semiotic point of view one could say that special language is a result of interference of another system of signs with the lingual code. Language as it is, with its elements, lexemes, and its rules, grammar, is simply encoded again. There is a superimposed structure, another principle of organization to govern it, and that is in the first instance that of formal logic.

What happens is that the lexeme as the basic linguistic unit of meaning together with its significance — the word and its significance — the whole field of meaning is re-initiated as a significance of a new sign on a different, hierarchically higher level. The sign is called "a term" and the significant is called "definition." The cross-associative richness of the lingual sign, its mythological potential in ambiguity and vagueness is pressed into a strictly speaking binary code: genus proximum and differentia specifica, the typical and the characteristic, totally according to the logical principle of contradiction: no one thing can be both or none of two wholly exclusive contradictory terms.

Furthermore, a sentence as a language unit becomes a statement. There are strict rules about that. Not any sentence can become a statement. A question, an exclamation, an expression of hope, grief or anger cannot function as logical statements. The semantics of a logical statement is different than that of a sentence. Whereas the sentence chiefly expresses relations between certain syntactically selected lexical meanings, a statement points out to a logical value TRUE or FALSE. Logical values T/F are not immanent in natural language. In natural language nothing has either value per se. It takes an additional code, where these values are assigned to statements by convention, agreement. It takes the logical structure and the axioms of a particular science to assign a TRUE or FALSE value to a statement. As opposed to science, which is the filling of a logical structure with content, the truth in natural language is mostly only a matter of the point of view. It gains more plausibility if there is a declaration of axioms or pseudo-axioms, but that already is a prerogative of logical code, which can interact with language outside the strictly confined limits of science.
There are different theories to describe a logical statement. They all agree that a statement consists of a subject and a predicate. However, some of them are relatively new, so they could not have had a crucial influence on scientific thought, and consequently, on special language. The predicate theory is the oldest and the most widespread statement theory. It tends to describe the predicate as an argument to the subject. In the statement "The king is old" "the king" is the subject and "is old" is the predicate. We see that the verb in the sentence which expresses the logical relations between the subject and the predicate is merely a copula. It has no lexical meaning in the given context. The predicate theory cannot really cope with the lexical verb.

Research into LSP grammar has shown that there is a parallel between the structure of an LSP sentence and predicative statement. The clear tendency towards a desemantization of lexical verbs, the definition-based semantics of technical terms, as well as the rules of syllogism clearly suggest that LSP discourse encodes natural language once more, and that the superimposed structure, the secondary code, is that of formal logic.

Introducing binary logical organization into natural language does not totally eradicate ambiguity or vagueness. This has something to do with the nature of the primary code, the natural language itself, which is older than formal logic and, which still allows for analogy, contradiction, nonsense. Secondly, not all of the discourse within an LSP communication act is doubly encoded. Sometimes there are passages of pure natural language. This is only too understandable, since apart from being experts, the people involved in expert communication are still human. Besides, in an interdisciplinary environment there is sometimes a need to translate from the special language of another field of knowledge. Thirdly, there is an interference with the third code or codes, these being special fields of knowledge which are referred to. Misunderstandings may arise from the variety of fields of knowledge involved. Under these circumstances it is possible that one significant, one word or lingual sign is associated with different definitions, depending on the special area involved at the time.
Let us repeat briefly the preceding statements:

**Semiotic explanation**: multiple encoding

1. Language
2. Logic
3. Area of knowledge

**Language sign**: lexeme - significating (word)
- signified (field)

sentence - significating (words + grammar rules)
- signified (parts of fields + relations)

**LSP sign**: term -significating (lexeme)&(sentence->hope, command...)
- signified (definition->) & (statement ->.T.,.F.)
- grammatical relations become logical relations

The entropy leading to incomprehension is caused by the fact that the whole linguistic sign acts as the significant of the LSP sign.

LSP sign (information science) - technical term significant

FIELD (lexeme: 1) area of land - >"working in the ~s"
2) in compounds area of expanse->" ice-~"
3) (" gold- ~")
4) department of study "the ~ of politics"
5) range "a magnetic ~ " etc. (homonym v.)

significant (definition) "Data unit within a record"

\[ \text{genus proximum} \quad \text{differentia specifica} \]

record-> "A group of data units within a data base"

\[ \text{genus proximum} \quad \text{differentia specifica} \]

data base-> "An organized data set related to the same problem" etc. (data)

The same happens to grammar: grammatical categories become the significant or logical relations between the terms within a statement. The statement tends to be built in the manner of predicate theory:

\[ \text{S(ubject)} \text{ is (copula) P(redicat).= } \text{TRUE} \]
There are people who have a rather arbitrary objection that grammar cannot be an element of special language, that it is purely an attribute of natural language. This claim is mostly based on total inexperience with LSP and is never connected with any kind of proof. As opposed to this rather affective attitude we can say that the syntax of LSP is reincoded. It is encoded again according to statement building rules. The predicative statement type being the oldest statement type, most of the sentences in LSP discourse get reincoded as statements of predicative type with pre-agreement assigned logical values TRUE or FALSE, which according to Günther Littmann do not tell us much about objective reality, but everything about the way language is used or rather to be used. In other words, it is a prescriptive, metalingual function, and is therefore outside the natural language itself.

This is where our passive voice research sets in. The implied hypothesis in my passive tutor was that passive voice in a way also becomes an element of LSP. At the time the program was designed I was maybe not able to formulate it, but it was there. This is how I would express it today:

The passive voice is used to imitate the predicative structure of the most widespread statement type.

The house(S) is (copula) built (P).

We tried to test the hypothesis on German as a special language for mechanical engineering. The analysis was performed on a newly compiled corpus containing 463 samples of written and spoken discourse (total 50,095 words). The corpus was compiled at the Polytechnic of Bremen thanks to a research scholarship awarded to me by DAAD (Deutsche Akademische Austauschdienst). The original plan was to have it parsed and make a sentence pattern statistics. The research goal was actually to determine the passive voice frequency and distribution in the corpus and to find out if and in what way it emulates the predicative statement type. In German there are different constructions with the passive meaning. We chose several:

For organizational reasons the parsing was postponed so I had to do some pre-research work in that I analyzed the structure of main clauses in the whole corpus manually. I chose the main clauses only because they are in most cases clearly distinguishable. It would have been a time-consuming job to make distinction between clauses and phrases in a subordinate function, in addition to doing the analysis manually.
CONCLUSION

It was interesting to see that most of the active statements in the corpus had the predicative structure. As Table I shows, the use of the passive voice proved to be a conversion from sentences with lexical verbs and lexical and semantic meaning into logical statements with predicative structure and an assigned TRUE or FALSE value. This happened with verbs whose valence demanded several actants, at least a subject and an object. Since a full lexical verb with more than one actant does not comply with the predicative statement, the language was rearranged so as to produce a logical statement with a subject term and a predicate consisting of a quasi copulaic verb and an imitated nominal part (the past participle). In cases where the passive principle was carried out by some verb other than the standard passive format, the used verb was delexicalized and desemantized, forced into the conjunctive function of a copula.

<table>
<thead>
<tr>
<th>Sentence</th>
<th>Count</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Das Wasser(S) wird(copula) gepumpt(P).</td>
<td>186</td>
<td>6.95%</td>
</tr>
<tr>
<td>Die Maße(S) sind(copula) angegeben(P).</td>
<td>177</td>
<td>6.61%</td>
</tr>
<tr>
<td>Man(S) öffnet(?) die Tür(P). -&gt; desemantization of a lex. verb</td>
<td>83</td>
<td>3.10%</td>
</tr>
<tr>
<td>Sein+zu+Infinitiv:</td>
<td>49</td>
<td>1.83%</td>
</tr>
<tr>
<td>Die Maschine(S) ist(copula) anzuschließen(P).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Läßt sich:</td>
<td>15</td>
<td>0.56%</td>
</tr>
<tr>
<td>Das Metall(S) läßt sich(copula) dehnen(P).</td>
<td>42</td>
<td>1.57%</td>
</tr>
<tr>
<td>Sein+bar-lich:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Das Eisen(S) ist(copula) giessbar(P).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bleiben:</td>
<td>12</td>
<td>0.45%</td>
</tr>
<tr>
<td>Es(S) bleibt(copula) abzuwarten(P).</td>
<td>6</td>
<td>0.22%</td>
</tr>
<tr>
<td>Diese Ware(S) verkauft sich(?) gut(P). -&gt; desemantization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Es gibt:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Es(S) gibt(copula) viel zu tun(P).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL:</td>
<td>59.33%</td>
<td></td>
</tr>
</tbody>
</table>
Final results are yet to be obtained. The research however seems to confirm the implicit intuitive hypothesis on the basis of which a highly successful CALLware package dealing with the passive voice was developed. It provides linguistic reasons for its success in the classroom. To come back to the initial issues, teaching and learning is an instance of one and undivided reality, which demands holistic approach, in research as well as in the application itself. There are innumerable reasons why a computer in a language class sometimes fails and sometimes succeeds. One should be very careful about generalizations. To state simply that the computer is better than a teacher in a language class would be faticous. The research goal would have to be in what cases, given what factors, the computer is really superior or applicable at all. The answers to these questions will never be final. The development of technology will dictate new educational roles for the computer. One thing, however, will remain unchanged: the need to explore the computer as an educational medium in interaction with a number of different parameters. The content itself must determine the rôle.

REFERENCES

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AUTHOR'S BIODATA

Marina Dodigovic, MA, was a lecturer of language for special purposes at the University of Osijek. Since 1986 actively involved in the theory and practice of CALL. 1990 awarded a German DAAD research scholarship (computer-assisted research in special language of mechanical engineering; one of the goals - to develop and improve LSP CALLware). 1991 lectured LSP at the Polytechnic of Bremen. 1992 a graduate student at the University of Bremen. Author of several courseware packages. Experienced in creative use of available CALL software.

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