Lastly, ESP teachers should not be afraid to step back and leave things to their students when tackling technical aspects of the subject-matter they do not know. Of course, teachers may not participate actively in the discussion, but they should remember their role as guide and informant, and deal with the complexities arising from misuse of language. It is my belief that good teaching is the result of the overall teaching skills, savoir-faire and personality of the teacher. As far as classroom dynamics is concerned, it should not be a oneway process (teacher + student) but rather a balanced exchange between them. It should be a dialogue where each party seeks and, gives knowledge. Students seem to prefer this situation to one where the teacher seems to be holding the book of knowledge, sees himself as the fount of wisdom or shows too much authoritarianism. In addition, the teacher should adopt a noncorrective approach to his teaching, or at least should not focus too much on students' mistakes.

The proposed programme is not a finished product; I am sure it needs some polishing. The positive aspect is that the programme is the first ESP course at university level to take into account students' needs (the needs analysis was conducted through questionnaires). The course will give both teachers and students a wide range of activities at different levels of linguistic proficiency and in respect of choice of texts. It is hoped that the course will appeal to teachers and students after years of trial and error practice and groping about.

J. M. ULIJN:
SUMMARY OF AN ARTICLE ENTITLED "THE SCIENTIFIC AND TECHNICAL REGISTER AND ITS CROSS-LINGUISTIC CONSTANTS AND VARIANTS"

Teachers of a foreign language for vocational purposes sooner or later face the following questions:

1. Does a scientific-technical register represent a lexical, syntactic and textual particularity of the common language and if so, is this a reduction or an enrichment in relation to the common language? And what is to be taught to students who already have some knowledge of the common language, in order to prepare them for the type of language they will need in their future professions?

2. Does a scientific-technical register vary or does it remain constant for languages such as German, English, French and Dutch? What actually prevails: universals linked to specific aspects of the profession or variants due to the different grammatical systems in question? Universals and variants of the mother-tongue and a foreign language - how can these be taken into account in vocational courses?

Some answers to these questions can be given on the basis of comparative research between German, English, French and Dutch and between common and scientific language (within these languages), as well as on the basis of psycholinguistic experiments undertaken for French (the French text being read by French and Dutch engineering students). Briefly, these are:

- on the lexical level scientific language is a particularity of the common language in terms of an "expansion", an enrichment;
on the scientific level a reduction is to be observed. The scientific and technical community creates conceptual and textual universals between the languages the lexical means of which are partly uniform (i.e. internationalisms, Greek and Latin neologisms) and partly divergent ("faux-amis", specific terms, etc.). Syntactic means belonging to the common language vary according to the affinity of the languages in general. In most cases, universals will be more important than variants.

These analyses partly verified by psycholinguistic experiments lead to certain implications with respect to the reading of scientific foreign literature, i.e. receptive knowledge of content words will be of vital importance, syntactic function words and structures will be less important. Comparisons with the mother-tongue will only be useful if lexical and syntactic contrasts lead to false conceptual interpretations.

In a course designed to teach the scientific and technical register it will be useful to take into account previous knowledge of the CL as one would, with certain precautions, the knowledge of the mother-tongue. However, crosslinguistic variants should not be stressed too strongly. For languages such as German, English, French and Dutch it seems more reasonable to stress universals.

The implications for teaching

1. What must be taught to students already possessing some knowledge of the common language in order to prepare them for communication in a foreign language in their discipline?
2. To what extent must their native language be taken into account?

1. It is possible to distinguish differing groups of students at the very outset: those just starting their professional training and those already well advanced. In both cases students may either have some idea of the CL or be complete novices. We will concern ourselves primarily with the students advanced in professional training with some idea of the CL of the language concerned. Generally speaking students embarking on their professional training gain more in getting to the ST register in their own language, except when the language of instruction is a second or foreign language, as in some developing countries.

The teacher can mobilize these ideas of the CL by making students aware of the differences between the CL and the ST register, namely the lexical enrichment and the syntactic reduction of the ST register with respect to the CL. It can be explained that these variations are due to certain specific mechanisms: the use of technical terms, the emphasis on the action, and the expression of certain logical relations: time, cause, condition, means, concession, purpose and consequence. These characteristics exist not only at the level of the sentence but also at text level.

a) A passive knowledge of the technical vocabulary is of prime importance when reading the ST register. Although we did not verify this psycholinguistically, this knowledge must also be active if one has to express oneself. In general it is not the foreign language teacher who is competent in this specialized domain. In the third world it is the foreign scientist who, in teaching his subject, also supplies the necessary vocabulary.
In the industrialized countries, where science is taught by the natives, a close collaboration between the foreign language teacher and scientist attached to the same university is useful, as the experiments carried out at the Universities of Bath (Coveney, 1970) and Eindhoven have long shown. Teaching frequency lists on the scientific language will not work. It is more a matter of creating communication situations which are as authentic as possible, situations which automatically lead to the introduction of new concepts. This proves to be increasingly necessary as the conceptual coverage between the lists in different languages decreases (Hoffmann). This vocabulary teaching in as authentic a context as possible is to be complemented by the presentation of the specific derivation or composition procedures by which nominalizations are formed. The Greco-Latin roots, prefixes, suffixes are often known from another source. This makes it possible to recognize many words which have an international root accompanied by Greco-Latin or French prefixes or suffixes. Words with different meanings in the CL and the ST register deserve special attention. A type of exercise for acquiring vocabulary round a specific technical theme which appears to be quite original is to ask the engineering student to listen to recorded conversations, to make a sketch of, for example, the process involved in making glass and subsequently to discuss the subject in class (Coveney & Grosjean, 1974). A didactic procedure of this sort allows him to mobilize his knowledge of the discipline and that of the foreign language in order to combine them with a view to effective communication.

b) As has been demonstrated by our analysis of reading difficulties with French CL and ST words (described elsewhere) (BF or VGOS), semi- or subtechnical words which have often different meanings in the CL and the ST register (inter-linguistic "faux-amis") are very problematic. Namenwirth (1984) is therefore right to stress the importance of for instance VGOS in teaching Dutch-speaking engineering students to read French texts.

c) Syntactic function words and structures will be of less importance in teaching, but because their number is finite, it is in the student's interest to learn them systematically. For French, lexicons such as the VGOS and the list by Combes and Strauss may be useful (for English see Huddleston et al., 1968, and Cheong, 1982). They should be integrated with a grammar of the ST register, which favours certain syntactic structures and function words of the CL, as described above. This grammar will have a notional and functional character, and a formal approach. It will be suited to the needs of the scientist who wishes to understand a paper or a text in a foreign language or who wishes to present this paper or write this text himself. On the passive level the reader must be prepared to encounter a variety of lexical and syntactic means which are more or less synonymous. Here a convergent approach to a single meaning will be preferable to a divergent formal approach to various meanings. For example, one may be confronted with any of the following markers of causal relationship in a French sentence:

- Puisque/parce que comme (function word + subordinate clause) le pétrole est mobile, il se trouve en équilibre instable dans les gisements
- Du fait de sa mobilité (function word + nominalization) le pétrole (.....).
  Le pétrole étant mobile (participle construction), (.....).

Or in an English sentence a relationship of purpose can be indicated:

1. the **purpose** of the safety valve is to permit excess pressure to escape

2. a. A safety valve **is provided** so as to allow, etc.
   b. A safety valve **is provided** in order to allow, etc.

2. A safety valve **is provided** so that the steam may etc.
   in order that

(example taken from Mackey & Mountford, 1973).

With respect to active use the same examples serve to illustrate what lexical and syntactic means are available for expressing such a content, it being understood that one such means suffices. Coyaud (1972) gives an interesting inventory of these logical articulations and their linguistic forms in the language of mythology. A grammar of this sort could accompany exercises designed in the same spirit which would allow the student to strip down the scientific sentence with a view to semantic analysis or the formulation of this phrase in a comprehensible fashion. They could be aimed at comprehending or expressing notions such as cause, condition, means, concession, purpose and consequence by means of all sorts of concurrent lexical or syntactic means.

In French other identical approaches followed up by exercises have been adopted by Masselin et al. (1971) and by Aupécle and Alvarez (1977) in the analysis of a number of examples of teaching materials produced in a variety of countries, particularly in South America (see especially the expression of condition in a course of technical French compiled in Argentina pp. 77-82). As for the English we may cite the English Studies Series for written comprehension (volume 7 Chemistry by Hawkins et al. is particularly worth examining) and the English in Focus Series for comprehension and written expression (see for example English in Physical Science by Allen & Widdowson, 1974).

d) The expression of different notions not only takes place within the sentence, but also between sentences. Mackey & Mountford (1973) mention 2 adjectives, 5 nouns, 2 verbs and 10 conjunctions for expressing cause or consequence in English at the sentence (phrastic) level as well as 7 adverbs and 4 noun phrases for doing the same thing at the textual level. The
exercises can be built into paragraphs and even into complete texts in order to make students aware of the differences between the structures of a CL and ST text. All the lexical and syntactic elements can come in here, as suggested by Descamps et al. (1976). They suggest exercises on nominalizing to the maximum a text taken from his geological corpus, in order to achieve a sort of telegram style. The teacher can bring the competition between various syntactic means to the attention of students, by requiring them to examine the same content in a simplified linguistic form and a difficult authentic form. The first text allows students to become familiar with the content, while the second text draws the attention to the more difficult formulations (see Coulon et al. 1972, who apply the procedure systematically). To the extent certain textual "skills" specific to the ST register are not acquired in the native language, they may be taught either in L1 or L2. Moirand (1977) gives some examples of sociolinguistic, linguistic, and logico-syntactic approaches for analyzing the text of a leaflet, a pharmaceutical folder, a business letter and so on. Here formal markers, modalities and figures of speech must be recognized. In general, the confrontation with the real communication situation in a scientific and technical domain allows the teacher and student to take the differences between the CL and the ST register into account.

2. A knowledge of the foreign CL is not the only factor which may facilitate or hinder learning the ST register, the same goes for a knowledge of the native tongue. The role of the native language should not be ignored when encouraging comprehension or oral or written expression of an ST register. When inter-linguistic similarities predominate, as a result of the unifying role of the profession, it is worthwhile to stress them, rather than to point out the contrasts. To resume these are: a) the number of internationalisms, b) the Greco-Latin procedures of composition and derivation, c) nominalization, d) the stressing of the action, e) constructions with participles and infinitives, f) the preponderance of the present, g) the simple structure of the sentence, etc. Certain phenomena of a conceptual nature inherent in the ST domain may well have parallels, lexical and syntactic solutions to express them will not be more than partially divergent from one language to another. Their existence cannot be ignored; certain technical terms, procedures for coining new words, syntactic function words, and procedures for highlighting the action. They often enter the CL and are worth close attention, particularly on the lexical level, e.g. with respect to faux-amis which are most common when languages are similar (English and French on the one hand, Dutch and German on the other). Didactic attention does not necessarily mean that languages must be a priori compared with one another. Often the exercises implying these phenomena will be enough, followed up by an explicit crosslinguistic grammatical explanation, if mistakes requiring correction are made. This may be done with the aid of a constraint diagram such as we have proposed (Ulijn, 1978, p. 51). In reading, comparison with the native tongue will only be useful in the event of lexical and syntactic contrasts which could lead to errors of conceptual interpretation. From this it follows that exercises such as translation which compare the entire sentence are not advisable (see also the Ulijn and Kempen experiment, 1975). Pupils will then spend time on unravelling
syntactic problems which hardly ever hinder the comprehension of the text.
In contrast to the comprehension process, that of expression cannot miss any choice of morphological markers and a word order. As the syntax is limited, it is not too difficult to teach this on the basis of L1, particularly with a view to expression. Here a certain amount of judicious translation can be useful.

The attempt by Meijers (1978) to design a self-teaching system is interesting in this respect. It is a course of grammar intended for preparing (future) scientists for a congress held in French; that is to say understanding a paper, asking questions, and taking part in a discussion, all in the context of their speciality. A self-evaluation system is also proposed: students must translate from Dutch (L1) into French (L2) either in oral or written form a list of sentences in which the words are given in the "neutral" form (infinitive, masculine, singular) and in an incorrect order. Morphology and word order can be tested this way.

In a course intended to teach the ST register it is best to take account of prior knowledge both of the CL, and - with care - of the knowledge of the native language. However, it should be preferred not to dwell too long on cross-linguistic variants. For languages such as German, English, French and Dutch it is more profitable to highlight the constants.

Editor's note:

Author Ulijn's article is accompanied by a 10-page bibliography which may be obtained from the author (or from the LSP Centre, The Copenhagen School of Economics) upon request.