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A Study of Specialized Terminology: the Problem of Technical Terms*

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Digest of a report describing a set of terminological studies mostly concerned with the comparison of Japanese with English, German, French, Russian and Chinese terms. The terminology in enterprises was also investigated as well as the sentence structures and the changes in the terminologies of some fields. A German version of this report is being prepared for publication.
(I.C.)

1. Introduction

1.1 The Scope of Technical Terms

'Technical Terms' may be defined as words used only by specialists in contrast to those used by average persons in non-professional walks of life. While 'ergative', 'affricate', and 'isogloss' belong undoubtedly to linguistic terms, 'comma', 'word' and 'dialect' are not considered terms but simply words of daily use. However, this definition cannot explain the fact that many such common words are also found in technical dictionaries for specialists. A dictionary of linguistics will therefore contain items such as 'comma', 'word' and 'dialect'. We will also find items such as 'mountain', 'river', and 'plain' in a dictionary of geology.

Another definition of 'technical terms', therefore, is necessary: namely, words used to express the concepts of a special field, whether or not they are also found in common usage. 'Dialect' and 'mountain' are technical terms in this sense. Technical terms according to the first definition are generally excluded from ordinary language dictionaries. Technical dictionaries on the other hand explain the concepts designated by technical terms in the second sense, as distinct from the meanings of the everyday words that may be used.

1.2 The Importance of Technical Terms in Modern Japanese

The rapid growth of modern language is due mainly to the growth of specialized terminology. A comparison by J. Dubois et al. of two editions of Petit Larousse showed that the net increase in technical terms is greater than the net increase in general vocabulary. A similar result was obtained from research on Kenkyusha's Japanese-English Dictionary.

* Summary of National Language Research Institute Report 68, 1981. 286 p.

	general words	chemistry	zoology
increase	36.4	14.9	9.1
decrease	61.2	8.7	3.2
	− 24.8	+ 6.2	+ 5.9

	technology	sports
increase	6.1	6.1
decrease	10.5	1.4
	− 4.4	+ 4.7

	medicine	botany	politics & economics
increase	5.6	4.7	4.7
decrease	2.3	4.1	2.7
	+ 3.3	+ 0.6	+ 2.0

	art	math & physics
increase	4.4	3.5 . . . (%)
decrease	1.4	1.4 . . . (%)
	+ 3.0	+ 2.1

Progress in science does not necessarily cause changes in the meanings of words. But sometimes a word changes its use because of changes in scientific concepts. For example, it once might have sounded funny to say "fish and whales" because "whales" were considered a kind of fish, as the German word "Walfisch" indicates. But today everyone knows that whales are mammals and not fish, and the expression therefore seems quite acceptable. In this way, the progress of science contributes not only to the increase of technical terms but also to changes in the meanings of common words.

2. International Comparison of Scientific Terms

2.1 Comparison with English

1000 items along with their English equivalents were chosen from standard terminology lists of 10 specialized fields, 100 from each field. Their relationship with 5000 basic words in both languages was then examined. The "distance" of these scientific, engineering and technological terms from the basic vocabulary was shown to be as follows (on a scale of hundred, 100 would signify total difference and 0 complete coincidence):

	mathematics	physics	chemistry
Japanese	61.5	60.0	72.0
English	32.5	29.5	48.0

	electrical engineering	mechanical engineering
Japanese	59.5	55.5
English	22.5	26.5

	aeronautics	architecture	zoology
Japanese	57.5	54.0	70.0
English	17.5	22.0	69.0

	botany	odontology	(average)
Japanese	72.0	78.0	64.0
English	59.0	45.5	37.4

2.2 Comparison with Other European Languages

65 physical terms were selected along with their equivalents in 4 European languages. The "distance" of these scientific terms from the basic vocabulary is as follows:

Japanese	63.8	English	31.5	French	36.2
German	40.8	Russian	46.9		

2.3 Common Elements in European Technical Terms

38 of the 65 physical terms share common elements in the four European languages. The number of items with common elements are:

Eng.-Fr. 57	Eng.-Ger. 45	Eng.-Rus. 44
Fr.-Rus. 42	Fr.-Ger. 41	Ger.-Rus. 41

2.4 Comparison with Chinese

Although many scientific terms were composed in Japan, most of them have Chinese roots and are generally written in Chinese compound characters. Many scientific terms in Chinese differ phonetically from Japanese but have written forms which are identical or similar to the Japanese. Among 62 physical terms, 26 have the same written form in Chinese and Japanese while 22 are similar to the relationship between French and English terms.

2.5 The Role of Chinese Characters

Chinese characters (ideograms) used in Japanese have two kinds of pronunciation: on reading – the Japanese adaption of the Chinese sound – and kun reading – the corresponding pure Japanese. Therefore, a number of scientific terms which appear in Japanese as Chinese loan words are somewhat easier to understand because the ideograms themselves are already associated with the sounds and meanings of pure Japanese words, i.e. words which originated in Japan.

3. Terminology in Enterprise

3.1 Business Terms

A comparison of two companies (Hitachi and Nittetsu) showed considerable difference in the terms each used for business items. The following is a part of the results.

		Hitachi	Nittetsu (%)
computer	"kompyūta"	63	35
	"densanki"	20	53
cash	"genkin"	73	49
	"kyasshu"	25	49

Moreover, this degree of difference was greater than the degree of difference in the terms used by the various strata or specialized fields within each company. For instance, one might have expected that Field A and Field B within Company X would differ greatly in their use of technical terms. The same would have been expected for Field A and Field B within Company Y. However, the actual results showed that the greatest difference in terminology exists between the companies themselves. This comes from the fact that Japanese employees usually remain in their original company until retirement and seldom transfer to another company. Instead of class dialect or occupational jargon, "company dialects" are now arising in Japan.

The existence of a "company dialect" is not usually overt within a company and is rarely noticed as such. But when an amalgamation of enterprises occurs it becomes obvious and can cause actual problems. For example, when two big banks were unified in 1971, the differences in terminology used in these banks, unnoticed before, surfaced during the merger and an internal pamphlet, "A List of Unified Terms", was issued after the two companies had amalgamated.

3.2 Mechanical Terms

The use of standard terms relating to machinery is spreading among junior workers and office clerks whereas senior workers still use non-standard terms. On a scale of standardization from −14 to +14, the highest level of 4.27 was reached by junior office clerks.

	average rating	range
foreman	−0.32	−7 – 3
senior worker	0.82	−5 – 7
junior worker	3.03	−7 – 11
senior office clerk	4.09	−3 – 9
junior office clerk	4.27	−1 – 8

4. Vocabulary and Sentence Structure in Technical Texts

4.1 Terms in Technical Texts

As we stated in Section 1, 'technical terms' can be defined in two different ways. According to the first definition, technical terms (as words used by specialists but not in daily use) are lexical forms not found in ordinary dictionaries. To operationalize this definition, we used two dictionaries as standards: one with about 4 400 items (A1) and the other with more than 60 000 items (A2). For the second definition, we treated as technical terms all words defined in technical dictionaries (B). The percentage of technical terms found in a paper on machinery varies according to the standard used, as follows:

A1 – 27% A2 – 2% B – 23%

The range of variation from the minimum ratio to the maximum ratio of technical to non-technical terms in several texts taken from different fields, all judged on the basis of standard B, is shown below:

machinery	15 – 42
zoology	27 – 38
economics	5 – 15
go (game)	12 – 47
baseball	3 – 29
sumo (wrestling)	7 – 21
dress	17 – 35
cooking	3 – 35

4.2 Sentences in Technical Texts

To investigate the structure of sentences in technical texts, 100 sentences each from the following three types of materials were compared: a textbook of mechanical engineering, novels and scenario dialogues.

a) The technical text has longer sentences than the other materials.

	(number of words) average	range
technical text	17.0	4 – 57
novels	9.8	2 – 27
scenarios	4.5	1 – 20

b) The technical text has more complex sentences.

	one-word sentences	simple sentences	complex sentences
technical text	0	46	54
novels	0	56	44
scenarios	16	60	24

c) The subjects of sentences in technical texts are often generalized (cf. "one" or "they" in English) and are more easily dropped than in novels, though sentences without explicit subjects are quite common in dialogues.

	with subjects	without subjects
technical text	79	21
novels	87	13
scenarios	30	70

d) Nouns predominate in the technical text.

	nouns	verbs	others	(%)
technical text	57.6	29.0	13.4	
novels	51.3	33.6	15.1	
scenarios	45.3	27.6	27.1	

5. Technical Terms So Far Overlooked

Technical dictionaries for various fields do not contain all terms in current use. This is especially true with regard to verbs and adjectives. This attitude would be justified if the corresponding nouns were explained. But even where such nouns are lacking, verbs and adjectives do not appear as items in technical dictionaries. On the other hand, dictionaries of the standard language are edited upon the basis of examples taken mainly from literary works and do not pay enough attention to the expressions peculiar to some special fields. In this chapter examples from mechanical engineering texts are cited and some distinctive features of word structure in this field are observed.

6. Changing Technical Terms

6.1 Changes in the Terminology of Mechanical Engineering

In the process of modernization, Japan had to introduce science and technology developed in the Western countries. Japanese scientists, engineers and teachers suffered not only from the lack, but also, in some cases, from the abundance of terms to be used in a translation. Many English–Japanese dictionaries and lists of technical terms were published in order to give proper Japanese equivalents or to unify the words already used in translations. Four lists in mechanical engineering which appeared in 1888(A), 1901–1924(B), 1932(C) and 1955(D) respectively were compared to identify all the Japanese equivalents of the same 159 English items. The similarity between the four lists, that is, the percentage of the items which contain the same Japanese equivalents are given in the following table.

B	33.3		
C	30.8	85.5	
D	28.9	59.7	67.9
	A	B	C

The change in this field (and perhaps also in other branches of technology and science) is so great that the similarity between A and D does not reach 30%. Though D is a standard list and some words in A which are not included in D are still used, 42.4% of the terms in A seem to have disappeared from modem Japanese.

The change in percentages of the terms according to their origin shows that the main trend is a shift from Sino-Japanese to European (in most cases English) loans. However, to this day almost half of these terms are Sino-Japanese words.

	pure Japanese	Sino-Japanese	loans from European languages	hybrids	(%)
A	13.6	79.9	0	6.5	
B	29.8	36.4	7.6	26.2	
C	29.4	38.0	11.3	21.3	
D	20.0	42.1	21.0	16.9	

6.2 Changes in Sports Terms

Many English terms were introduced along with various sports over the past 100 years. From the very beginning few of them were translated. Most entered the Japanese language directly as loan words. Therefore, the Chinese-European shift which took place with scientific terms didn't occur. Below are percentages of terms listed according to their origins in various sports:

	pure Japanese	Sino-Japanese	loans from European languages	hybrids
sumo	63.9	8.4	0	27.7
judo	47.0	27.5	0	25.4
wrestling	31.7	6.5	46.7	15.1
skiing	4.2	24.3	59.2	12.4
baseball	0.9	14.8	80.1	4.2
tennis	0	3.0	94.5	2.5

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