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「第12回専門用語研究会シンポジウム：東アジアにおける専門用語研究の新しい動向」から
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専門用語研究会
Japan Terminology Association

第12回専門用語研究会シンポジウム
東アジアにおける専門用語研究の新しい動向

専門用語研究は，従来ヨーロッパ諸国で積極的に行われてきました。1990年代に入り，東アジア地域，特にわが国および中国，韓国など母国語で漢字を用いる国において積極的かつ大規模な研究・開発が行われつつあります。1997年には，これらの国の国際的な専門用語の統一化や文書の電子化を中心に向けた研究団体として，モンゴルなどを含め，EAFTerm（East Asia Forum on Terminology）が組織され，第1回の会議が中国で開催されました。2001年には，EAFTermは日本で開催される予定になっています。

以上のような趣旨のもと，1999年11月13日（土），国立国語研究所（東京都北区）にて，約60名の参加者を得て，標記シンポジウムを開催しました。

当日は，上述の東アジア地域での専門用語研究の進展に鑑み，中国，韓国からの4名の特別講演者を招き，電子辞書開発および専門用語の最新のトピックスについて講演をいただきました。

本号では，その後会誌用に大幅に修正・加筆をいただいた1件（宋）と予稿集からの転載6件（細野，影浦，JIAO Yung，全，手塚，藤原），および，当日特別参加されたC.Galinski氏から本誌に寄稿がありましたので，あわせて掲載します。

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概念間の全体一部分関係に関する一考察

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1.　はじめに

ターミノロジー、情報検索用のシソーラス、オントロジーの分野では、概念やことばの研究はきわめて重要であり、種々の取り組みがなされている。特定の概念やことばを理解するには、他の概念やことばとの関係を把握することが不可欠であるが、こうした関係の把握は、それらを処理する目的と密接に関わるので、その捉え方も多様である。たとえば、ターミノロジー、オントロジー、情報検索シソーラスでどのような関係を重要とみなすかは、必ずしも一致するわけではない。

概念間やことば間には種々の関係が存在するが、そのなかでよく取り上げられるのが、類種関係と全体一部分関係であろう。類種関係はその特徴の分析が比較的十分行われているため、この関係に関しては共通理解がなされているといえる。それに対して全体－部分関係は重要さが指摘されているにもかかわらず、その特徴の把握は、十分であるとはいいがたい。そこで以下では、全体一部分関係を中心に概念間の関係について考察する。

2.　関係の種類

概念はその定義あるいは呼び名である用語とは不可分であるので、概念間の関係と用語間の関係とは多くの点で重なる。また概念間の関係として何を考えるかは、分野によって異なる。

2．1ターミノロジー

ターミノロジーの分野で概念や用語間の関係を扱う代表的な文書は、ISO/DIS704とISO/DIS1087-1であるが、そこでの関係は、階層関係(hierarchical elation)と連想関係（associative relation）の2つが規定されている[1),2)]。このうち、階層関係は、さらに類種関係（generic relation）と全体一部分関係（partitive relation）に細分されている。

概念がある特定の分割基準に基づいて細分されるとき、元の概念は上位概念（superordinate concept）、細分によって新たにできる概念は下位概念（subordinate concept）と呼ばれる。また、同じ分割基準によって細分された同レベルの部分概念同士は、同意概念（coordinate concept）と呼ばれる。

下位概念が持つ内包に上位概念の内包が含まれ、それに加えて一つ以上の区別特性（delimiting characteristics）を持つ時、その上位概念と下位概念との間に類種関係が存在する。この関係における上位概念は一般概念（generic concept)、下位概念は特定概念（specific concept）と呼ばれる。

全体一部分関係は、上位概念が全体をそして下位概念がその全体の部分をそれぞれ表現するときに存在する。この関係においても上位概念と下位概念が存在するが、それらは包括概念（comprehensive concept)、および部分概念（partitive concept）

＊　慶應義塾大学

と呼ばれる。

一方、連想関係は、経験からテーマ的なつながりが概念間にあるときに存在する関係と定義されている。したがって、連想関係には種々のものが考えられる。たとえば、ISO 704で示されている例には、容器（鉛筆入れ）－中味（鉛筆）、活動（書く）－道具（鉛筆）、原因（湿気）－結果（腐食）、生産者（パン屋）―製品（パン）、継続時間（時間）―測定器具（時計）、職業（画家）―商売道具（絵筆）や、原料－製品、行為－道具、量－単位、物資－特性、物資－状態、行為－目標、行為－場所、行為－行為者などがあげられている[1]。なお、1087-1では、連想関係は時間や順序に依存する継続的（sequential）関係と、原因・結果の関係を示す因果的（causual）関係に分けられており、さらに、継続的関係の下位に時間的（termporal）関係があげられている[2]。

2．2オントロジー[3]

知識処理の分野におけるオントロジーは、知識を構築する際に用いられる基本概念の体系的記述をいい、それに基づいて記述された知識は一貫性を持ち、他人が記述した知識の理解を容易にするといわれている。オントロジーは、概念の定義の集合と関係の定義の集合とから構成され、関係の記述は重要な意味をもつ。

この分野では、概念の体系化に用いる基本的な関係として、類種関係と全体一部分関係が規定されている。類種関係は、知識処理やオントロジーの分野での概念処理において基本的な関係であり、ISA関係あるいはAKO（a kind of）関係とも呼ばれる。全体―部分は、ある概念とその概念の構成部分にあたる概念との関係と定義されており、part-of関係とも呼ばれる。

2．3シソーラス

シソーラス分野での関係の規定は主として用語間であり、概念間の関係は直接には扱っていない。この分野での関係を規定するガイドとなっているのが、ISO2788である。ISO2788では、関係の種類として、同等関係、階層関係、連想関係が規定されている[4]。同等関係は同じ概念を表現する用語間の関係を示すものである。階層関係は、さらに類種関係、階層的全体―部分関係、例示関係に細分されている。そして、階層関係にある語は上位語および下位語と呼ばれる。なお、階層関係は、シソーラスのみならず、分類法、件名標目表など図書館・情報学の分野においてはきわめて一般的な関係であり、よく使用されている。また、連想関係は、同じカテゴリーに属する用語間、および異なったカテゴリーに属する用語間で規定されているが、その中には全体―部分関係も含まれ得る。なお、連想関係にある語は、関連語と呼ばれる。

シソーラス分野での関係の規定は、他の二つの分野ほどは厳密ではない。これはシソーラスが効果的な情報検索を保証するための道具であり、実践的な色彩が強いからである。したがって全体―部分関係の規定も部分的であり、細かい区別はなされていない。

3．　全体―部分関係

全体―部分関係は meronymy、そして全体の構成要素となる部分は、meronym とも呼ばれる[5]。たとえば、腕は身体の meronym である。また、同意関係にある腕と脚は co-meronym と呼ばれる。

3．1ターミノロジー

部分概念には、次のような特徴がある[1]。

- 本質的部分概念：包括概念を構成する際に不可欠（必然）となる部分概念で、包括概念の本質的な特徴を持つ概念
- 非本質的部分概念：包括概念の本質的な特徴を形成せず、その存在が任意あるいは選択的である概念
- 区別機能(特性)を持つ部分概念：本質的部分概念であるだけでなく、全体（包括概念）を他の同様な包括概念と区別する役割を果たす概念

シャープペンシル（mechanical pencil）を例にとると、その部分概念として、胴体、芯送り機構、替え芯、替え消しゴム、止め金具、指柄がある。このうち、留め金、消しゴム、指柄は、すべてのシャープペンシルに付いているわけではないので、非本質的な概念である。それに対して胴体、芯送り機構、替え芯は、本質的である。そして芯送り機構、替え芯は、区別機能をも持つ部分概念である。これらによって、シャープペンシルとボールペン、万年筆、鉛筆などの他の筆記用具との違いが規定されるからである。

また ISO704 では、シャープペンシルの部分概念である芯送り機構、替え芯、替え消しゴムは、完全な外延を持つが、胴体（barrel）はそうでないとしている。これは胴体（barrel）が概念的にシャープペンシルに固有ではなく、他の筆記用具にも barrel を持つものもあるからである。

3．2オントロジー[3]

オントロジーにおいて全体一部分関係は、概念定義(クラス)とそのインスタンスで捉えられる。そして概念定義（クラス）間の全体一部分関係は、インスタンス間に成立する全体一部分関係を規定しているのみで、クラス間にはインスタンスのような実際の全体―部分関係はない。概念Ｘと概念Ｙの間に全体一部分関係があるとき、概念Ｙはインスタンスｘと全体一部分関係にあるインスタンスｙのクラスを規定しており、クラス制約とよぶ。

全体―部分関係の記述には、部分概念そのもの、部分概念のクラス制約、部分概念の役割を表す概念（ロール概念）の３つを考える必要がある。このうち、クラス制約は、全体にあたる概念のクラスをインスタンス化する際に、そのインスタンスになり得る概念(インスタンス)のクラスを表している。たとえば、夫婦と男性の間に全体（夫婦）一部分（男性）という関係がある場合、男性がクラス制約となり、夫婦のインスタンスが男性クラスのインスタンスを部分として持つことを表している。一方、ロール概念は、全体概念からみた部分概念の役割を示し、ある“もの”がある状況のもとで、果たす役割を捉えて概念化したものである。たとえば、男および女は、それぞれ夫婦の部分概念であり、家族の部分概念でもあるが、その際夫

や父親は、男という部分概念を規定するロール概念となる。

3．3シソーラス

全体―部分関係のうち、身体の組織と器官、地理的場所、学問分野、階層的社会構造の4つは、階層的全体―部分関係としてあげられている。これらは類種関係に近い関係にあり明確に区別することは難しい。なお、特定の主題領域に限定されるようなシソーラスにおいては、通常は連想関係で捉えられている全体－部分関係を階層関係で表現することが可能である[4]。たとえば、タービン工学に特化するシソーラスでは、TURBINES、COMPRESSORS、BLADES のような階層関係を考えることができる。しかしこうした便法は、部分名によって全体名が類推できるような限られた分野以外では使用しないよう求められている。たとえば、一般的なシソーラスでは、BLADES のような用語は、意味的に複数の捉え方がなされるからである。

ISO 2788 では、全体－部分関係は、4つの種類を除きほとんど言及されておらず、実際に使用されていない。また、その特徴に関する考察もない。デスクリプター(用語)間の関係としては、あまり重要視されていないといえよう。

4．　全体―部分関係の把握に関わる問題

全体―部分関係は、演繹的に決定することも、また各種の事例・用例から帰納的に導き出すことも可能であろう。たとえば、Iris 等は Webster's Seventh Collegiate Dictionary の用例を対象に全体―部分関係を抽出したが、これは帰納的に導く例である[6]。この試みでは、機能的な構成要素（例：自転車とその車輪）、ある物とその一部分（例：パイとその一切れ）、集合とその構成員（例：群れとその一員）、集合とその部分集合（例：果物とりんご）の4つが、全体―部分関係として捉えられている。このうち最後のカテゴリーは、概念的には類種関係であり、全体―部分関係ではない。それにもかかわらず全体―部分関係として捉えられているのは、用例でのことばの表現が、この関係を表しているからである。つまり、ことばのレベルでの全体―部分関係といえよう。

これは、全体―部分関係の意味や扱いが必ずしも明確に規定できないことを示している。実際こうした問題点はしばしば指摘されている[6]。オントロジーにおいても同様であり、たとえば、全体―部分関係に関して選択されるロール概念は、必ずしも一意ではないといわれる[3]。

シソーラスでは、前述した階層的全体―部分関係における4つの例以外の全体―部分関係は、通常全て連想関係と捉えており、こうした関係にある用語は、上位語あるいは下位語ではなく、関連語と呼ばれている。しかし、もし部分の名称が全体の名称を暗示するような特定分野でシソーラスを作成する場合には、全体―部分関係を階層関係として扱うことを認めている[4]。したがって、前述したタービン工学分野のシソーラスでは、BLADES を COMPLESSOR の関連語ではなく下位語とすることができる。COMPLESSOR と TURBINES との間でも同様である。しかし、これは、シソーラス分野では、全体―部分関係の適用そしてこの関係の捉え方があ

いまいであることを示す顕著な例である。

ターミノロジー分野においては、全体—部分関係の把握の困難さが指摘されている[1]。例として、ある概念の部分概念を完全に分析することの困難さが暗示されているが、それは概念とその呼び名（designation）との間に存在する言語依存的特徴が、全体—部分関係の規定に影響を与えるからである。そして部分概念がその包括概念にとって固有でないならば、部分概念の外延や本質的な特性を完全に記述することはできないとし、さらにある概念が全体—部分関係で定義され得るのは、その概念の完全な外延と本質的な特性が決定されているときのみであるとしている。

前述のシャープペンシルの例では、その部分概念として胴体（barrel）があげられているが、英語の世界では barrel はシャープペンシルに特化した呼び名がある固有な概念ではなく、barrel という概念の外延を構成する要素群の一部分を形成しているにすぎない。したがって、barrel の完全な外延を得るには、類種関係でシャープペンシルよりも上位の概念である筆記用具の元で、barrel を分析することが必要である。これは全体—部分関係を使用して barrel を定義する場合には、問題が生じることを示している。

5． おわりに

全体—部分関係は、概念間およびことば間の関係を把握するための方法として重要であり、前述したように種々の分野で使用されている。しかし、この関係の特殊さおよびその特徴に関して十分論議がなされているとはいいがたい。たとえば、概念の推移性が推論に不可欠であることを考えれば、オントロジーの分野でこの関係を使用する場合には、推移性の有無が大きな問題になろう。

また、一般に全体—部分関係が、概念を理解するための基本的な関係であるのかどうかについての深い考察も必要である。さらに、barrel の例で示されるように、この関係の言語依存度がどの程度であり、それがどのような影響を及ぼすかも、分析する必要がある。全体—部分関係は、言語に依存せず概念間のみで捉えることのできる類種関係とは、大きな違いがあるように思われる。

1) ISO/DIS 704. Terminology Work – Principles and Methods. Revision of second edition, 1999. 39p.
2) ISO/DIS 1087-1. Terminology Work-Vocabulary- Part1:Theory and Application. 1999. 31p.
3) 古崎晃司他．オントロジー構築利用環境の開発—関係およびロール概念に関する基礎的考察—，人工知能学会研究会資料（SIG-KBS-9803-3(3/23).p.13-18.
4) ISO 2788. Documentation – Guidelines for the Establishment and Development of Monolingual Thesauri. Second ed. 1986. 32p.
5) Radford, Andrew and others. Linguistics : An Introduction. Cambridge University Press, 1999. 438p.
6) Evens, Martha Walton. Ed. Relational models of the lexicon; representing knowledge in semantic networks. Cambridge University Press, 1988. 390p.

専門用語研究 №19, 6～12 (2000)

The Study of Terminology from Application to Theory — Contributions of Automatic Term Recognition —

専門用語研究の応用から理論へ — 自動専門用語抽出の貢献 —

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要約

これまでの多くの専門用語「の」「理論」には、二つの問題がある。第一は、最近多くの人により指摘されはじめたが、研究の視点が規範的過ぎることである。これは例えば「概念」という概念の規定に典型的に見られる。第二は、専門用語「の」「理論」が専門用語「の」「理論」であるかどうかについてよくわからない状態にあることである。本稿では、後者の問題、すなわち、専門用語の理論が専門用語「の」「理論」であるための可能性の条件に踏み込むための一つの出発点としての、自動専門用語抽出という応用の意義を簡単に整理する。

1 Introduction

Most of the so-called 'theory' of terminology has two shortcomings. The first, most typically observed in the so-called "Vienna School of Terminology" (e.g. Felber 1984; Picht & Draskau 1985) is that the way in which the study of terminology is viewed is prescriptive and too restricted, and descriptive devices such as 'concepts' are not rich enough. Many researchers have recently begin to point this out (Cabré 1995; Zawada & Swanepoel 1994). Temmerman (1997) is a current breakthrough in this respect.

The second problem, to which this paper is devoted, is concerned with the status of the 'theory' *per se* with respect to the terminological phenomena. In the traditional 'theory' of terminology, there is no guarantee in the 'theoretical' framework that the statements or descriptions obtained by analysing terms as empirical data can be claimed to be *about* terms and/or terminology *de jure*.

This point is essential for the study *of* terminology. I have pursued a detailed argument concerning this point (Kageura, to appear), as this simple but nevertheless *important* point seems to have been much neglected among the people who do research in terminology.

In this paper, I first briefly summarise the second problem, and then I discuss the possible contribution of application-oriented studies of terminology, such as automatic term recognition, to the theoretical study of terminology.

The simple contention in this paper is: as far as the study of terminology is concerned, those who do not understand the implications and technicality of the application-oriented non-prescriptive studies of terminology, *including their deficiencies*, might well not understand what the theory 'of' terminology is in the first place. Note that in this paper the word 'terms' is used in a restricted sense and is synonymous with 'technical terms'.

2 'Theories' 'of' Terminology

In this section I describe the basic problem of the study of terminology and clarify some necessary conditions under which 'theories' 'of' terminologies can be developed.

2.1 Basic Problems

One of the favourite questions of many of the 'theoreticians' of terminology is "What is a term?" (Condamines 1995; Desmet & Boutayeb 1994; Felber 1984; Miyajima 1981; Picht & Draskau 1985; Shelov 1982; Wüster 1959/60). One of the most common definitions of a term is "a lexical unit which represents a concept (of a domain)" which is no more than a straightforward tautology if it is not simply incorrect (Kageura 1999a, 1999b). Though getting into tautology at the critical moment is unavoidable, if we cannot obtain anything *in between* two ends (as in the case of 'concept' and 'term'), the basic framework of the study should be reconsidered.

What is needed for a theoretical study 'of' terminology is, first and foremost, a clarification of what a 'theory' is, not what a term is. When a question concerned with the latter is raised, investigations to answer the question presuppose that terms are already recognised as *empirically observable objects*. But what should be asked with respect to the theory is how we can talk about 'terms' or 'terminology' theoretically *in the first place*. This is a nominalistic problem.

Of course, it is logically necessary that the concept 'terminology' be already consolidated in the latter case as well. So it is in any case necessary to begin from a point where either the concept 'terminology' is already consolidated temporarily or the range of terms or terminology as empirically observable objects are procedurally determinable to a certain extent.

However, when we ask a question about the conditions of the possibility of terminology (here I mean *logical* conditions as opposed to *historical* or *empirical* conditions), we also clarify the conditions of the possibility of theory of terminology, while when we ask about the nature of terms as empirical objects without due care we will probably become confused while unnecessarily mystifying the theoretical nature of terms.

To understand the problem, it is convenient to think of it in terms of an analogy with the study of 'the youngest children in families'. We cannot claim to have established a theory and/or description 'of' 'the youngest children in families' by sampling 'the youngest children in families', observing the sample and pointing out that 'the youngest children in families' have two eyes, a nose, two ears, two hands and two legs, some bald, some with hair of varying colours.

As the category of 'terms' is an relational or aspectual category defined over linguistic items, just as 'the youngest children in families' is a category relationally defined over the category of human being, it is not enough to point out some observed characteristics, however refined they may be, in order for 'theoretically motivated' studies which treat terms as empirical objects to be claimed to be theories 'of' terms or terminology.

A typical study of terms involves a detailed examination of the 'concept' of a term, based on certain theories of 'concept'. In fact, if one carefully reads 'standard' reference sources for terminology such as Felber (1984), one will find that most of the technical section is devoted to this. Necessary and interesting though it may be, it is far from enough for theories 'of' terms or terminology. By definition, a theory of 'concept' is a theory of 'concept', not of 'term'. In addition, nobody knows within this type of work to what extent the observations obtained in relation to 'concept' are generalisable with respect to terms. Within this framework, theories exist, but not theories of terms; they are theories of something which can be used for descriptions of terms. But theories of scissors are different from theories of hairstyles.

2.2 How are 'Terms' 'Terms'?

How are 'the youngest children in families' 'the youngest children in families'? The answer is simple and straightforward: be being the youngest children in families. For that to be defined *logically*, one needs concepts of age, siblinghood, etc. Being a relational category, *these*

are the essential *logical* conditions by which the concept of 'youngest children in families' is consolidated. We cannot understand the basic nature of 'youngest children in families' by trying to discover essential common internal characteristics (though it would be wonderful if we could find an internal nature unique to 'the youngest children in families').

In the same manner, the question 'how are terms terms?' can be answered as follows: by being used as terms. No mystification, no magic, no 'concepts' which terms represent (and whose essential definition is 'something represented by terms'). Incidentally, studies which treat concepts, such as Lara (1999b), which claims that it treats concepts *in terms of* terms, are interesting to observe. Lara (199b) introduces conceptual hierarchy, which belongs to the theory and *description* of concepts, and then assigns terms to it, by some kind of unknown magical power. A corollary to this is that if the author is determined to assign texts to the same conceptual hierarchy, it can also be done. This is similar to establishing a theory of human beings, and then applying 'youngest children in families' to this theory and claiming that the theory is about 'the youngest children in families'. Wonderful though this might be, it is not quite persuasive.

Now, for linguistic elements to be used as terms, we *logically* need a few conditions:

(1) The existence of the concept 'domain' is required before the concepts 'terms' or 'terminology' can be consolidated. The concept 'domain' is something extra-linguistic, so the concept 'terminology' is supported by extra-linguistic factors. This is equivalent to the concept of 'youngest children in families'. It is supported by the concept of 'age' which is external to the substance of human beings. The concept 'term' is thus understood to be consolidated at the level of *parole*. The corollary to this is that a proper 'theory' 'of' terminology has to be linked up with the concept 'domain' or (some of) its representations.

(2) From (1), it is obvious that the concept 'terminology' precedes the concept 'term', because it is the former that corresponds more closely to the concept 'domain'. In order for a lexical unit to be recognised as a term, the concept 'terminology' should exist in advance (though empirically the relation between terms and terminology seems to be the other way round).

(3) If, like many researchers in terminology, we accept that terms are lexical items, a lexical sphere needs to exist, as distinct from the textual sphere. Without this, different tokens or occurrences of (the same or different) lexical items in texts cannot be consolidated into a category 'terminology'. This is a logical requirement. Fortunately, recent psycholinguistic studies show some interesting phenomena which strongly support the psychological reality of the lexical sphere (Baayen, Lieber, & Schreuder, 1997; Schreuder & Baayen, 1997).

These points seem very practical and concrete, and have nothing to do with the deep abstractedness favoured by some people in the field of terminology. It seems that for some people no terminological study deserves the name of 'theory' if it does not refer to 'concept' (Nakamura 1997; Galinski 1994), or abstract *metaphysics* which do not deserve to be called theory or science (Lara 1999a). But these are the *logical* conditions for the study of terminology, or at least an important part of the necessary conditions, if not sufficient.

2.3 The Target of the Theory of Terminology

The concept 'terminology' logically precedes the concept 'terms', terms as empirical objects, and terminology as an empirical object. This means that the theory of terminology should first and foremost take into consideration the

concept 'terminology'. Note that this is not related to the choice of a particular 'theory' of something for terminology, such as the choice between the traditional view of 'concept' (Felber 1984) vs. the cognitive view of 'concept' (Temmerman 1997) etc. Because terms are recognised at the level of *parole*, the theoretical study 'of' terminology should take into account the following:

(1) The essential range of the theoretical study of terminology is bound to *individual* domains, however "domain" is defined, because the concept 'terminology' is consolidated with respect to individual domains.

(2) Within individual domains, terminological study should, as its main target, treat the vocabulary as a set.

I do not claim that studies that do not reflect these two conditions do not deserve to be treated as studies related to terminology. However, if we stick to the definition of terms and terminology and to the concept of the 'theory' 'of' terminology as distinct from 'theories' of something which can be used for describing terms, then it becomes necessary to face the problem of characterising 'the terminology of a domain' at some point, because it is here that the very concepts 'term' and 'terminology' are *logically* consolidated.

This means that the 'theory' 'of' terminology, at least at the starting point, cannot be abstract, 'sound' and/or 'deep' (in a mystifying way). Terms are terms, and you can find some samples of terminology by looking up terminological dictionaries, whose entries are mostly from existing concrete texts. Having said this, it is almost clear why studies of automatic term recognition are useful for the 'theory' 'of' terminology. But let us turn to this anyway.

3 Automatic Term Recognition

Let us now briefly summarise the framework of automatic term recognition (ATR) and its possible contributions to the theoretical study of terms, together with some shortcomings of current ATR.

3.1 The Basic Framework of ATR

Automatic processing of terms has become a focus of domain-dependent lexical processing since the early 1990s. Some workshops were held, e.g. *Computerm'98* and Workshop of NTCIR1. As for ATR, some reviews (e.g. Kageura & Umino, 1996) and discussions of the basic framework of the task (Jacquemin, 1997) appeared recently, which contributed to the clarification of the basic framework of ATR.

The simplest and most basic framework of the ATR, as distinct from automatic indexing, can be summarised as: to extract a set of terms from a set of texts, which represent in some way the terminology of the domain to which the set of texts belong (Kageura & Umino 1996). Note that automatic indexing is concerned with the keywords which represent individual documents, while ATR is concerned with extracting terms from a set of texts, which in turn represent a domain, however domain is defined.

This immediately means that the ATR task should at least adopt an operative definition or clarification of the concept 'domain' and a set of texts that represents the domain. Here, at least, researchers of ATR should start from texts that correspond to a domain, not from individual terms which are assumed to be attributed to a domain, as is mostly the case in 'theoretical' studies 'of' individual terms.

Secondly, by definition the task of ATR is concerned with distinguishing terms from non-terms on the basis of texts. Individually, this is related to clarifying or defining operationally the degree of 'termhood' (Kageura & Umino 1994; Nakagawa & Mori 1998) of terms. Viewed as a mass, this theoretically (and ideally) corresponds to the consolidation of a terminology of a domain on a concrete basis.

Thirdly, the extracted terms are not only evaluated on an individual basis, but also on the basis of a set of terms as a mass (e.g. Niwa, Nishioka, Iwayama & Takano 1997), which

opens the door to addressing the concept 'terminology', which precedes the concept 'term'.

Therefore, whether explicitly or implicitly, the study of ATR, defined properly as distinct from automatic indexing, is expected to deal with the essential aspects of terminology which provide the basic conditions for the possibility of talking about terms.

Note an interesting point here: these also are what should be taken into account when terminological dictionaries are compiled manually; the only difference is that the manual compilation of terminological dictionaries does not use so systematically the textual corpus which represents a domain. This situation is changing because currently dictionary compilers as well as computational linguists rely heavily on textual corpora anyway.

In analogy with the task of terminological dictionary compilation, it can be claimed thus: the inspirations of 'theoretical' study of terminology come more from the stage of choosing terms for entries in terminological dictionaries than from defining chosen terms, with the so-called 'traditional' theory of terminology corresponding to the latter. In short, ATR has a rich potential for giving inspiration to the theoretical study of terminology.

3.2 The Current Status of ATR

If you examine earlier work in ATR, however, you might well find that not a small portion of so-called ATR is not well-defined. Much ATR seems to be nothing more than automatic indexing from a set of texts, with no particular applications such as information retrieval (e.g. Bourigault, 1992; Daille, Gaussier, & Langé, 1994; Damerau, 1993; Enguehard & Pantera, 1994; Frantzi & Ananiadou, 1995; Fung, Kan & Horita, 1996; Justeson & Katz, 1995).

Some common characteristics of these are: (1) a set of terms, not a certain amount of a terminology, is the basic target, (2) terms are extracted from a given text or a set of given texts, but neither the attribution of the text(s) to the domain nor their status as a sample is well clarified, (3) the evaluation of the results is usually carried out by what is called the "looks good to me" criterion.

As long as ATR work has these characteristics, important theoretical aspects that could be clarified through ATR remain unaddressed on the one hand, while application oriented ATR remarks nothing more than a loose imitation of automatic indexing.

The current situation in ATR is changing, however. For instance, there is a growing interest in the comparative evaluation of different methods of ATR (Nakagawa & Mori 1998; Kageura, Yoshioka, Takeuchi, Koyama, Tsuji, Yoshikane, & Okada 1999). Also, there is an interest in looking at the 'representativeness' of terms with respect to a set of texts (Hisamitsu, Niwa & Tsujii 1999), where 'representativeness' is potentially relevant to the relations between the terminological and textual spheres of a domain.

In short, a growing number of researchers in ATR are beginning to think about the usefulness of automatic term recognition *per se*, as distinct from automatic indexing, and as a result they are starting to adopt, either implicitly or explicitly, the basic definition of ATR given in the previous section.

If this trend continues in the research area of computational terminology and especially ATR, and if more researchers in the theory of terminology realise and appreciate the *theoretical* importance of the implications of such application-oriented tasks as ATR, then the study of terminology, both theoretical and application-oriented, will surely progress substantially.

4 Conclusions

In this paper, I first discussed the essential problem concerning the study of terminology, i.e. on what conditions and how we can 'theoretically' talk about terms and 'theories' 'of' terms. Then, focusing on the study of automatic term recognition, I discussed potential contributions of application-oriented ATR

work to the theoretical study of terminology. Many claims, in fact it seems to me too many, have been made about 'theories' which can be used *for* observing and describing terminological data, most of which have been either already pointed out in such works as Sager, Dungworth & McDonald (1981) or imported from other domains such as cognitive linguistics, epistemology, conceptology, etc, while little effort has been devoted to the possibility of establishing a theory *of* terminology, with *concrete* analysis. It is time to face up to this, for otherwise the study of terminology will end up being something more properly carried out by those who have trained in the related domains claimed to be relevant by those who do research in terminology.

A crucial point I have raised in this paper is that, thinking of the 'theoretical' study 'of' terminology in correspondence with ATR or the compilation of terminological dictionaries, the stage of choosing a set of terms has stronger theoretical implications than the stage of defining individual terms, if we think seriously of the conditions for the possibility of theoretical studies 'of' terms or terminology. And the possible contributions of ATR to the theoretical study 'of' terms do not just remain as abstract implications, but actually become very real.

The concept 'concept', which has been advocated as a key concept of the theoretical study of terminology, has been advocated as the key concept without any essential necessity. It is useful, for instance, to define individual terms, or to organise a set of terms *which have already been selected* according to the conceptual system, at the conceptual level of describing and characterising terms. But it is as useful to describe the syntactic patterns of complex terms for the study of individual terms as to describe the conceptual nature of terms, if the study is aimed at describing the syntactic patterns of terms.

It is, however, not possible to address the essential conditions for the possibility of the theoretical study 'of' terms by talking about 'concept'. If one talks of 'a theory of A', it should be a theory 'of' A, and one cannot substitute it with a theory of, for instance, B, however useful B is for dealing with A. Once again, it is useful to restate that a theory of hairstyles should be a theory of hairstyles, and you cannot claim a theory of scissors to be a theory of hairstyles, however useful scissors are for creating hairstyles.

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The Development and Future Project of the East Asia Forum on Terminology

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Abstract:

East Asia Forum on terminology (EAFTerm) was established in 1997 as a non-governmental academic forum in East Asian region. The Forum engages in the research on terminology and its standardization of East Asian languages, mainly Chinese, Japanese, Korean and Mongolian. The background and process of EAFTerm's establishment as well as main tasks, long- and short- term projects of EAFTerm have been introduced in this paper.

1 Background

East Asian countries are neighbors sharing many commonalties. They have been enjoying close and harmonic relationship in politics, economy, science and technology, culture and education for thousands years. Each of East Asian countries learns from one another to make up deficiencies for the development and advancement of world civilization, and glorious achievements have been created. Over this decade some countries in East Asian region have made remarkable progress, their cooperation and communication are more and more frequent, particularly in the fields of economy, science and technology. However, the terminological confusion leads to, in some degrees, holding up efficient exchanges among East Asian countries.

For instance, within the cultural circle of Chinese characters, besides China, Chinese characters are used also in the countries including Japan, the Republic of Korea, Singapore, Malaysia, and regions of Taiwan, Hongkong and Macao. Malaysia and Singapore use simplified Chinese characters used in mainland China, while the Chinese characters used by other countries and regions are different. Now in this era of information, differences of Chinese characters put information transfer to inconvenience, and the problem of intercommunicating Chinese characters must be considered and solved. In addition, Korean language is used by Chinese Korean, Koreans in the Republic of Korea and the Democratic People's Republic of Korea. Historically, the provisions in orthography of Korean language are inconsistent, although this phenomenon is not harmful in oral communication, but the differences in written form and technological field created a big language barrier to effective communication of information within the nationality. Besides the Chinese and Korean, there exist a same problem in Mongolian

language.

This problem brings to East Asian countries' attention, they are convinced that unambiguous and appropriate terminology based on terminological principles and methods are indispensable for the effective transfer of knowledge, unimpeded access to information and knowledge, promotion of scientific and technological considerable development, successful interchange between professional and unprofessional personnel, and the protection of intellectual property rights. Therefore, the East Asian countries are hoped to strengthen the cooperation and coordination of terminology standardization, and devoted their contributions to the economic development and social all-round progress in East Asia and the world.

2. Establishment of EAFTerm

The establishment of East Asia forum on Terminology(EAFTerm) was primarily supported by international terminological organizations, such as Infoterm, TermNet, IITF, GTW, particularly Mr. C. Galinski who first suggested to set up a regional terminological organization in East Asian region.

In Aug. 1997 the inaugural meeting of the East Asian forum on Terminology was held in Beijing, in which took part specialists of terminology and terminology standardization from China, Japan, the Republic of Korea and Mongolia, as well as representatives from mentioned-above international organizations were also participated. In this meeting the EAFTerm has been declared formally setting up, and passed the concerned documents including ***Directive of East Asia Forum on Terminology***, ***List of Coordination Group and Liaison Office*** and ***Working Project from 1997 to 1999***.

3. Objective and Composition of EAFTerm

East Asia forum on Terminology (abbreviated as EAFTerm) is a non-governmental and non-profit making academic forum. Its objective is to provide a forum for the promotion of the terminology research and development in East Asia (at present mainly the Chinese, Japanese, Korean and Mongolian terminologies). Individuals and corporate bodies engaged in the research on terminology and standardization may participate in the activities of EAFTerm.

Now, the members of EAFTerm are specialists come from China, Japan, the Republic of Korea and Mongolia. A Coordination Group has been set up. It consists of nine members: three from China, two from Japan, two from the Republic of Korea and two from Mongolia. EAFTerm's Liaison Office is located in Beijing, China. Its secretary comes from China, the executive secretary will be taken in turn by the

host of its activities, and the Liaison Officials are shared by Japan, the Republic of Korea and Mongolia, with one liaison official from one country.

4. Main tasks of EAFTerm

EAFTerm shall meet in principle once a year in any country or region in East Asia.

Its main activities are as follows:

- Information exchanges, introduction of respective progress in terminology research among its members;
- Collection of terminology documentation;
- Carrying out activities relating to terminology in various fields;
- Making preparation for the establishment of multilingual and multi-functional terminology database in conformity with ISO standards;
- Identifying the need for and carrying out coordinative projects in the field of terminology;
- Promoting and coordinating terminology work for the purpose of knowledge and technology dissemination;
- Promoting research, education and training in terminology;
- Translating and publishing works on terminology and promoting the application of research achievements;
- Organizing workshops, lectures, training courses;
- Helping universities and colleges to arrange seminars on terminology and to set up terminology specialty.

The projects of EAFTerm have been made in the first meeting of East Asia forum on Terminology.

5. Work has been completed since the founding of EAFTerm

5.1 Publication

- Three issues of ***EAFTerm Newsletter*** have been published. ***EAFTerm Newsletter*** introduces the researches, publications, activities (such as conference, training, etc.) and discussing of terminology and its standardization in east Asian countries. In the first issue there were an introduction to the research on terminology and its standardization in East Asian countries; a congratulatory letter from Director of Infoterm, Mr. C. Galinski, in which he had the high hopes on EAFTerm and made demands for further work of EAFTerm.
- A book entitled "***An Introduction to Modern Terminology***" by Chinese terminologist Mr. Feng Zhiwei, a research fellow of the Institute of Applied Linguistics, SLC of China. The author discussed thoroughly the economical law for the formation of terms, the

potential ambiguity in terms proposed by the Chinese scholars, and proposed the principle of classification for the structure of word - terms and phrase-terms in Chinese terminology. It is an attempt of systematical classification for term structure in the view of linguistics. This classification reflects the peculiarity of terminology research of China, attaching importance to the structure and function of terms.

5.2 **Seminar of Modernization of Chinese Ethnic Languages held in China**

This Seminar was held in May, 1998 in Beijing, China. Following problems have been delved into, and its proceedings were published.

- Relationship between information processing and modernization of ethnic languages;
- Research and delving of the problem of information industry of ethnic languages;
- Research on the standardization of ethnic languages;
- Exploration of information resources and information interchange;
- Experiences and lessons extracted from the Chinese and Western languages software development.

5.3 **Preparation of next meeting of Forum**

Next meeting of EAFTerm is to be held in the August of 2000 in the Mongolia, simultaneous with a training seminar on "Terminology management and language engineering".

The EAFTerm meeting includes:

- Report on the progress, financial statement of EAFTerm
- Work plan and Budget review of EAFTerm in 2000
- Reports on development of terminology in east Asian countries and regions
- Establishment of SIGs on "multilingual unified/standardized terminologies", "terminology and language engineering", "Fundamental terminology R&D", and "Terminology teaching and training"

The training seminar includes the following items:

- Computer-assisted terminography and computational linguistics
- Terminology and lexicography(inclu.specialezed encyclopedia)
- Terminology and machine translation
- Text management and computer-assisted authoring
-

We are contacting with Mongolia and we will to inform every one as soon as we determine the time and place for the forum.

The Forum has been established for two years. On the occasion, I would like to take this opportunity in the name of its convener to express

our sincere thanks to all scholars and specialists who supported and helped us in developing terminology and terminology standardization in East Asian region, particularly, to distinguished Mr. Galinski.

Terminology work and terminology standardization serve an important foundation for advancement of economic construction, science and technology, as well as social development. They are also fundamental systems engineering, and very important to the dissemination of scientific and technological knowledge, the exploitation of new fields of science and technology, the setting up of new theories, scientific and technological exchanges at home and abroad, the communication between science and industries, the popularization of achievements in sciences and technologies, particularly the development and application of modern information technology. Now, in this place I would like to say in all sincerity, EAFTerm is engaged in an arduous undertaking that would be benefited the mankind, it needs hard work and long-term cooperation of specialists and experts from every country. East Asia Forum on Terminology will not only actively promote the terminology work and terminology standardization in East Asian region, but also benefit the development of world economy and all-round social progress. We welcome more and more scholars and specialists from east Asian and non-east-Asian to join EAFTerm and its activities.

専門用語研究 №19, 18～26 (2000)

Medical Terminology in the Compilacion of Encyclopedia

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0. Something about Myself

A MD myself, I graduated from PUMC (Peking Union Medical College), an institute of higher learning in medicine founded by Rockefeller Foundation in Beijing, China early this century. We had an eight year program that stressed the integration of basic sciences and clinical medicine. Since 1979, however, I have been working as a senior editor in Encyclopedia of China Publishing House for almost 20 years and have participated in the editing of volumes on Biological Sciences, Modern Medicine and Chinese Traditional Medicine. Not long after I took up my job, I came to recognize the importance of the practice of collecting, defining and structuring the basic terms of the subject field I worked in as the first step in building up its knowledge structure, though I didn't know the existence of such a well-developed discipline called terminology then. Part of the reason was that I participated in the editing of biological sciences and medicine largely from the perspective of a subject specialist. But as I learnt more and more about terminology later, I myself have gradually become a terminologist, by which I mean a person who looks at and does things from the perspective of terminology.

1. Most Chinese medical terms are translations from their counterparts in European languages (chiefly English). Among the various modes of translations, paraphrasing has been the mainstay for Chinese. As compared with transliteration and transcription which are popular among languages with alphabetical writing systems, paraphrasing has the advantage of transparency.

Most scientific and technical terms in China are translations from Western languages, chiefly from English. Terms of modern medicine are no exception. In fact, it is almost a universal rule that, along with knowledge and technology transfer from the scientifically and technically more developed countries to the less developed ones, the corresponding terminology is transferred at the same time, largely by translation. The simplest way of translating would be transliteration, which, however, is possible only among languages sharing common alphabetical writing system such as that among the European languages. Between languages with alphabetical writing systems not homologous with each other, transcription may be the choice, as is seen in the increasing use of transcription from English in Japan in recent years. In China with her non-alphabetical writing system, however, paraphrasing has been the mainstay. Paraphrasing has the advantage of transparency, an important point for us when we have in mind education and knowledge dissemination among general public. In contrast, the chief weakness of transcription is the lack of transparency. For beginners as well as for laymen, transcriptions are as meaningless as numerical codes and the

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overall result is the addition of thousands of new words which might have been avoided if the concepts had been designated semantically by mother tongue. This simply violates the principle of linguistic economy.

Another cause for the preference for paraphrasing in China comes from her long-standing civilization which provides such a wealth of expressions that almost every concept may be represented by suitable combination of Chinese words. The practice that has worked so well is to select a Chinese word broader in extension than the one to be introduced (the superordinate concept or the genus) and put a suitable pre-modifier that serves to restrict its meaning to match with that of the original (the specific differences), though the second step attains this goal only with varying degrees of success.

Sometimes new terms are introduced from without not with systematic transfer of knowledge and technology, but simply as a result of trades of industrial products and spread of news. And the translators may be laymen or specialists who have not yet acquired systematic knowledge concerning the terms. Quite often, the only information accessible to them is the literal meaning of the terms themselves and no accurate definitions are available. Pressed for time, they manage to produce something hasty. With a **lexicographic approach**, they often translate the root and affix of the original word separately before combining them into a term while they know little or nothing about the true meaning and status of the original term, that is, what object it refers to exactly and whether the designation is a mere label or reflects the essential features of the concept semantically.

Nevertheless, most of the terms in current use are paraphrases contributed by subject experts that are based on adequate knowledge of the concepts. In fact, paraphrasing based on definition is no translation; it is simply *de novo* naming of the concept in the target language. This practice of naming based on definition is really what is recommended in terminology and consequently may be called the **terminological approach**.

In general, transcriptions are used only occasionally. However, the use of transcription is not excluded entirely; actually some transcribed terms, such as 雷达 (*lei da*) for radar and 基因 (*ji yin*) for gene, have enjoyed such popularity that they have crept into daily usage. Nevertheless, it has been the practice to add some transparency to the transcription by selecting characters that not only sound alike but suggest the meaning or by adding the superordinate concept of the concept in question. As examples of the first method, the Chinese transcript of radar is 雷 (thunder) 达(arrival), and that of gene is 基 (basic) 因 (factor). With the second approach, the superordinate is added as the nuclear word while the transcription is turned into the premodifier. Thus, tank is translated as 坦克 (*tan ke*) 车 (vehicle), and AIDS as 艾滋 (*ai tsu*) 病(disease).

Also, it is interesting to note that, with rapid progress of science and technology, some definitions cannot be fixed from the very beginning or may be subject to constant change. On the other hand, terms in humanities may be interpreted differently by different persons. As a result, for such fluid and variable concepts, literal translations of the original are sometimes preferable to *de novo* naming that is intended to freeze the conception to a particular definition. For, literal translation of the original does nothing of this sort except serving as a provisional designation as well as a reminder of the understanding of the term at that stage of development.

2. Collecting a list of terms to serve as the headings for the entries is usually the first step in compiling encyclopedia. But, just as building a term system is a major task in terminography, so the central task remains for us, starting from this term list, to work out a well-structured representation (Cognitive Model) of the knowledge of the whole field in question. And both theoretical consideration and practical experience favor an object-oriented approach rather than a subject-oriented one.

I joined the work of encyclopedia compilation in 1979. As it was the first time that we undertook such a big project, it was decided at the time that, in the first edition, volumes on special subject fields were started separately and, only with the second edition, should we combine them into a unified format.

The first task in compiling encyclopedia of a special field was usually to make an outline of knowledge of the field in the form of a structured term list, called a "framework" in our publishing house. It was almost always a tree structure composed of the headings of the entries. And for almost all of the volumes, the framework was contributed by subject specialists, and the higher level headings in the tree structure were usually with the ending "-logy", that is, entries describing the various academic disciplines. Thus most frameworks of the first edition were subject-oriented ones.

At that time, the experienced editors in our publishing house were mostly specialists in Chinese literature. In striking contrast, most of us who had knowledge and experience in the various disciplines of science and technology had switched to the present job only recently, without any previous training in editorship.

Not long after, I found great difference existing between the two kinds of editors among us in the way we approached our work. For the old editors, encyclopedia were just like dictionaries and the separate headwords of the entries were the objects of their work for which, they thought, they were supposed to offer explanations. But, for me, the whole knowledge structure of the domain I was working in was my point of departure and my task was to break it up into parts of proper sizes and present them to the reader interested in such parts. And the entry headings were mere designations of concepts referring to such parts which were intended primarily to help the readers in finding out the knowledge they were seeking.

Moreover, as I found out later, the reader is more interested in the world of nature, of man and society, and of human institution themselves than in the disciplines by means of which man acquires knowledge about the objective world. In fact, an object may be studied by many disciplines each of which studies an aspect of the object from its particular theoretical perspective, using its particular methodology and with its particular purpose. Taking an example from medicine, a drug may be studied by a chemist who wants to elucidate its chemical structure or a chemical engineer who wants to develop a more efficient technology for its manufacture; it may also be studied by a pharmacologist who wants to define its metabolic pathways in human body or to identify the mechanisms underlying its action on human body or pathogens; finally it may be studied by a clinician who wants to evaluate its therapeutic and side effect and find out the best way of using it. Of all the related disciplines (chemistry, chemical engineering, pharmacokinetics, pharmacodynamics, and the various clinical disciplines which might use the drug in question), each deals with only one aspect of it.

All these considerations led me finally to adopt an Object-oriented approach

rather than a Subject-oriented approach while drafting the framework of the volumes of *Modern Medicine* by myself.

3. A simple analysis of the conceptual structure of subject knowledge reveals its multi-dimensional nature. The connections linking the various concepts form a network rather than a tree as is represented in an oversimplied manner in most terminological documents. For handling such a complicated structure, a modular approach is the way out and top-down and botton-up approaches performed in alternation are often needed in improving the model.

In making frameworks, one usually draws up a tree structure where it should be a network instead. Taking again the above example, as drugs may be dealt with by chemistry, pharmacology and clinical disciplines so they can be classified in terms of their chemical features, pharmacological features or therapeutic features. In fact, I don't know of anything that cannot be classified in more than one way. Taking another example from medicine, diseases can be classified in terms of their characteristic symptoms, specific causes or typical pathological changes. Multidimensional classification is actually a universal phenomenon. It is simply because multidimensionality cannot be easily represented on two-dimensional paper that we often single out the main threads to make it a tree structure. But with such a simplified mental representation, one is liable to lose sight of the various relationships below or above the "surface". For example, cross-references represent interconnections among various concepts and important cross-references may be missing just because we lack a stereoscopic view of the knowledge structure.

Thanks to scholars of the older generation, however, we do not have to start from scratch in constructing the multi-demensional model of the subject knowledge. In past decades, various schemes of knowledge organization have been proposed as you may find in the texts taught in universities or other academic writings. We are thus able to compare them and choose, as our starting point, the best candidate with or without modification. Preferably, we should start from some relatively independent structures, the basic modules, and, using them as building blocks, try to build up the cognitive model of the whole field. It is usually at this step that we begin to experience the difficulty of model building. For, as dictated by the multi-dimensional nature of knowledge, there are many ways of grouping smaller units of knowledge into larger ones.

While working out a framework, experience with encyclopedia taught me to take a mixed approach of going both bottom-up and top-down. With a bottom-up approach as described above, I started with special knowledge of the various branches of medicine which constituted the major substance of our volumes. With a top-down approach, on the other hand, I first built up a macroscopic model of human knowledge in general and a mesoscopic model of medicine in particular, an approach which later proved very important in helping me control the overall layout. The top-down approach provided a complete and balanced macroscopic and mesoscopic view while the bottom-up approach took care of the microscopic interrelationships among the entries to ensure a comprehensive treatise of each concept within its proper context (in relation with other related entries).

While proceeding in a top-down manner, again, I found it difficult to decide which way to break up the knowledge. Given the multidimensional nature of subject

knowledge, there are as many ways of breaking up the knowledge from larger units into smaller ones.

Actually, both the general model and the separate models were not to be built up in one step, but rather would be the result of repeated efforts, the result of top-down and bottom-up approaches done in alternation for at least two or three rounds with ever greater refinement and elaboration in each turn. And the final result was a great network made up of nodes of various size which themselves may be composed of smaller nested networks. The simple elegant hirarchical structure was not to be seen any longer.

Nevertheless, it was not a mess. The nodes and the interlinks connecting them were not of equal weight. We first distinguished between two kinds of interlinks: logical and ontological, and assigned greater weight to the latter, a practice that conformed to our object-oriented approach. Actually, for a node, one or several major links could usually be found that formed the main threads linking the node to other nodes; this was particularly true of the basic modules. Thus a network composed of nested modules connected by higlighted interlinks eventually emerged as the final picture.

4. Similarly, the comprehensive nature of a concept dictates a multi-faceted definition. Just as definition is an integral part of an entry in term bank, so definition formulation is essential to the success of an encyclopedia, for the whole entry will be largely an expansion and development of the definition.

Once the framework is established, the position and the scope of a single entry within the framework as well as its contents in relation to other related entries are basically fixed. However, the writing of the separate entries is no easy matter.

As stated above, although an encyclopedic entry may be very large, containing as many as thousands of words, yet the whole entry will be written chiefly around the core of the definition.

According to modern understanding of terminology, a term is a designation that represents a concept in a special language, which, in turn, is a mental construct used to categorize objects. Here we have three levels in the whole terminological process: term, concept, and objects. And, in writing encyclopedic entry, we should have these three levels in mind as well.

At the level of the designation, we posed the requirement that the etymology as well as both homonms and synonyms (including quasi-synonyms) be fully described.

At the level of concepts, difficulties may be encountered in rapidly advancing disciplines and humanities where concepts may be quite fluid and highly variable. It is a well known fact that the same object may be percieved differently by different persons. One person may perceive a natural phenomenon anthropomorphically and interpret it in teleological terms while another may perceive it more objectively and explain it in scientifical terms. Even among the scientists, some may look at it, say, more from a structuralist view while the others, more from a functionalist perspective.

On the other hand, concepts are changing all the time, usually as a result of advance of knowledge. A good example is the English word "stress", a common word that has been transformed into a scientific term that is defined differently in different fields. As a common word, it originally means a pressure, a constraining force applied

to a body. It was defined as an academic term first in physical sciences and has come to denote force per unit area within materials that arises from externally applied force, uneven heating, or permanent deformation. Unfortunately, it is a term used quite loosely, sometimes referring to the causative factor and sometimes to the resultant state. For example, it was later defined chiefly in the latter sense by Hans Seyle in physiology, as the nonspecific response of the body to external stressful event. In psychology, it usually denotes any interference that produces adverse effect such as anxiety or depression and, when protracted, can lead to physical illness (psychsomatic disorder). In ecology, the word "stress" is often used to refer to environmental factors that restrict growth and reproduction of an organism or population (eg. pollution). We may say it is a polysemant term that represents different concepts in different fields. Yet as we trace the evolution of its meaning both within a field and across fields, it is found to be the basic similarity underlying all these "concepts" that led us to reserve the same designation throughout. In all cases, it refers to factors acting to disturb the equilibrium of a system or the resulting "off-balance state", no matter whether it is a physical system, a physiological system, a psychological system or an ecological system. The various meanings have been derived one from the other smoothly and they differ from one another by only a tiny bit (as compared with the tremendous similarity). Thus we are confronted with the question as to when the differences become so great that it may be called a new concept.

All these considerations have led us to require that, in cases of fluid and variable concepts, the conceptual development be presented in historical order in the entry. Its super-ordinate, coordinate and subordinate concepts under various classification schemes as well as all related concepts of it are to be covered. The subtle differences between the apparently similar terms as well as the basic similarities between the seemingly opposite terms will be discussed with illustrative examples.

Finally we come to the level of objects, which will make the major part of the entry. Quite often, for a single object, many aspects may be distinguished and a multifaceted or conprehensive definition should cover all its major aspects. For example, the definition of a drug should cover its chemical, pharmacological and clinical aspects while the definition of a disease, its symptomatological, pathological and etiological aspects. So the writing of a single entry may require the joint work of experts from many related fields.

5. Exposition of the objective basis of the concept is one of the major goals in formulating a scientific definition. In physical sciences, operational definition has been recommended though mere description of the operations is not sufficient and the motivation should be explained. In humanities where speculation prevails, the writer recommends formulation of "working definition" as a means to reveal the link between the speculation and the reality

The Nobell laurate P. W. Bridgman emphasizes defining physical concepts in terms of operations, both physical and mental, involved in their measurement. This so-called operational definition adds objectivity and accuracy to conception in physical sciences.

In the medical volume of our enclopedia, many medical concepts were found to lend themselves to operational definition. A notable example was arterial hypertension which can be defined simply as an abnormality of blood pressure beyond

a certain normal range so that cases of hypertension can be easily and unmistakably identified using a sphygmomanometer. It was found, however, that the readers were not satisfied with such an operational definition. "What are the reasons that such and such a blood pressure is considered abnormal ?" they asked. Actually persons with a slightly higher than normal blood pressure might not have any subjective symptoms nor could any objective signs other than the slightly higher blood pressure be found. They are considered as suffering from hypertension simply because the slightly elevated blood pressure carries a certain risk of developing cardiovascular complications if unchecked and this "abnormal" blood pressure can be corrected with drugs, thus preventing the complications. This sort of thing should be explained clearly to the readers.

The last volume I took charge of was that of traditional Chinese medicine (TCM), on which I worked for about eight years. What struck me most at that time was that the theoretical structure of TCM was not a positive discipline of modern science but rather a culture-specific branch of humanities while the technical aspect was largely empirical. Most of the key concepts of TCM such as Yin and Yang, Five Evolutive Phases and Jing (the Vital Essence), Qi (the Vital Energy) and Shen (the Vital Spirit) were borrowed from the classical philosophy of China.

Besides, it has always been my view that, although prescriptive terminology is the primary goal of a standardizing body, a descriptive approach should be the policy of an encyclopedia, for the reader may consult the encyclopedia with questions about any term they have encountered whatever the rating status of the term may be. And descriptive terminology becomes the only choice in TCM, where terms are subject to various interpretations by different schools. This may also be true of all humanities and social sciences.

In psychiatry where speculative elements are abundant in branches like psychoanalysis, the policy adopted in the working-up of the famous *Diagnostic and Statistical Manual of Mental Disorders* (DSM) is to dispel as much theory-laden elements as possible and to retain only the empirical core. This policy is not appropriate here as the theoretical framework together with the terminology are the very object of our study.

Being speculative rather than positive in nature, the terminology of TCM theories which were largely borrowed from ancient Chinese philosophy sound abstruce and subject to various interpretations. When asked to give a definition of a basic traditional term such as Qi (sometimes translated as Vital Energy), the physician under investigation usually gives one that he learnt from his teacher or from medical classics rather than the one that really guides his clinical analysis and judgment in actual practice, that is, the working definition. A term philosophized from the common word Air, Qi has since taken up the meaning of driving force for all changes in the universe, including astronomical, meterological and geological changes in objective world as well as physiological and psychological changes within human body. It is true that the word sounds abstruce when used in abstract academic discourse. Yet, used in daily conversation, it reminds one of the air surrounding us and the air we have to breathe in to keep ourselves living. It seems also to give us strength, for we have to hold our breath while straining to do something. Thus the mental model of Qi is really very concrete. As was found out by us, and at least true for some physicians, it is this concrete mental model that works in actually guiding them in their clinical judgement and decision. For example, a patient may consult them

with the complaint of general weakness and shortness of breath, the mental model of Qi will immediately suggest the diagnosis of Qi Deficiency and the treatment of Replenishment of Qi with some Qi-Replenishing Herbs. This may be working subconsciously and the physician may not be able to express it clearly in declarative statements. Yet this is exactly what works in clinical medical processes.

Here the working definition serves as the actual link between TCM as a theoretical framework based on speculative philosophy and TCM as a practical art. It reflects the mental operations by which the physician arrives at the clinical judgement and clinical decisions. Thus one of the major tasks of terminological work in fields of humanities involves investigation into the working definition.

EXPERIENCE WITH BIOLOGICAL SCIENCES.
- Terminology
- Term list
- Headwords for entries
- Key words in entries
- Definitions
- Cognitive Models
- Levels of Organization
- Structure-Function
- Living Processes
- Homeostasis-Metabolism
- Genetics
- Reproduction & Development
- Ecology & Evolution
- Diversty-Classification

MODERN MEDICINE
- Science vs Art vs Profession
- Cognitive Models
- Basic Medicine
- Human Biology
- Microbiology
- Pathophysiology
- Pharmacy
- Clinical Medicine
- Dignosis
- Symptoms, Signs, Diseases & Disorders
- Treatment
- Drugs, Procedures
- Population Medicine
- Prevention
- Sanitation, Vaccination

TRADITIONAL MEDICINE
- Philosophy
- Cognitive Models
- Theoretical Framework
- Traditional Philosophy
- Clinical Medicine
  - Special Diagnostic Procedures
- Pulse-taking, Tongue-inspection
- Categorical Identification
- Treatment
- Herbal Prescription
- Acupuncture & Moxibustion

Macro _ Term System Building
Micro _ Definition Formulation

専門用語研究　№19, 27～28（2000）

国際医薬用語MedDRA

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“MedDRA” は，Medical Dictionary for Regulatory Activitiesの略で医薬品の開発，承認申請，市販後調査などの場で用いられる用語集としてICH(医薬品規制ハーモナイゼーション国際会議)において作成されたものである。医薬品規制の場で用いられる用語は，正確，迅速に医薬品情報を伝達するために必須のものである。その用語の範囲は，副作用の記述のみならず病名，症状名，徴候名，臨床検査項目名，手術名など幅広いものである。現在に至るまで，これらのデータを扱うすべての機関，製薬企業などでは，副作用用語集とともに，疾病用語集，臨床検査用語集などが組み合わされて使用されてきた。この様に多様な用語集が使用されていることは，データの検索や解析を複雑化するのみならず医薬品の開発，市販後の各段階で得られたデータを相互に参照することを困難にしている。又，地域によって異なる用語集を使用すれば，一つの用語集を用いて作成されたデータベースから他の用語集を用いたデータベースへの変換が必要となり，そのために時間的遅れや，データの損失またはゆがみを生ずる可能性もあり，国際間の情報交換に不都合が生じる結果となることもあり得る。これらの問題を解決するため，上記ICHの場でMedDRAが開発されたものである。ここでその概略を紹介する。

内容および使用対象

MedDRAは医薬品の開発のあらゆる段階および医療用具の健康への影響を記述することに適用される。これらの目的で以下の範囲の用語を含んでいる。

症状，徴候，疾患，診断，適応症，臨床検査の名称と結果，外科および内科的処置，病歴，社会環境，家族歴。使用される範囲は，臨床試験，副作用および有害事象の報告，規則当局への申請および報告，製品情報等の記述に用いる。また，既存の用語集である。WHO-ART，J-ART，COSTART，ICD-9，ICD-9-CM，HARTSに含まれている用語は，取り込まれている。

構造

MedDRAは，5階層の構造となっている。(図1)

1）基本語（Prefered Terms: PT）

用語集の中で一番基本となる用語で症状，徴候，診断などを表す用語であり「単一で曖昧でない臨床概念を表す語と」定義されている。

2）下層語（Lowest Level Terms: LIT）

PTの下位に属する用語で，PTとは，下記の関係を有している。

①同義語；同じ意味ではあるが表現の異なる語，例えばLiver functionとHepatic function

②語彙変化；略称，倒置語など

③準同義語；通常は，意味が異なると考えられているが医薬規制の場では臨床的に同等と扱われる語，例えば右手と左手

LLTの語数は約5万語あり，このことはデータ入力に際し入力者の主観的選択を少なくして，データの一貫性を高め，入力を容易にし，更に

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将来自動コード化を行う場合にも有用なツールとなる。

3）高位語（High Level Terms: HLT）
PTの上位語であり，解剖学的，病理学的，病因学的または機能によって，関連するPTをリンクさせる包括的なカテゴリーである。HLTはデータ検索集計表示にのみ利用し，データ入力には使用されない。

4）高位グループ用語（High Level Term: HLGT）
HLTの上位語で，より広い概念で検索するためHLTをグループ化する機能を有している。

HLTと同様に，データ検索と集計表示にのみ用いられる。

5）器官別大分類（System Organ Class: SOC）
データ検索に際し，最も広い概念を提供する最上位の階層で，26に分類されている。

6）特別検索カテゴリー（Special Search Categories: SSC）
ある疾患や症候群に関連するPTをグループ化しておりSOC間にまたがる臨床概念により特定の疾患または診断に関連する症状，徴候をひとまとめのグループとして検索することを可能にする機能を有している。

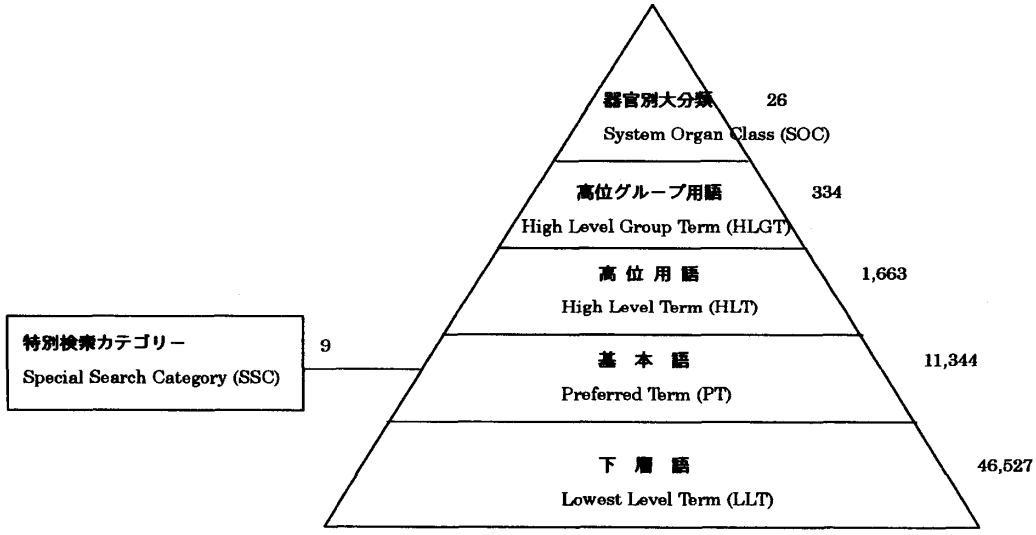

図1．MedDRAの階層構造と用語の総件数（V.2.2）

以上，MedDRAの内容およびその構造の概略を紹介した。更に，そのメンテナンス，利用の現状，今後の展望について来る研究会の場で紹介させていただく予定である。

専門用語研究　№19, 29～40（2000）

韓国における専門用語の歴史と現状*

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On history and state of terminology in Korea

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キーワード：専門用語学 標準化 漢字制限 自国語化 分かち書き データ処理

要約

専門用語研究は、用語そのものの概念規定といった基礎科学的側面の研究から国内外の情報交換のための情報管理的応用分野にまでその領域が広まっている。このような研究領域の拡大は、情報化に伴う情報交換手段としての専門用語の必要性と重要性の高まりにその原因がある。用語標準化の歴史の短い韓国における専門用語研究は、基礎科学としての用語の標準化と情報管理及び交換のための応用技術の開発が同時に求められている。1998年、韓国科学技術院に専門用語言語工学研究センター(KORTERM)が設立され、応用技術の開発と共に専門用語の標準化を各学会と共同で推進している理由もそこにある。韓国語における専門用語の標準化の問題は、日本や中国と同じく、歴史的、言語的変化と密接に関わっている。韓国で専門用語が本格的に用いられ始めて50年。専門用語は、研究者集団の質的・量的変化と共に一連の漢字制限といった言語政策の変化によって大きく変貌した。1950年代からの漢字制限は必然的に音借語と固有語の増加をもたらした。これは日本がかつて経験し、経験していることである。本稿では、韓国における専門用語の歴史を概観すると共に韓国語の専門用語が抱えているいくつかの問題、特に漢字制限に伴う問題について述べる。同時に、現在の専門用語の急激な増加と音借語の急増に伴う様々な問題を解決するための試みとして現在専門用語言語工学研究センターで取り組んでいる応用技術開発の現状についても紹介する。

1. 専門用語と専門用語学

専門用語の国際標準化に関する代表的組織である国際標準化機構の第37技術委員会(ISO/TC37)は、次のように構成されている。

（1） SC1 専門用語の原理
（2） SC2 専門用語の記述法
（3） SC3 専門用語への電算的支援

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これら三つの組織は、現在における専門用語研究の特徴と定義を反映するものと解釈できる。SC1からSC3までに見られるように、現在の専門用語は、より幅広い観点からの研究を要求しており、学問としての独自性が強く求められている。本稿では、従来の用語そのものといった限られた専門用語研究との混同を避けるため、専門用語そのものに関する研究と応用技術開発に関する研究を網羅する概念として専門用語学という述語を用いる[1]。

専門用語学は、用語そのものの学問的概念規定や定義に関わる科学的側面とそれを管理、流通させるための応用技術、すなわちテクノロジーに関わる側面とに分けることができる。科学的側面の研究は、専門用語を用いる各学会や団体が主体となって専門用語の概念規定や同一学問分野での用語の整備などの研究を進める。テクノロジー的側面の研究は、特定分野はもちろん、異なる分野間の専門用語の管理と流通のための研究を行い、国際情報交換形式への変換、専門用語研究支援のための専門用語自動抽出および整理のためのアプリケーションの開発、データベースの作成と管理など、様々な側面からの専門用語の科学的側面と応用技術の研究を支援する。

専門用語学の確立は、専門用語の爆発的増加、国際的情報交換手段としての専門用語標準化と情報化への要求の高まりに対応できる土台作りのためにも必要である。

2．専門用語の分類と標準化

専門用語は、日常語と同じく様々なレベルが存在する。専門用語を使用分野の広さによって分類すると次の三つに分けることができる。

（1）基幹専門用語：幅広い分野で用いられるもの
（2）準基幹専門用語：いくつかの分野で用いられるもの
（3）特殊専門用語：特定の分野でしか用いられないもの

このような分類に基づき、専門用語を分類すると、（1）には、「定数」、「メカニズム」など、あらゆる学問分野に必要な基礎概念を表わすものが多く、（2）には、「原子」、「粒子」のように、物理、化学、工学などといった学問的類似性の高い分野で共通して用いられるものが多い。（3）の場合は、「熱融合」、「臨界」など、その分野独特の用語を表わすものが多いといった特徴がある。

この分類を基に、専門用語を概念規定と標準化の観点から解釈すると、より立体的に専門用語のそれぞれの分類における特徴が見えてくる。（1）は、「定数」、「常数」、「恒数」のように同じ概念に異なった語形が用いられている場合が多く、これら同一概念の異なった語形に対しては、各学会が合意することにより用語の標準化が比較的簡単に行われる可能性が高い(日本では現在「定数」に統一されている。韓国では分野によって多少違いはあるが、ほぼ「常数」に統一されつつある)。（2）は、後に述べる「adhesion」の訳語、「but'um」(くっつくこと)のように上位概念、あるいは広概念(broad term)が学問的類似性の低い物理学や医学のような分野で同時に用いられた場合、概念規定が分野によって異なることがあるため、用語の統一がかなり難しい。

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[1] 専門用語学ということばは、一般に英語ではterminologyやterminographyと訳すことができる。日本では用語学、記述的用語学のように訳す場合も見られるが、そうした場合、専門用語辞書の編纂に関わる記述的問題に関わる研究といった意味合いが強くなり、専門用語研究に必要な様々な技術を含む概念としての側面が薄れてしまう恐れがあるため、あえて専門用語学ということばを用いる。

（3）は、その分類から一つの分野に一つの用語しか出現しないため（1）と（2）のような問題は生じない。しかし、学際的研究が盛んになり、分野間の用語使用における壁がだんだん崩れる傾向にある現在においてその標準化が今後問題になる可能性がある。

3．学問分野と概念規定

概念規定と語形の関係を一般語彙と専門用語の観点から定義すると、一般語彙は、語形と語の意味からなる一単位であるため、意味と語形の関係が本質的には恣意的であっても一旦定着した関係を簡単に変えることは難しい。一方、専門用語は、概念に語形が結びついたもので、概念変更の必要性があれば、それを用いる特定集団内部における合意によってその関係の変更が比較的簡単である。これは、一般語彙の場合はその意味が社会的コンセンサスに支えられていて、意味と語形の関係を人為的に変えることが難しいのに対し、専門用語は、意味ではなく、学問に必要な概念であり、学問的必要に応じて概念と語形の変更が容易であることを意味する。

専門用語における概念と語形の関係の恣意性を表わすものとして、英語が同じでも学問分野によって同一語形に異なった概念規定がなされている場合がある。例えば、「adhesion」という用語に対して、韓国物理学編『物理学用語集』(1995)では、固有語[2]「but'um」以外に、漢語の「付着」、「接着」が同時に訳語として載っている。物理学では、これら三つの用語の概念が同じであり、どれを用いても基本的に物理学用語として問題がないことを意味する。一方、医学ではこれら用語に対して、より厳密な使い分けが必要であるとの意見がある[3]。医学で『物理学用語集』のように「but'um」を用いると、「病気や細胞の異常増殖によって臓器と臓器がくっ付く」場合と「正常な状態で臓器と臓器がくっ付く」場合の区別ができなくなるという。固有語「but'um」は、日本語の「くっつく」と同じく、「付着」、「接着」、「癒着」といった下位概念をすべて包括する上位概念であるからである。このことから医学では、前者に対して「癒着」を、後者に対しては「付着」を用いることを提案している。これらの英語訳もそれぞれ「adhesion」と「adherence」のように使い分けた方が望ましいという。

専門用語は、分野の必要に応じて異なった概念規定に基づく用語の独自的使用が可能であり、このことが一般語彙とは異なる専門用語の特徴であり、本質であるといえよう。

「定数」、「常数」のように、同一概念に対する異なった用語使用はもちろん、「adhesion」のように異なった概念規定を必要とする分野間の用語使用におけるずれの問題をどう調和させ、管理するのか、また、これらをどう記述し、標準化していくのかが専門用語学の課題である。

学問分野による異なった概念規定の詳細な記述まではいかないが、英語の一つの専門用語に対していくつか異なった韓国語の訳語が用いられている場合について韓国科学技術翰林院から1998年に『英韓・韓英科学技術用語集』(アカデミア)が出版された。現在、専門用語の標準化のための分析資料として有効に用いられている。

4．韓国における専門用語の歴史

韓国における専門用語の始まりをいつか

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[2] 日本語ではこれと同じ概念として「和語」という用語を使うが、より中立的な用語である「固有語」を以下の記述において用いる。

[3] 池堤根「韓国科学技術用語の標準化の現状と必要性」(『専門用語研究1』、洪陵科学出版社、2000、第3章、KORTERM)

ら認めるかは言語史の時代区分と同じく難しい。ここではそれまでにない新しい用語が大量に入ったことを重視し、その始まりを18・19世紀の実学派(それまでの観念的儒学から脱皮し実用的な学問を目指した学派)の台頭、中国語からの借用と対訳集の編纂に求め、その後の用語の流入窓口の変化、専門用語そのものの性格の変化などにより韓国語の専門用語の歴史を次の三つの時代に大別する。

第1期：17世紀から1910年以前
第2期：1910年から1970年代半ば
第3期：1970年代後半から現在

第1期は、17世紀後半からの実学派の台頭、18世紀に多く編纂された外国語との対訳集の刊行によってそれまでになかった多くの実用的用語が整備された時期である。この時期には、政治、経済、地理、数学、医学など、様々な分野の実用的研究が行われ、対訳集の編纂過程で数多くの用語が中国から借用された。17世紀に入った用語としては「放送」(釈放)、「下獄」(投獄)などがあり、学術用語としての専門用語の性格は薄いものの本来の意味から変わって現代社会を説明する重要な用語となったものが多い[4]。これら用語の意味の変化にどのような要因が作用したかはもう少し研究の必要があるが、日本語からの影響が強く作用している可能性は高い。

第2期は、韓国語における現代学問に関する専門用語の骨格が作られた時期であり、日本製専門用語が数多く借用された[5]。この時期には日本による植民支配があり、1945年植民地支配が終わってからも1975年頃まで日本語の漢語専門用語がそのまま活発に流入され広まった。1945年からソウル大学を始めとする大学の設立が活発になり、大学で用いる韓国語教科書の編纂過程で日本語で教育を受けた研究者が中心となって教科書の編纂にあたったこと、当時の韓国語が漢字を活発に用いていたことが日本語の専門用語がそのまま韓国語の専門用語として数多く定着する原因となった[6]。

現在の日本語と韓国語の漢語専門用語を辞書や用語辞典を対象にその一致度を調べた研究がある[7]。その一致度は、科学技術の分野では96.9%、健康・医療の分野では83.3%、国際関係の分野では72.8%に達するという。この調査は、漢語だけを対象にしたもので、固有語や音借語などを含めた調査によって日韓の専門用語の全貌がより正確につかめると考えられるが、一つ興味深い事実は、日中、中韓の言語学用語においてその一致度が日中では18.2%、中韓では16.6%に過ぎないということである。この数字から韓国語において、少なくとも漢語専門用語に関して日本語からの影響がどれほど強いものであったのかが伺える。

第3期は、専門用語の標準化の始まりと多様化によって特徴づけられる。1946年に結成された大韓化学会は、最も早い時期に専門用語の標準化の必要性に目覚め、1952年朝鮮戦争中の避難首都であった釜山で化学述語制定のための事業を始めた。大韓化学会の標準化への動きは1960年代に入って各学会に広まり、政府も小・中・高の教

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4) 李基文、『韓国語の歴史』(大修館書店、1975、PP.245-248)

5) 張元哉、『近代日韓語彙交流の研究-1895・6年における同形漢語を中心に－』(東京都立大学大学院人文科学研究科修士論文)によると、19世紀末まで、日韓の漢語はあまり似ていなかったことが実証的に示されている。

6) この時期の大学の教科書では、漢字が用いられていたが、1960年代から高校や一般社会では漢字制限やハングル専用運動の影響により漢字は姿を消すようになった。

7) 塩田雄大、「日本・韓国・中国の専門用語－日本語とはどのくらい似ているか－」(『国文学解釈と鑑賞』第64巻1号、至文堂、1999)

育に必要な教科書編纂のための専門用語審議会を文教部(現在は教育部、日本の文部省にあたる)に設け、専門用語の整備と標準化に乗り出すようになる。さらに、科学技術団体総連合への国庫支援による「科学技術用語集」の編纂事業が始まり、1976年に実を結んだことは韓国語の専門用語の歴史において特記すべき出来事である。

1950年頃から始まったハングル専用化とそれに伴う漢字廃止、その後の漢字制限、漢字併記といった一連の言語政策は、音借語と固有語専門用語の増加につながった。1975年頃を境に大学の教育でそれまで用いられていた翻訳書が原書(英語)に代えられるようになったこともこれら音借語と固有語専門用語の増加に影響を与えた。このような変化には、第二次世界大戦後、学問輸入の窓口が日本からアメリカへ移ったこと、それと同時にアメリカ留学経験者の急増などが大きな原因として働いた。

この時期における学会の用語集の標準化および専門用語の変化は次の三つに大別される。

(1) 漢語専門用語の固有語化
* adhesion : 付着 → but'um
* rotaion : 回転 → dolgi(回ること)

(2) 第2期に大量に直訳された日本製漢語専門用語のうち、韓国語の語彙体系に合わない日本製専門用語の整備
* abberation : 収差 → bət'səɔnam[8)]
* lottice : 格子 → salchang

(3) 音借語の増加
* fortran : poturan
* potencial : potensyal

用語集におけるこのような専門用語の標準化が進む中、実際の社会では、年齢、専門分野などによって日本製の漢語専門用語、固有語用語、音借語が混在して用いられるといった用語集と実際の用語使用におけるずれの問題が生じた。このようなずれは、専門用語標準化の主体が必ずしも明確ではなかったこと、それによるコンセンサス獲得の失敗が原因となっている。さらに、専門用語研究者の絶対的不足、韓国語学界の実証的データに基づく研究への軽視といったことも原因となって、せっかく刊行された用語集も幅広い支持を受けることはできなかった。このような標準化における過去への反省が専門用語言語工学研究センターの設立につながり、理工系研究所でありながらも専門用語の標準化と応用技術開発の両方に力を入れている原因になった。

KORTERMは、その短い歴史にも関わらず、国内の学会や専門用語関連機関との専門用語の整備と標準化のための連携はもちろん、ISOのP-メンバーとして韓国を代表する機関に指定され、専門用語に関する韓国を代表する機関になった。しかし、韓国国内の専門用語研究に必要な人的・物的資源の絶対的不足、研究者の育成など、これから解決すべき問題は山積している。

5．専門用語の国際比較

日本語の専門用語が英語やフランス語などに比べ難しいことはよく言われている。韓国語の場合はどうであるかを物理学用語を対象に調べた。物理学用語を選んだ理由は、他の科学技術分野の基礎となる用語が多いこと、分析資料として用いる韓国物理学会『物理学用語集』(1995)は、積極的に物理用語の固有語化に努めていることから今後の専門用語標準化の方向性を探る上でも参考になると判断したからである。

8) 「収差」は第2期に使われたが、韓国語としては物理学でしか使われない特殊な漢語であったため固有語の「bəɔt'səɔnam」(はずれること)に置き換えられた。

調査方法は、日本の『専門語の諸問題』(国立国語研究所、秀英出版、1981)に示されている方法に従った。同書では専門用語と基本語彙との比較のためアドリブに選んだ65個の物理学用語を対象に、日本語や英語などの基本語彙、5,000 個とのへだたり度を調べている。韓国語の基本語彙は、約1,000万文節規模のKAIST Corpusから上位5,000語を抽出し選定した。へだたり度の計算は『専門語の諸問題』で示された以下の基準によって全体が一致するもの、部分的に一致するもの、一致しないものの三つに分け調査を行った。

（1） 連語・合成語は、構成要素が基本語彙にすべて入っていれば、一致するものとする。例えば、「光の圧力」、「仕事率」に対して、基本語彙に「光」、「圧力」、「仕事」、「率」があった場合、全体が一致するものとする。

（2）「供給電圧」の場合、「供給」だけが基本語彙にあったとすると部分的に一致するものとする。

（3） 接辞は基本的には対象外にするが、「不合格」、「二色性」のような場合、「不ー」、「ー性」、「ー色」、「二」、「合格」が基本語彙にあると、接辞でも意味的類推が簡単であることから例外的に、全体が一致するものとする。

（4） 動詞からの派生名詞は、動詞の基本形を比較の基準とする。例えば、「重なり」、「結び」などが専門用語の一部分として出現した場合、その基本形、「重なる」、「結ぶ」が基本語彙にあるかどうかを調べ、あった場合、部分的に一致するものとする。

（5） 一つの英語専門用語にいくつかの訳語があった場合、最初の訳語だけをとる。

（1）から（4）までの基準は韓国語にもそのまま適用できる。ただし、（5）の場合、韓国の『物理学用語集』は、固有語の専門用語と漢語の専門用語を同時に載せている場合が多いため最初のものだけをとることには問題がある。『物理学用語集』は、標準化された用語集というより標準化への過渡期的な性格が強く、固有語の専門用語と同時に漢語専門用語を用いる人たちの理解のために漢語専門用語も載せているからである。したがって、漢語を中心に集計したものを「韓国語(1)」とし、固有語や混種語、音借語を対象に集計したものを「韓国語(2)」として分析を行った。韓国語の物理学用語の計が61個になっているのは『物理学用語集』に日本の『専門用語の諸問題』で外国語との比較に用いた「accomodation」のような用語が出現しなかったからである。

へだたり度の計算は、基本語彙と専門用語がまったく一致しないもの(「なし」)には 1 をかけ、部分的に一致するもの(「部分」)には0.5をかけ計算した。次はその結果である。

	全体	部分	なし	計	へだたり度
韓国語(1)	17	26	18	61	50.8
韓国語(2)	22	21	18	61	46.7
日本語	8	31	26	65	63.8
英語	36	17	12	65	31.5
フランス語	30	23	12	65	36.2
ドイツ語	30	17	18	65	40.8
ロシア語	22	25	18	65	46.9

表1 専門用語と基本語彙の言語別へだたり度

この結果から、英語のへだたり度が最も低いことが分かる。英語の場合、新しい概念に対して日本語や韓国語のように積極的に新しい用語を造らないことが原因になっているようである。例えば、『新英和中辞典』(小稲義男他編、研究社、1989)から「cabin」と「coach」を引くと、その違い

がはっきりする。

cabin：丸太小屋、船室、(航空機・宇宙船の)船室、((客室・乗務員室・貨物室など))
coach：四輪大型馬車、バス、(セダンなどの))自動車、普通客車、(旅客機の)二等

このことが一般的現象なのかどうかはもう少し吟味を要する。日本語や韓国語では「溶解」、「融解」・「融合」、「融解」を細かく区別しているが、英語もこれらをそれぞれ「disolution」、「fusion」、「melting」のように区別し、必ずしも「cabin」、「coach」のように一対多の関係ではない場合もあるからである。

造語の観点からの分析ではないが、基本語彙のその言語における使用率について興味深い研究がある。日本語と外国語の語彙調査に基づく上位 1,000 語がその言語の延べ語数のどれだけをカバーしているかについての中野洋氏の調査報告がそれである [9]。同氏の調査によると、日本語の場合、上位 1,000 語をとった場合、延べ語数の 60.5% しかカバーできないのに対し、フランス語の場合は、85.8%がカバーできるという。この結果をそのまま各言語における基本語彙と専門用語のへだたり度の違いを説明するものとして解釈することは早計であるかも知れない。しかし、上位 1,000 語のカバー率が高いことは、専門用語造語への基本語彙の積極的参加と解釈することは可能である。後に詳しく述べるが、日本語の漢語専門用語を訓読した場合、そのへだたり度がフランス語のそれとほぼ同じ数値になることは注目すべきである。

へだたり度における漢字の役割と関連し、表 1 の結果から観察される興味深い事実がある。調査結果から、表面的には日本語の方が韓国語のそれよりへだたり度が高いことになっている。日本語の場合、漢字を訓読すると、その訓が基本語彙の中に含まれる可能性が高くなり、へだたり度が縮まるのに対し、漢字に訓はあっても現代語では訓読をする習慣がない韓国語の場合、その可能性はない。

例えば、日本語の場合、「開口計」に対して、「ひらく(開)」、「くち(口)」、「はかる(計)」のように訓読をするとその意味を簡単に類推することができる [10]。訓読を前提に日本語のへだたり度を計算し直すと、へだたり度は 36.0 になるという。英語まではいかなくてもフランス語のそれに近い数字である。これを考慮に入れると、日本語と韓国語のへだたり度の順番は逆転し、韓国語の方が日本語のそれより高くなる可能性がある。韓国の物理学会が分かりやすい専門用語の普及のために固有語による専門用語造りに着目したのも訓読の消滅と漢字制限による専門用語への理解度の低下と関係がある。

日韓のへだたり度の比較においてもう一つ考えるべきことは、韓国語の場合、実際の物理学の論文や書籍などに使われている用語と『物理学用語集』に載っている用語とはずれがあることである。『物理学用語集』は、標準化された用語集というより、約 50 年に渡る物理学会の用語整備の結果生まれた過渡期的な性格が強く、上述のように漢語、固有語、音借語が一つの英語に混在して対応している。したがって、正確な調査のためには『物理学用語集』と実際に物理学の分野で用いられている教科書や論文の専門用語との比較が必要である。

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9) 中野洋、「単語の数はどれくらいあるか」(新・日本語講座 1『現代日本語の単語と文字』汐文社、1975)

10) 野村雅昭、『漢字の未来』(筑摩書房、1988、PP.141-142)

物理学の論文の用語調査から得られた専門用語を対象に基本語彙と専門用語とのへだたり度を調査した[11]。その結果、韓国語の物理学論文におけるへだたり度は 66.5 となり、『物理学用語集』を対象にしたそれよりかなり高くなっている。このような結果は『物理学用語集』とは別に実際の物理学分野の論文では漢語による専門用語が多く用いられていることを意味する。用語集と実際に使用されている用語とのずれは、韓国語の専門用語の標準化の現在のレベルを物語るものであり、今後の標準化において解決すべき重要な課題となっている

6．専門用語の標準化と漢字・漢語

表１の「韓国語 1」と「韓国語 2」のへだたり度の違いは、これからの日本語の専門用語の造語の方向性を探る上でも再吟味を要する。日本語の場合、訓読によって専門用語と基本語彙とのへだたりがある程度縮められていることがあるとしても一般の認識としては、依然専門用語を難しいものと感じている社会で、漢字以外の方法による造語の可能性に注目した次のような主張がある[12]。

> 日本語における訓の存在が、両者をちかづけるうえで一定の機能をはたしていることはたしかであるが、それは現在の学術用語の体系についていえることである。そのことが漢字・漢語以外の方法による造語の可能性を否定するものでないことは、いうまでもない。

このような指摘は、日本語において漢字・漢語以外の方法による造語の可能性についてより積極的に検討する必要があることを示唆している。固有語に注目することが、基本語彙と専門用語とのへだたりを縮め、分かりやすい専門用語の普及につながることは韓国語の例を見ても確かである。

韓国の『物理学用語集』は、すべての漢語専門用語を固有語に置き換えているのではなく、次のような場合に限定して置き換えを行っている。

1）韓国語にない、あるいは極めて特殊で理解の妨げになる漢語を固有語に置き換える
2）漢字で表記しないと曖昧性の生じる接辞などを積極的に固有語や二字漢語に置き換える

４章でも取り上げたように、「aberration」の訳語として 1962 年に刊行された『現代物理学』（池彰烈・朴興秀他共訳、探求堂）では日本語と同じく「収差」を使っていたのを「収差」が韓国語としてほとんど用いられないことから「bəɾ'səɲam(外れること)」のように固有語動詞「bəɾ'səɲada」の名詞形を用いて表現している。接辞に関しては、同音異義として解釈できる接頭辞「ban-(半、反)」などを固有語、あるいは二字漢語に置き換えている。このような置き換えにより、基本語彙とのへだたり度は漢語専門用語(韓国語(1))の 51.6 から固有語専門用語(韓国語(2))の 47.7 に減っている。

固有語への置き換えの動きは、日本の植民地時代の韓国語抑制、あるいは抹殺という歴史的事実への反発と自国語の大事さの自覚によって起こり、韓国語の音節構造の特徴がそれを可能にしたものと考えられる。韓国語の場合、「子音＋母音」以外に、「子音＋母音＋子音」、「子音＋母音＋複合子音(子音＋子音)」という複雑な構造を持ち、漢語の一音節が固有語の一音節に対応して

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11) 宋永彬、「専門用語の位相と辞書構築」（『韓国における専門用語研究と方向』第一回専門用語言語工学シンポジウム論文集、KORTERM、1998、PP.90）
12) 野村雅昭、『漢字の未来』（筑摩書房、1988、PP.142）

いる。例えば、「power source」の場合、漢語では「電源」という訳語を用いるが、「電源」の「源」の部分がハングルで表記された場合、韓国語としては「won＝元、源」という二つの字音形態素に対応し、漢字を用いないと曖昧性が生じる。そのため「sem」(イズミ)という一音節の固有語に置き換え「電力 sem」という混種語を『物理学用語集』では提案している。

「virtual displacement」の場合、漢語の用語では「仮想変移」というところを「仮想 omgim」(仮想ウツスコト)のように混種語に置き換え(このような場合、「変移」と「omgim」は、韓国語としては両方とも二音節である)、「変異」、「変移」の「byon-i」という同音異義から来る曖昧性を解消している。このような固有語への置き換えによってへだたり度は縮まったが、固有語への置き換えにも限界がある。例えば、「caloric theory」の場合、『物理学用語集』では「熱素説」という対訳が付いている。この場合、「熱」の自立語基としての馴染みが深く、一般はもちろん、物理学専攻者でも「熱/素説」といった誤った分析をしてしまう可能性がある。さらに、「素説」をハングルで表記すると、その同音異義語「小説(sosol)」に解釈されやすいことから「熱素論」や「熱素理論」に置き換えたらどうかとの意見も出ている。「説」を「理論」や「理論」との意味的つながりが強い「論」に置き換え、ハングル表記による曖昧性の問題を解決しようとしているのである。「説」や「論」、「理論」の部分を固有語に置き換えることは不可能である。

「analyzer」と「splitter」の場合、『物理学用語集』には同じ「karuge」(分けるもの)という固有語の対訳が見られる。このような固有語による混同を避けるため、第2期に使われた「分析器」、「分割器」を復活した方がよいとの主張もある(「分析器」、「分割器」の場合、発音も異なるので、漢字表記を用いる必要はない)。固有語化にも限界があり、例え、一般語彙に比べ人為的操作が可能な専門用語であってもその国の語彙体系から完全に自由ではないことを意味する例である。

植民地時代の反動として始まった過激な固有語化の時代を乗り越え、より冷静に韓国語の語彙体系に合った専門用語の確立が必要な時期に来ているといえよう。

韓国語において議論してきたように、専門用語を固有語に置き換えることは簡単な問題ではない。それには、歴史的背景、音韻構造といった言語的特徴など、必然的な動機が必要である。もちろん、専門用語の固有語化が基本語彙と専門用語とのへだたりを縮め、分かりやすい専門用語の普及につながることは確かである。しかし、その道のりは極めて険難な道であることが韓国語の例を通じて確認できよう。

7．専門用語の自国語化

専門用語の自国語化は、なぜ必要なのか。韓国では最近、医学用語の韓国語化が一部の病院や看護婦団体で進められている[13]。例えば、「昨夜熱が出て、お腹が痛かった」といった表現を次のようにカルテに記す場合があるという。

fever & abdominal pain last night

極端な場合、次のような表現も見られるという。

f ap 1da

「f」、「ap」、「1da」は、それぞれ「fever」、「abdominal pain」、「one day ago」を簡略化したものである。このような表現を用いると、書いた医師本人でないと診療の詳細

13) 東亜日報、1998年11月26日、社会面

が分からなくなり、担当医の変更、患者が他の病院に移った場合など、様々な問題が生じる。英語を母語としない医師にとって患者の訴える細かい症状を英語で書き表すことは容易でないことから診療の質の低下にもつながる可能性がある。

頭が(ちくちく/ずきずき/がんがん)痛い
お腹が(ちくちく/しくしく)痛い

専門用語を自国語で表現することはそれを用いる集団や社会のコミュニケーションの質的向上につながる。このことが専門用語の自国化のもっとも本質的で重要な理由である。

学界ではますます英語で書かれる論文が増え、英語は学問をやる人間にとって必要不可欠なものにまでなった。しかし、このような時代であるからこそ専門用語の自国語化が重要な意味をもつ。自国語を用い続ける限り、正確な概念の理解は英語ではなく自国語によって可能であり、正確な自国語の概念規定に基づいて初めて英語の専門用語も正しく理解できるからである。

8．標準化とデータ処理

専門用語は現在、学問そのものの急激な発展と共に急激に増える傾向にある。これら増え続ける専門用語に対してこれまでのように審議を通じた標準化では処理できる数と用語選定における客観性の確保に限界がある。効率の良い標準化のためにはデータの利用によるより積極的な標準化へ取り組みが必要である。その取り組みの一つにコーパスの作成がある。専門用語辞書を集め、それを調査するのも一つの方法ではあるが、辞書の持つ時間的保守性から新しい専門用語に対応しきれないといった問題がある。コーパスやWeb空間に存在するデータは標準化された用語ではないにしても新しい専門用語をリアルタイムで集めることを可能にし、韓国語のように年齢や分野によってずれが大きく、標準化による置き換えが激しい言語において、コーパスやWeb空間に存在するデータの存在は専門用語の標準化はもちろん、専門用語の変化に対する的確な情報をつかむためにも必要である。現在、KORTERMでは基礎科学に属する物理、化学、生物などの大学の教科書を中心にコーパスを作成している。

コーパスの作成と同時に、Webから集めた文書を分野ごとに自動的に分類する研究を進めている[14]。現在の研究は、百科事典の分類や見出し語を用いた初歩的の段階ではあるが、実現できればリアルタイムで専門用語のコーパスが大量に作成できる可能性がある。

今後の音借語の増加に対する取り組みとしてKORTERMでは、英語の専門用語を外来語表記法に基づいてハングル表記に自動的に変換するプログラムの開発を進めている[15]。現在の水準は、現行の外来語表記法に基づいた研究であり、様々な音借語に十分対応できるまでにはまだ時間がかかりそうである。音借語の表記に関する転写基準の確立は、約2,400の音節が表記可能な韓国語において簡単な問題ではないからで

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14) 李敬順「専門用語および情報抽出に基づく文書分類システム」(『第11回ハングルおよび韓国語情報処理学術大会論文集』、1999、PP.79-84)

15) Lee,J.S.,and Choi,K.S.,「English to Korean statistical transliteration for information retrieval」(『Computer Processing and Oriental Languages』、12(1)、1999、PP.17-37)
李栽成、「二重言語コーパスからの外来語表記辞書の自動構築」(『第11回ハングルおよび韓国語情報処理学術大会論文集』1999、PP.142-149)
姜炳周「韓－英自動音借復元」(『第11回ハングルおよび韓国語情報処理学術大会論文集』1999、PP.63-69)

ある。

音借語表記の問題は、原音を忠実に韓国語で書き表そうとする原音中心主義と既存の外来語表記法の枠組みの中で解決しようとする二つの立場がある。最近では原音になるべく近い表記を採用した用語集も見られ、この問題に対する積極的な対応が要求されている。

9．標準化と分かち書き

韓国語の専門用語の標準化において重要な問題に正書法の確立がある。正書法は表音文字による語の綴り方を示したもので、韓国語の場合、外来語表記以外に問題となるのは分かち書きである。漢字を基本的に用いない韓国語において二次結合、三次結合以上の長い合成語は意味の理解に支障を来すことにつながる。このような場合、現行の分かち書きでは例外として一つの単語であっても分かち書きを認めている。例えば、「valence electron」の訳語「原子価電子」を「原子価 電子」のように分かち書きしても良いことになっている。しかし、このように分かち書きしたものをハングルで表記した場合、「でんし」は「jənja」のように発音され、韓国語として「前者」と「電子」の二つの意味に解釈される。同じく、「価」の場合、「ga」と発音され、「価」と格助詞「が」と両方の解釈が可能であり、次のような曖昧性も生じる[16]。

原子が 前者である
原子が 電子である
原子価 電子である

このような曖昧性の問題は漢字を用いることによって解消できると主張することも可能であり、実際、そのような主張がある。しかし、漢字制限から50年以上経った現在、漢字を復活することは容易ではない。漢字を復活したとしても若い世代にそれが受け入れられる可能性は低い。漢字表記に代わるものとして、最近ではハングルで書かれた専門用語に括弧で英語の専門用語を併記する場合が増えている。漢字の果たしてきた役割が英語に代わりつつあるのである。

10．終わりに

専門用語は、その操作性の容易さにも関わらず、その国の言語体系や使用者から完全に自由ではない。韓国語の場合、長年に渡る漢字制限の結果、専門用語と日常語のへだたりは少しずつではあるが、縮まりつつある。その一方でハングル表記による様々な問題が発生しているのも事実である。専門用語の標準化は自国の学問的発展に必要不可欠な問題であり、自国語の体系に合った専門用語を用いることにより独自の学問の発展も可能である。

現在の専門用語の性格からして専門用語の標準化はもちろん、応用技術としての専門用語研究への技術的支援も必要である。今後、幅広い研究分野を網羅する専門用語学の確立が専門用語の問題を解決する可能性につながることは確かである。

本稿では主に英語から韓国語といった観点から専門用語の問題点を取り上げたが、分野によってはその逆の場合も存在する。東洋医学など固有の学問分野の専門用語がそれである。これら固有の学問分野の専門用語を含め、韓国語の専門用語について体系的に研究を進める機関が韓国科学技術院に設立されたことは韓国だけではなく東アジアの今後の専門用語研究においてもその意味は深い。

同じく漢字文化圏に属しながらもそれぞれ異なった環境の下で独自に専門用語を育

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16) 李憙煥「化合物命名法と化学述語制定方法および問題点」（『韓国における専門用語研究と方向』、第一回専門用語言語工学シンポジウム口頭発表原稿、1998）

んできた日本や中国においてその共通点や相違点を明確にし、今後の専門用語研究と標準化に必要な共通の土台を築き上げるための交流と努力が期待される。

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Mechanisms of Knowledge Organization Based on The Representation of Semantic Relationships among Terms

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Abstract

Technical terms are the most convenient and powerful representation medium of abstract concepts in science and technology as in other areas of human activities, because terms are used in thinking processes and in representing results for communication and for storage.

It is shown that concepts or terms can be self-organized according to semantic relationships among terms, extracted by systematic procedures based on analyses of coinage rules of terms and terminological structures, semantic analyses of sentences defining meaning of terms in literatures and dictionaries. The most important result of the analyses is establishment of the homogenized bipartite model (HBM) which can provide flexible description and representation of meaning of terms as well as relationships among terms.

Self organized multilingual terms are very useful for understanding contents of scientific information. An international joint project will be proposed to develop "Self Organized Multi Lingual Scientific Term Bases" as a new type of knowledge resource which is a key to advanced utilization of information. Hence, new types of functions can be developed beyond the limit of conventional database and knowledge-base management systems, e.g. semantic processing for problem solving, decision making, machine thinking based on generating information and conjecture of the open world.

The multilingual terms thus self organized, may be used to clarify mechanisms of learning and thinking in brains and to design architecture of a new type of computers and software systems.

1 Introduction

Semantic processing and understanding are necessary to realize thinking functions of computers. Self-organization of conceptual structures carrying various and rich semantic relationships is an effective solution, and corresponds to machine learning. Simple semantic processing has been applied to information retrieval, natural language processing and machine translation where semantic relationships include only typical ones such as equivalent, hierarchical and associative ones, which can be expressed by thesauri (3,4). Therefore representation of usual thesauri is too simple to describe diversified semantic relationships necessary for advanced functions i.e. analogical reasoning, induction, (analogical) abduction, creation and association as well as information retrieval, and data management. It will be shown that self-organized conceptual structures can represent various semantic relationships.

It is required to construct systematically conceptual structures carrying various and rich semantic relationships within domain specific information for thinking. The conceptual structures should include various relationships, which are much more complex than usual thesauri, and conventional data vehicles are not flexible sufficiently for the purposes [1～ 7]. A homogenized bipartite model is used to describe semantic relationships in the conceptual structures, which consist of diversified types of edges and nodes [9,10] which is explained briefly in the following section

together with its applications. The conceptual structures including multiple hierarchical relationships and associative relationships with labels are much more complex than usual thesauri. Overlapping, n-ary, dynamic and relative relationships in the conceptual structures can be represented based on homogenized bipartite model which is an extended hyper graph model.
The self-organized conceptual structure for super conducting materials as one of practical examples has been developed by integrating fragmentary semantic relationships extracted automatically from technical term analyses. The automatic integrating system includes structuralization of all connections according to their meaning as well as consistency check e.g. broad term analyses, and narrow term analyses. The interface was developed to visualize the conceptual structures from various view points of concern. The resulted conceptual structures can be used for advanced functions e.g. analogical reasoning, induction, abduction, creation and association as well as information retrieval, data management as shown bellow.

2 Conceptual Structures Represented by Terms and Relationships

Representation of conceptual structures corresponds to organization of terms and semantic relationships among them.

2.1 Multiple Hierarchical Relationships

Hierarchical relationships are one of the major elements of conceptual structures. Those of domain specific terms include is-a, part-of and facet classification among others. Each hierarchical relationship usually composes a semantic relationship system. However, it is necessary to integrate at least both types of hierarchical relationships, to express generally and efficiently semantic relationships. [3]

Whereas usual thesauri mainly express relationships of tree structures, in this conceptual structure, multiple hierarchy is represented. For example, "antennae" include "electric conductors" and "communication" as the broad terms and the term "floor warming cable" has two types of hierarchical relationships. By faceted hierarchical relationships this term belongs to the subfacet of a term "heat engineering components" and it's broad term "cable" in the is-a hierarchical relationship belongs to term "electric conductor". Many terms belong to a same facet under it's broad term of is-a hierarchical relationships.

2.2 Associative Relationships

In usual thesauri, most relationships other than is-a are simply expressed as associative relationships. Logical relationships such as an agent-object relationship, and particularly causal relationships are inevitable in applications of induction, analogical reasoning and (analogical) abduction which are major functions of thinking process. The conceptual structure includes a new type of associative relationships with labels for describing special associative feature e.g. SP(State and property) and CP(composition and property) as shown. These labels carry composite experimental contents e.g. Value(electric resistance of Ba - Cu - Ln Oxides is 0 in a super conduction state at 93K).

2.3 The Homogenized Bipartite Model for Describing Diversified Relationships

The representation of conceptual structures shown in the figures 1 and 2, is based on the homogenized bipartite model (HBM) which is an extended recursive hyper graph model. This model consist of diversified types of edges and nodes to describe hierarchical, overlapping, n-ray, relative, and view dependent dynamic relationships in the conceptual structures [9,10].

Table 1 Characteristics of Information Structure

1. Diversity of Semantic Relationships
   - Sufficient Description and Flexible Representation
   - Explicit Scope and Limitations
2. Multiple Hierarchy
   - Redundancy of Extension → Inheritance
3. Partial Overlap
   - Not Distinct
   - Similarity and Association Depending on Contexts
4. N-ary Relation
   - Beyond Gragh Structures (Binary Relation)
5. Internal Structures : Nested and/or Recursive Structures
   - Non Well Founded Sets
   - Evolutional Sets Corresponding to Open World
6. Relativity and Duality
   - Homogeneity of Concepts(node) and Relationship(link)
7. Dynamic Relationships
   - View Dependence

The model is formulated as follows:
Let V, E and L be a set of vertices, edges and labels respectively,

$$E \subseteq 2^V \quad (1)$$
$$V = V \cup E \quad (2)$$
$$E = E \cup V \quad (3)$$
$$L \rightarrow E \cup V \quad (4)$$

The formula (2) and (3) allow recursive and nested structures respectively. Integrating (2) and (3) eliminate difference between vertices and edges i.e. nodes and links are homogenized. In addition, the above homogenization solves relativity issues between nodes and links corresponding to concept - relationship, entity - attribute and so on. These can not be solved by either graph structures or hyper graph ones.
Another important issue of evolution can be solved by the homogenization as well and the HBM is relevant to open world problems, which are the essential ones of thinking functions. The major functions of thinking consist of induction, analogical reasoning and (analogical) abduction, and the mechanisms are shown bellow.

The mechanisms of conjectures including information generation are as follow :

Let $C=(V, E)$ be the universe of concepts, and
$Cr=(Vr, Er)$, $Cs=(Vs, Es)$, $Cc=(Vc,Ec)$,
where r, s, and c designate reference, sample and common substructures respectively.

The mechanism of induction :

$$Cc \subseteq Csi \cap Csj \cap \cdots \cap Csn \cap Cr,$$
$$Cs' = (Vs', Es') = Cr(Vr, Er), \quad (5)$$
i.e. $Vr = Vc + \delta Vr$, $Er = Ec + \delta Er$, and
$Vs' = Vc + \delta Vr$, $Es' = Ec + \delta Er$.

The mechanisms of analogical reasoning and (analogical) abduction :

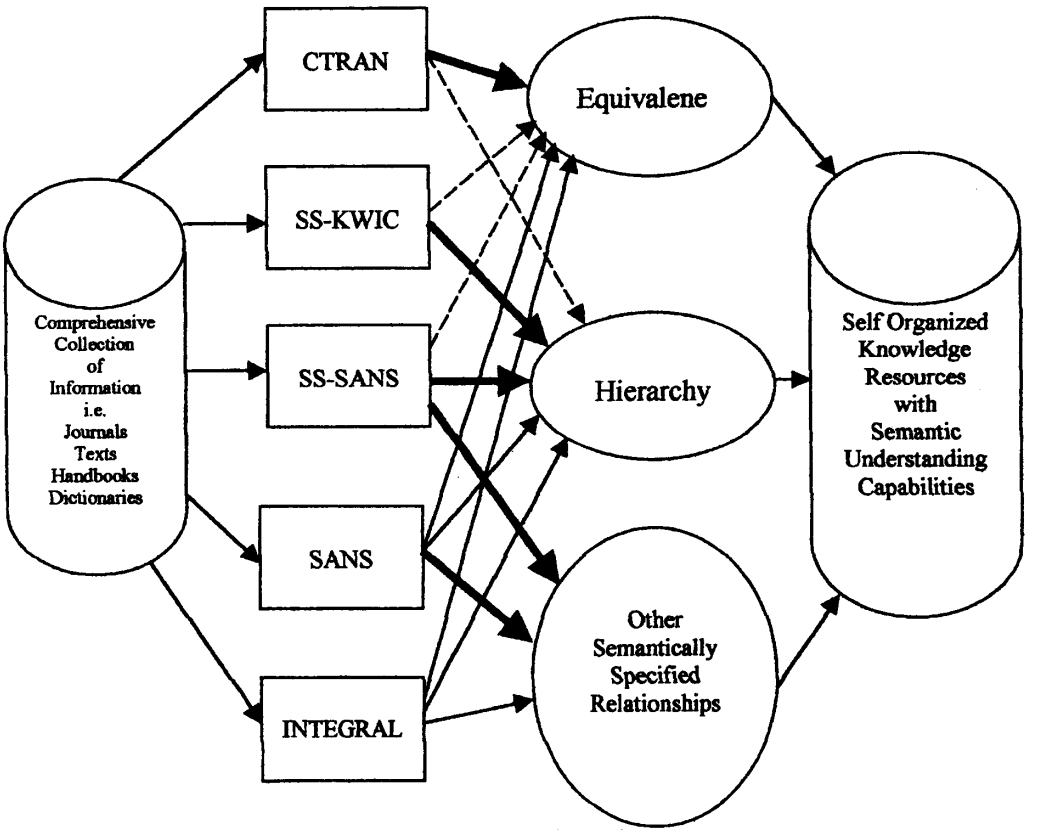
$$Cc \subseteq Cs \cap Cr,$$
$$Cs'(Vs', Es') = Cr(Vr, Er), \quad (6)$$
$$\text{i.e. } Vr = Vc + \delta Vr,\ Er = Ec + \delta Er, \text{ and}$$
$$Vs' = Vc + \delta Vr,\ Es' = Ec + \delta Er.$$

It is interesting to see that all of induction, analogical reasoning and (analogical) abduction have the same simple mechanisms which include procedures to generate new information.

2.4 Automatic Construction of Conceptual Structures

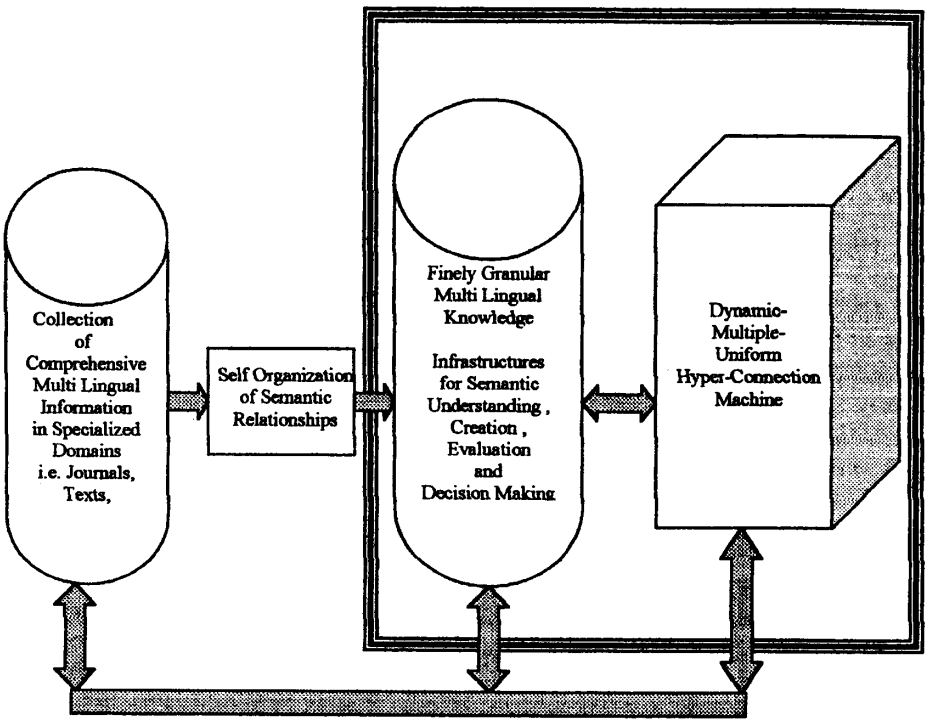
Automatic extraction and self-organization of semantic relationships are necessary to obtain a large amount of semantic relationships. A system of self-organized conceptual structure has been developed by integrating fragmentary semantic relationships extracted automatically from technical terms collected comprehensively and those obtained from definition of terms as well as available thesauri [13,14].

Figure 1 Extraction of Semantic Relationships among Terms



The automatic integrating system includes symbolic analyses of terminological structures and consistency verification within relationships collected thus. The interface was developed to visualize the conceptual structures. The system is applied to the information of materials and organic reactions and results are reported in the papers [15,16].

2 Knowledge Driven Hyper Brain Systems



3. Discussions

The structuralization of multiple hierarchical semantic relationships makes it possible to represent wider relationships of terms including standard logical ones and modal ones too [6] [7]. For example, in facet hierarchies of the term "parallel communication" is shown as

communication > communication technology
> communication transmission methods
> parallel communication ,

where > means broad to narrow relationship
and in the is-a hierarchy extracted by the SS-KWIC method [11] although this term is simply shown as

communication > parallel communication.

In this case, deeper hierarchy is shown and the shallower hierarchy is deleted because that is redundant due to transitivity of hierarchical relationships belonging to a same broader term "communication".

Logical relationships are also included in the conceptual structures. This makes associative relationships more specific and inferences is simplified as navigation without heavy complexity of unification during deduction according to the resolution principle. The terms in conceptual structures are not only conceptual units but also used as atomic formulae and function symbols to represent logical relationships.

4. Conclusion

The methods of construction of complex conceptual structures describing various semantic relationships and automatic integration of semantic relationships from different sources are developed. The conceptual structures based on the homogenized bipartite model can be used for advanced functions such as analogical reasoning, induction, abduction, creation and association as well as information retrieval, data management [8].

In other words, the self organization of conceptual structures corresponds to learning in brains, and provides computers with the functions to understand and to process meaning of stored information. Hence thinking machine can be implemented, based on well structured information which may be called machine understandable knowledge.

Proposals of International Joint Projects

1. Construction of Multilingual Knowledge Infrastructures : ML-KI

   a) Collection of Domain Specific Comprehensive
      Necessary Information
   b) Self Organization of Semantic Relationships
      among Concepts Represented by Terms

2. Hyper Brain Thinking Machines Based on ML-KI : HB-TM

   a) Hyper Brain Super Parallel Processors
      with Dynamic-Multiple-Uniform-Hyper-Connections
   b) Implementation of Hyper Brain Thinking Systems
   c) Applications to Problem Solving and Decision Making

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TERMINOLOGY INFRASTRUCTURES IN SUPPORT OF THE TERMINOLOGY MARKET IN EUROPE

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Abstract:

There seems to exist a vexing relationship between the possibility to use one's mother-tongue and the positive economic development of the respective language community. People whose mother-tongue is not (or not sufficiently) developed from the point of view of specialized languages or who are denied to use their mother-tongue in education and training, for accessing information or on their daily work situation tend to be/feel disadvantaged. In most cases the limitation of the use of a language to areas such as culture and folklore results in the - almost irreversible - loss of its applicability in professional communication. On the one hand, the 'linguistic map' of Europe reveals the richness of the European cultural heritage, but should not, on the other hand, be a source for complacency, if we consider the potential for conflict. It definitely needs a framework of measures at European, national and language community level in order to prevent the smaller language communities from dropping into a really disadvantaged situation.

The terminology infrastructure(s) as well as the terminology market(s) are still characterized by the co-existence of many loosely interconnected elements. Of course there are very different language situations within the various language communities with respect to the evolution of terminology infrastructures and the terminology market. Nevertheless a certain pattern seems to evolve. First of all a distinction has to be made between the horizontal and vertical infrastructures. Definitely the development of the terminology market and the development of a terminology infrastructure mutually support each other. Obviously the development of both is speeding up recently, but there is still a long way to go.

The planned European Network of Terminology Documentation Centres (TDCnet) will be a cornerstone of the future terminology infrastructures in Europe. It will also support the further development of the terminology market by providing information on existing terminology resources, activities, experiences, services etc. and on the conditions of their availability.

Where and whenever specialized information and specialized knowledge are being prepared, represented, processed, transformed and transferred, terminology is accorded a crucial role. There is, therefore, hardly any area in an enterprise or other specialized organization, where terminology is not used.

1 LACK OF AWARENESS AND FRAGMENTED SITUATION

On the one hand terminology is of fundamental importance as it represents specialized knowledge at the level of concepts (which are the basic units of subject-field related thinking/cognition, knowledge and communication), so that terminological data are the main 'contents carriers' to record, order, store, manage, represent, retrieve, disseminate, communicate or transfer specialized information and knowledge. On the other hand there is comparatively little awareness for this importance even in the quarters of the specialists being the primary creators and users of the terminology of their respective subject-fields.

This is partly due to the fact that terminologies are created as a rule by domain experts of various levels in a multitude of subject-fields in an 'evolutionary' rather than coordinated way. This results in a highly fragmented and sectorized situation with respect to most terminological activities and applications. The emergence of a terminology market for terminological products and services will certainly improve this situation, but it also needs terminology infrastructures to support the creation and distribution, re-use and use of terminologies - especially in multilingual and multicultural Europe.

1.1 ECONOMIC AND SOCIAL IMPACT OF MOTHER-TONGUE USE

There seems to exist a vexing relationship between the possibility to use one's mother-tongue and the well-being of the respective language community. People whose mother-tongue is not (or not sufficiently) developed from the point of view of specialized language or who are denied to use their mother-tongue in education and training, for accessing information or on their daily work place tend to be/feel disadvantaged. Especially smaller language communities (incl. linguistic minorities of all sorts) have to balance many linguistic disadvantages by making more efforts than the surrounding larger language communities in order to prevent marginalization with respect to scientific-technical and economic-industrial development - which ultimately may lead to socio-economic decline. In most cases the limitation of the use of a language to areas such as culture and folklore results in the - almost irreversible - loss of its applicability in professional communication. This calls for a distinct conciousness for the need of terminology planning in many/all language communities and concrete legal and administrative action to support it.

1.2 SITUATION OF SPECIALIZED LANGUAGES IN EUROPE

In today's European Union (EU) there are only a few language communities whose mother-tongue is openly discriminated or even suppressed, but many whose language situation can be called disadvantaged for various reasons. An unorthodox analysis of the 'linguistic map' of Europe shows that from the point of view of language variety Europe must be considered rather 'poor' compared to other continents. Nevertheless the language distribution is far from being simple and without problems. According to recent figures about 55-60 languages are used as mother-tongue by

language communities of more than 50,000 speakers (including non-European languages of foreign workers or refugees, while not taking into account the Caucasus region, which is a linguistic cosmos of its own). If only languages of more than 500,000 mother-tongue speakers are considered, the figure drops to about 45 languages. Some of these language communities do not much care about SPLs (special purpose languages or specialized languages), matched by a few language communities of sometimes less than 500,000 speakers undertaking serious efforts to develop their language as a tool of modern communication.
In the EU more than 260m citizens use one of he major four languages of more than 50m mother-tongue speakers each: German [90m], English [61m], French [58m] or Italian [55m]. Some 80m people use one of the other 7 official working languages of the EU institutions as mother-tongue: Spanish [25m - if deducting Basque, Catalan and Galician speakers], Dutch [21m], Portuguese [10m], Greek [10m], Swedish [9m], Danish [4m] or Finnish [4m]. Additional 20m EU citizens use one of more than further 10 languages with more than 50,000 speakers. Together there are more than 30 officially recognized language communities in the EU, further 10 are seeking official recognition, not to mention all sorts of 'minority languages'. The ratio of small languages to large language communities, therefore, is about 35% (if Spanish and Portuguese in this context are included in the small languages – which can of course be argued). In this connection it is also difficult to evaluate the situation of people speaking a minority language somewhere, which is a large language elsewhere in Europe or in the world. Every further extension of the EU will push the above-mentioned ratio towards 50% and above, which would mean that somewhen in the future more than half of the EU population might belong to a potentially disadvantaged language community.
Various references consulted with regard to language statistics are by no means consistent. Therefore, individual figures may be questioned, which, however, has no substantial effect on the overall picture presented here. The figures, on the one hand, represent the richness of the European cultural heritage, but should not, on the other hand, be a source for complacency, if we consider the potential for conflict. It definitely needs a framework of measures at European, national and language community level in order to prevent the smaller language communities from dropping into a really disadvantaged situation.

2 THE 'TERMINOLOGY MARKET'

Not the least due to the European Commission's emphasis on multilingual aspects in all Community R&D Programmes a terminology market - deserving to be called so - is gradually emerging.

2.1 TERMINOLOGY PRODUCTS AND SERVICES FOR WHOM?

Terminologies emerge among others
- in science and technology in the course of scientific and technical development,
- in crafts and arts in the course of new techniques and skills,
- in public administration and in society in general in conjunction with new conceptions and approaches.

They are created primarily by domain experts of various levels in a multitude of subject-fields in an 'evolutionary' rather than coordinated way. The expert communities, comprising the primary creators and users of their domain specific terminologies, thus also cause the well-known communication problems, such as homonymy and synonymy, which some of them try to resolve by means of descriptive or prescriptive terminology work. Terminology work, therefore, is carried out in a large number of subject fields usually by groups of experts. In addition, it should be remembered that it is a time-honoured scientific tradition to define what one is talking about in scientific and technical literature (a general rule for instance in standardization) – a good tradition often neglected today in scientific discourse.
Since science and technology increasingly influence more and more all walks of life and society, deficient terminologies are not only causing communication difficulties in the respective peer groups, but also have negative repercussions on many people who have to use specialized terminology
- at their work places,
- as consumers,
- as citizens, and

more and more even in intra-family communication. Potentially and increasingly everybody is or could become a more or less frequent user of some or any specialized terminology regularly or occasionally in his/her life.
The gradually emerging 'terminology market' will offer terminological products and services - which in fact are a particular family of information products and services - to a variety of consumers and clients, such as
- terminology creators (e.g. researchers, technicians, administrators, etc.),
- terminology data producers (e.g. terminology database creators, specialized lexicographers, etc.),
- terminology data distributors (e.g. dictionary publishers, online information services, etc.) and
- terminology users in general.

Terminology creators, data producers and data distributors in most or many cases are also or can become re-users of existing terminological data.

2.2 TERMINOLOGY PRODUCTS

Terminology products mainly comprise

- different kinds of terminological information in different forms for different purposes and different user groups,
- terminological tools for various purposes.

Terminological information (if terminology documentation is included) comprise three distinct fundamental types of data, viz.:

- terminological data proper (i.e. information on domain-specific concepts and their representation by linguistic and non-linguistic symbols supplemented by a variety of associated data),
- bibliographic data on a variety of different kinds of publications in the field of terminology,
- factual data on institutions, experts, programmes, events and other activities in the field of terminology.

Each of them requires a different type of database system (comprising a set of distinct databases or one integrated database system each for different data models). A comprehensive terminology information and documentation centre like Infoterm has to deal with all three types of database systems modelled on the basis of well-defined data categories (according to the 'objects') for different purposes. The data as well as the respective software can be used as 'products' and as a basis for a variety of 'services'.

The total volume of the above-mentioned types and categories of data may be estimated as follows:

- terminological data proper – more than 50m records accross all subject-fields (potentially in some 200 languages which are of relevance or potential relevance in terminology; not including product-specific terminology) – the increase is more or less parallel to the increase of specialized knowledge,
- bibliographic data - about a quarter million records (of which an estimated 200.000 are about technical dictionaries and lexicons; the majority published in the form of ‚grey literature') - the annual increase can be estimated about 10%,
- factual data - about 50.000 records (80% of which concern terminology committees, commissions and working groups as well as terminological institutions at international, regional and national levels) – the increase is difficult to estimate, but the biggest problem here is the high degree of fluctuation!

Terminological data proper

Terminological data from the formal point of view represent specialized knowledge at the level of concepts. They do not only comprise terms and definitions and similar types of linguistic symbols, since subject-field related concepts can be represented by any kind of symbol. Terminological data can be offered

- in conventionally published form (i.e. as hard-copy dictionary, glossary, lexicon etc.),
- as an electronic publication (comprising only the data as such in a given format or in combination with a software or hardware, such as in an electronic dictionary),
- through online information services.

In palm-top computers or even smaller pocket-size electronic dictionaries the terminological data may be implemented in inseparable combination/integration with the respective software or even hardware.

Terminological data can be acquired by customers on the terminology market for internal use only or for re-use, in the course of terminology data interchange, etc. on a variety of different data carriers (diskette, CD-ROM, etc.). However, different user groups need terminological data of different degrees of complexity and granularity for different purposes. It is, therefore, highly economical to prepare multi-purpose terminological data for different purposes and users, whose needs are taken care of by appropriately tailored customer-specific user-interfaces. Terminological data can also be used very efficiently as the intellectual 'skeleton' (or infrastructure) around which the contents of domain-specific encyclopedia can be organized.

Terminological tools

Terminology application software provides the most common tools for the handling of terminological data in some way or other. ***Terminology management systems*** (TMS) are designed as dedicated tools to record, store, process and output terminological data in a professional manner. There are different kinds of TMS for different purposes. ***Terminology databases*** consist of terminological data and a TMS to handle these data. ***Terminology data banks*** (TDB) are more or less sophisticated organizational/institutional structures established for the handling and maintenance of large amounts of terminological data for a multitude of users with the help of a TMS. TDBs can comprise several or many terminology databases.

TDBs are supported by a TMS often running on a mainframe, mini-computer or work-station, whereas most of the PC-based TMS today are applied by individual users, small cooperatives (integrated or not by an appropriate LAN), or larger departments (where the individual work-places are usually linked by a more or less sophisticated LAN).

On the one hand TMSs are increasingly further developed into tools for various applications, such as

- computer-assisted translation,
- scientific and technical authoring (incl. technical documentation),
- spare-part adminstration,
- electronic commerce, etc.

On the other hand TMS moduls of varying degree of sophistication are implemented into all kinds of application software. They are thus increasingly applied in a variety of information and communication workflows.

In the future appropriately designed TMS or TMS modules will find new markets particularly in applications, such as

- cooperative writing (today a high percentage of the citizenship of developed countries works more or less intensively in some form or other as 'technical writers'),

- documentation (in the meaning of information & documentation as well as of archiving and filing), and
- cooperative terminology work.

If appropriate tools were available for computer-assisted cooperative (and network-based distributed) terminology work, the preparation, processing and maintenance of terminological data could be carried out faster, more efficiently and in line with modern quality management approaches. Needless to say that this would considerably help the terminology market to develop.

There is a tendency in software development to try to integrate TMS into all kind of information and work flows thus turning them into management tools.

2.3 TERMINOLOGY SERVICES

At present the following terminology services already exist or are foreseeable in the near future:

- terminology consultancy and training services,
- outsourcing of terminological tasks,
- information services in the field of terminology.

Consultancy services and training

Consultancy services and training are most often needed in conjunction with application aspects, such as

- application of terminological principles and methods (including especially the appropriate application of existing standards on terminological principles and methodsas well as related standards),
- selection and application of tools (e.g. software for the processing of multilingual data),
- terminology project management etc.

As a rule today's experts have not studied the basic theory of logic and epistemology underlying the science of sciences (or science theory – also comprising the basic theory of terminology). They, therefore, often need training in the theoretical and methodological basics of terminology science and terminography. Large organizations/institutions often need to integrate terminological methods and tools into their information management or quality management schemes. Government agencies and other public authorities in many countries want to implement knowledge transfer policies, which would largely benefit from the appropriate terminology planning methods. Institutions and organizations frequently also need advice with respect to legal problems (especially related to intellectual property rights) concerning the application of terminologcal data and tools.

Terminology consultancy, therefore, should become an integral part of many types of consultancy services, especially business consulting, communication consulting, etc. It will become indispensable in future e-commerce, e.g. for the preparation of online product catalogues, interchange of data on technical devices, etc. As knowledge management cannot do without terminology, information and knowledge management also need a strong terminology component. It has to be mentioned, however, that with a few exceptions (e.g. China, Greece, etc.) these needs are still latent, decision makers not being aware of the usefulness and effectiveness of such services. Therefore, it is still a dormant market for lack of interest and investment.

Outsourcing

Increasingly institutions and organisations of all sorts consider outsourcing a suitable method to cope with identified limited terminological needs. Outsourcing may refer for instance to

- ***research and development on demand*** concerning new tools or applications, adaptation of existing tools etc., such as
  - TMS or even TDB design and implementation,
  - meta-browsers for information networks, etc.
- ***terminology work on demand*** with respect to
  - terminology preparation,
  - terminology maintenance (including among others revision and updating),
  - conversion or merging of terminological data,
  - evaluation and validation of terminological data, etc.
- ***maintenance and aftercare services*** with regard to
  - TMS software maintenance and upgrading,
  - comprehensive data holdings maintenance, etc.

Information services

Increasingly terminological products and services will – similar to the general situation in the field of information and communication technology (ICT) – be available as one or attached to one of many kinds of information services available on the market. They will also increasingly be integrated into other ICT applications.

For the distribution of terminological data to different user groups with various user needs efforts should be made to establish market-oriented and fee-based information networks for providing

- terminological data proper as well as
- value-added terminological products and services

on a commercial basis. The clients thus will have to pay for terminological products and services. The more clients can chose among an ever increasing variety of terminological products and services the more affordable they will become.

High-end and low-end services in the field of terminology
As a rule terminologists working in on the preparation or revision of terminological data (especially those used to support linguistic applications, such as translations, localization, technical writing etc.) are situated at the lower end of the job ladder. Those who can use sophisticated tools and have access to a variety of information sources can ‚sell' their services at a much higher rate. If they know a variety of tools and applications well, their services may be of high value for companies and institutions which want to improve their efficiency. This translates into high service rates similar to those providing training in the use of methods and tools. Terminology consultants who can advise industry and public institutions on the most efficiant application of terminology and language engineering tools will certainly find themselves at the high end of the business lader. The future belongs to those who can demonstrate the efficiency increase by integrating terminological methods and tools into any specialized information, communication and knowledge related (in particular multilingual) application.

3 THE TERMINOLOGY INFRASTRUCTURES IN EUROPE

Given the amount of terminological entries accross science and technology and other subject-fields to be prepared in a multitude of languages this monumental task cannot be performed without the help of millions of experts who need to do this anyhow, if they want to work and communicate efficiently and effectively. In most cases today such terminology work is carried out in the form of thousands of small cooperative efforts scattered all accross the globe and in many subject-fields with little inter-connection. It is performed as a rule in a non-commercial (let alone non-profit) framework. In some cases terminological activities are carried out 'horizontally', i.e. across many or all subject-fields at the language level. In many or most cases, however, they are carried out 'vertically', i.e. within a given subject-(sub)field. In smaller language communities (or even larger language communities, which feel 'threatened' for some reason or other) the share of horizontal terminological activities/efforts will probably be bigger than in larger language communities with many developed specialized languages.

Since the beginning of the eighties the emergence of new terminological infrastructures is speeding up. At the same time the networking at transnational, regional and international level is also improving.

Horizontal terminology infrastructure(s)
In every language community it requires a public or semi-public or at least partly public infrastructure
- to promote, organize and coordinate terminological activities by domain experts taking into account multiple user needs,
- to provide the information on terminological activities, institutions, publications and services available,
- to promote cooperation and coordinate activities in order to find solutions to common problems.

The future horizontal terminology infrastructure is composed of five main structural elements or aspects:
- terminology (planning) policy,
- (more or less systematic) terminology creation,
- information and documentation in the field of terminology,
- terminology associations (primarily for individuals),
- purpose-oriented cooperation groupings in private industry or between private industry and public institutions (for the sake of creating and/or sharing terminological data).

Often two or more of these elements/aspects can or will be combined, in many cases they are or should be institutionalized in order to be effective.

Vertical terminology infrastructure(s)
In contrast to the impression one may have from visiting bookstores or libraries, most of terminological data are not prepared by terminologists or lexicographers, but by subject specialists, normally in teams, with the primary aim to facilitate communication within the respective subject field. In every larger language community several hundred or even several thousand scientific-technical institutions, learned societies or professional associations organize the preparation of terminology. In the field of standardization alone there often more than 100 working groups of technical committees standardizing or harmonizing the terminology necessary for enhancing the coherence and consistency of the standards' texts and for facilitating understanding. Most of these efforts are carried out without knowing about similar projects, lacking basic knowledge of terminological principles and methods, and without using appropriate not to mention state-of-the-art tools. The degree of (formal or informal) authoritativeness may vary very much – sometimes even within an organization. World-wide there are probably more than 50,000 terminology working groups or committees actively preparing terminologies at any given time.

By far most of terminology work is carried out as a collective work by subject-field specialists under the umbrella of a more or less ‚authoritative' organization or institution. Sometimes the terminology contained in technical rules/regulations at national level is also considered as quasi-standardized terminology. Harmonized/standardized terminologies are issued by an official public or officially authorized harmonization/standardization body. Often the documents containing such terminologies are referred to in laws, so that the terminology becomes ‚legalized'. Quasi-

standardized terminologies are prepareds by a subject-field authorities recognized in the respective field (e.g. IUPAC) or by an institution/organization authorized for this purpose, but not belonging to the official standardization framework. Other kinds of ‚authoritative' terminologies are at least issued by or published under the patronage of a (formally or informally recognized) subject-field authority.
The authoritative nature of data (viz. the degree of authoritativeness) depends on the status of the data originator being
- a legal or quasi-legal (public or semi-public) authority
- a harmonizing/standardizing (or quasi-standardizing) body
- an 'informal' authority in the respective subject-field

and on whether it is
- prepared within the framework of a working group or committee/commission established for this purpose by the ‚authority',
- prepared by one (or more) individual experts on behalf of the subject-field authority,
- adopted by the subject-field authority from external originators,

as well as on whether it
a) is prepared on the basis of a proper terminological methodology (such as following the respective ISO standards),
b) consists of individual data being well documented (incl. indication of source references, originating body/expert etc., responsibility codes etc.),
c) is prepared by (individual or a group of) subject-field experts possibly assisted by professional terminologists,
d) is prepared by another kind of expert(s) (e.g. specialized lexicographer, translator, etc.).

As a rule there is no absolute 'authority' covering all applications, the authority in most cases is restricted to a (implicitly or explicitly) defined scope, but can often be extended towards similar/neighbouring applications. Sometimes non-authoritative terminology being prepared by one (or more) individual experts on behalf of an issuing institution/organisation (e.g. publisher) may also acquire the reputation of being ‚authoritative'.

Terminology standardization
Terminology standardization covers two distinct aspects, which belong to two different infrastructures. The standardization of terminological principles and methods (under the lead of the Technical Committee ISO/TC 37 „Terminology (principles and co-ordination)" of the International Organization for Standardization – ISO) certainly belongs to the horizontal infrastructures, whereas the standardization of terminologies in the various technical committees definitely is an element of the vertical infrastructures. World-wide there are probably more than 5,000 terminology working groups in standardization active at any given time.

Special/diagonal terminology infrastructure(s)
Special terminological efforts are undertaken in the fields of intellectual property rights, customs, air traffic control, etc. They relate to a multitude of subject fields or all domains. Some of these are undertaken with a high degree of authoritativeness. Legal (or quasi-legal) terminologies are for instance determined by legislation or jurisdiction at international, European or national levels.

4 TDCnet - „European Network of Terminology Information and Documentation Centres"

Given the fact that linguistic diversity is an essential component of the national and regional diversity of the cultures of the member states, the European Commission conceived the EU Programme for a ***„Multilingual Information Society" (MLIS)***. Business and citizens, whatever their language, should enjoy equal opportunities for participation in the new information age. They, therefore, need multilingual facilities for creating, exchanging and accessing information. The MLIS Programme represents a concentrated effort to speed up the process of getting new language processing technology onto the market.
One of the three MLIS action lines is concerned with the construction of infrastructures for European language resources: such as dictionaries, terminology databases, grammers, speech data. The European Project „European Network of Terminology Information and Documentation Centres" (TDCnet) is meant to be a motor for establishing the terminology infrastructure in support of the multilingual information society in Europe. Ten Partners of the TDCnet Consortium take the lead to establish the network, which is open for other TDCs from the European Economic Area to join.

4.1 Domain covered by the TDCnet Project
This project aims at creating a ***'virtual terminology directory'*** in the form of a logical and physical network of the official or officially recognized terminology information and documentation centres (TDCs) in Europe. The active networking will comprise
- a ***physical network*** (in the form of an extranet in the Internet) linking existing and emerging TDCs in various language communities in Europe in order to make their wealth of information recorded in databases as well as information on their library and documentation holdings accessible online from all over Europe,

- a (logical) ***co-operation network*** aiming at a permanent network of co-operation and co-ordination of information and documentation activities between all existing TDCs in Europa, covering among others the exchange of information and documents, mutually supplementing of missing data and revision of existing data, co-ordination and streamlining of products and services, etc. on the basis of long-term agreements,
- the ***distribution of data*** online as well as enhanced or ***value-added information products and services*** made possible by the existence of the TDCnet.

Thus duplication of efforts will be reduced on the one hand while a higher degree of overall completeness of information by means of the TDCnet will be achieved on the other hand.
The implementation of the network will be accompanied by the development of new products (such as CD-ROM etc.) and services (e.g. document delivery services etc.). A promotion strategy will be implemented in order to make new potential user groups aware of the information available.

4.2 The market for the TDCnet

In the past the academia used to searching information via secondary and factual reference data was the main user group of existing reference data in the field of terminology. Users (such as translators) and re-users (such as terminology software developers also offering terminology data) are still proceeding like 'hunters and gatherers' to whom systematic information - not to speak of complete information - is nowhere available without major efforts.
In industry, where terminology work often has to be performed under great pressure in terms of time and capacities, the present situation leads to the duplication of efforts due to a relative lack of reference information easily accessible online or in the form of bibliographies and directories and to high expenses due to the lack of information on methodology, existing training opportunities, existing terminology services etc.
In this connection some language communities are highly disadvantaged/under-privileged (especially those that have to undertake special efforts to create 'terminologies' in their own language in order to develop the language into a modern tool of communication). Others enjoy better access to existing information sources due to the existence of well staffed and equipped TDCs and to the activities of pertinent terminology organisations.
The systematic approach to providing reference data to users largely on the basis of existing databases (which in most TDCs at present are primarily used as inhouse information tools) and to promote this effort widely necessitates the development of new information products and services in order to cope with foreseeable information bottlenecks.
TDCnet will provide everybody in all language communities with an equal opportunity to access existing reference information wherever in Europe it may come from.

4.3 Technology

The TDCnet's extranet in the Internet serves as the technical basis for linking existing distributed heterogeneous databases and for organizing the data flow and communication between the collaborating TDCs. The procedures for linking existing databases (via interfaces etc.) and for the interactive co-operation of TDCnet partners (by means of dynamic worksheets etc.) have to be developed. In the course of this development some programming efforts are necessary to solve character set problems, data security questions etc.
Some of the data of the virtual reference directory can and should be made available on
CD-ROM or other appropriate information carriers for use at the workplace of individual users or in LANs.
A ***European Terminology Information Server*** (ETIS) representing among others a first level access to secondary (viz. bibliographic) and factual (i.e. on activities, institutions etc.) information in the field of terminology will provide

- a harmonized interface for multi-sites consultation of heterogeneous databases
- access to the above-mentioned secondary and factual information by offering a selection according to certain types of data.

Some of these are recorded and offered in a form as completely as possible, while others are a representative selection from big distributed data collections.
From ETIS the user can be switched through to the distributed databases of the project partners for either more detailed information or for additional information depending on the type of information required. Further TDCs and other collaboration partners beyond the scope of the TDCnet will have the opportunity to provide pertinent data via ETIS in the future.

4.4 Organisation of the Project

In the first phase the TDCnet Project Partners have

- analysed the given situation of existing or emerging official TDCs in Europe and come up with recommendations,
- transformed the recommendations into data models and system specifications,
- implemented a TDCnet Prototype.

In the second phase (equivalent to the second project year) this prototype will be

- evaluated,

- tested and adapted according to the test results,
- extended to further partners.

The TDCnet will during the second phase be extended to all existing official TDCs in Europe. Later - after completion of the project - other documentation centres and further collaboration partners can join or be linked to the TDCnet.
It is planned to establish user clubs (e.g. with European Union institutions and organizations, international organizations of the United Nations system [Joint Inter-Agency Meeting of Computer-Assisted Terminology and Translation], and other pertinent organizations [such as the European Association for Terminology - EAT], and possibly a selected number of organizations in Central and Eastern European countries) in order to ensure user feedback as early as possible.

4.5 Strategic impact

The TDCnet project represents an indispensable building block of the future terminology infrastructure in Europe, because it establishes a long-term framework for systematic co-operation first of all between the existing official TDCs and their wealth of holdings, data collections and experience accumulated over the years, thus creating synergies at every individual site. The physical and logical network enables the development of new (traditional and value-added) information products and services.
The TDCnet will be instrumental in helping to establish TDCs where they are needed, but do not yet exist.
The TDCnet will provide the users (traditional users as well as new user groups and re-users) with all existing secondary and factual data in the field of terminology and the reference information necessary in order to find out

- whether terminological data in a given field and for certain languages exist,
- whether there are ongoing terminological activities in a given field,
- who and where are crucial players in the field of terminology,
- whether and where methodological support (in the form of standards or guidelines, advice or consultancy services, etc.) exists,
- whether and where terminological services can be outsourced, etc.

4.6 Dissemination

The activities within the framework of the project will lead to a higher degree of completeness (of individual records as well as of whole databases) and availability at every site and overall in the network. Dissemination to potential users will be facilitated, by providing efficient access to data. First level information is provided via ETIS (European Terminology Information Server).
Some of the reference information will be made available on a commercial (or at least semi-commercial) basis both online and on data carriers after the project has established the TDCnet on a permanent basis.

5 OUTLOOK

The terminology infrastructures as well as the terminology market(s) are still characterized by the co-existence of many loosely interconnected elements. But gradually the mosaic of these elements is becoming more complete, while at the same time turning into a dense networking of interacting structures and activities. Cooperation in terminology, which started at international level, by now has got organized already at transnational level within the framework of some language families in Europe. Within the various language communities, however, there are very different language situations with respect to the evolution of terminology infrastructures and the terminology market. Nevertheless a certain pattern seems to evolve – as was described above.
The development of the terminology market and the development of an infrastructure mutually support each other. Some tasks/activities, such as the collecting and 'housekeeping' of information, which are in the public interest, must continue to be funded by the community, whereas others increasingly are (and should be) financed by the users, especially those from the private sector.
Obviously the development is speeding up recently, but there is still a long way to go. Access to information in the field of terminology is still not as easy for the user as it would be desirable. Cooperation among the 'players' in the field still needs promotion and support. Quality of information and services has to be enhanced with a view to user needs - which also requires a higher concern for multifunctional data. The teaching and training situation is still characterized by many 'missing links'.
The „European Network of Terminology Information and Documentation Centres" (TDCnet) will be a cornerstone of the future terminology infrastructure in Europe. It will also support the further development of the terminology market by providing information on existing terminology resources, activities, experiences, services etc. and on the conditions of their availability.

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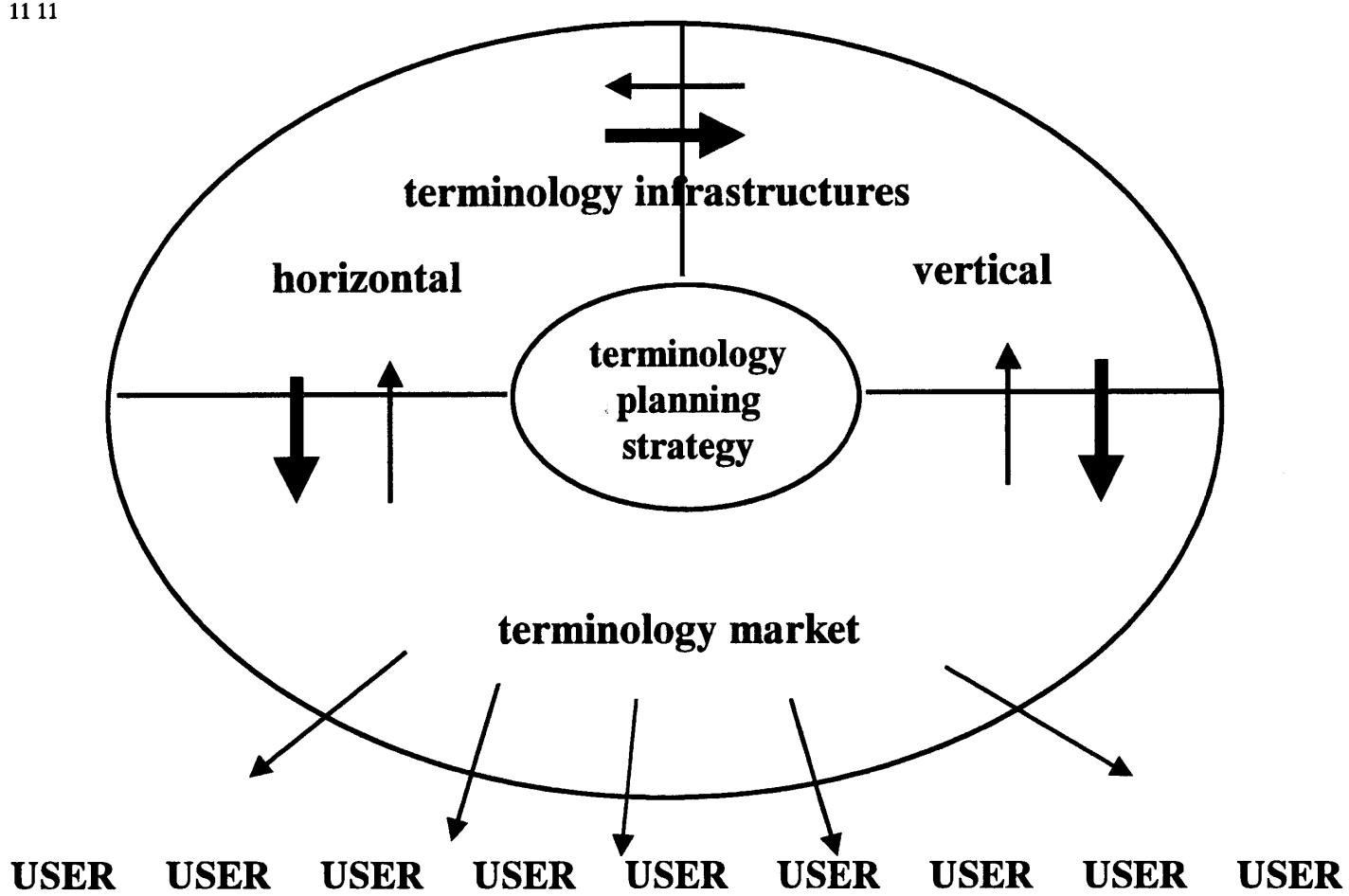
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シリーズ特集：Terminology 素朴な疑問 —「概念」に関するｘつの疑問— ④

図やアイコンは用語？

中山　亮一*　NAKAYAMA Ryoichi

「図やアイコンは用語である」が，私の意見，結論である。

まず，アイコンは絵文字とも言われ，コンピューターの画面上で使われる表示，例えば時計が描いてあれば時間を意味するものと解釈する。図はそれを見ればどの様な物であるかが直ちにわかる絵と言うことにしておく。

図やアイコンは，比較的概念をイメージとして描き易いが，用語となると，やや抽象的となり，すぐには結論を出し難い。

また，図とアイコンを，ここで問題にするのならば，符号を含む記号，標識，文字も採り挙げないと検討が不十分になると思う。ここでは，道路標識は勿論，記号の？，〉，$，@，%，も，ハッキリとした意味を示しているが，「　」，（　）は，それ自身直接意味を持たない。◎，▽，●，□等は使う場所によって，意味を持ってくる。試験の回答に○があれば，それは正解を意味する。文字にしても仮名は原則として，意味を持たないとされてはいるけれども，1字で「め」或いは「メ」が「目」を意味している文は珍しくない。ボディーランゲージ，ジェスチャー，手旗信号，手話も立派に意味を表示，伝達する。

元に戻って，広辞苑を使い「用語」をひくと「使用する言語，語句。特定の部門や人の特に使われることば」とある。従って，次に「言語」を調べる必要が出てくる。「人間が，音声または文字を用いて，思想，感情，意志などを伝達したり理解したりするために用いる記号体型，またそれを用いる行為」とあって，説明文の中に，私が最初に問題提起した，「記号」の文字が出ている。

理解することにおいて，「　」や（　）も，それを助ける訳である以上，この範中に入る訳であり，言葉の説明文の中での「音声や文字を用いて」の部分に図形，記号を加えていないのは，片手落ちである。

人間の伝達や理解の重要な手段であると言う観点から見れば，方法論的にはどの様な形式を採用しても良い筈であり，表記の命題は，その一部に含まれることになる。

従って，「用語」という文字を使う場合には，どうしても「語」の持つイメージに引きずられ勝ちとなるので，さらに1段上を行くならば，図，文字，標識，記号等を総轄，統合包含した範囲，ジャンルを意味するある種の言葉を作り出しておけば，さらにこの辺りは明確になる。

これだけ道路標識が世界的に増加し同一に表示されれば，結果として運転者や歩行者の安全に役立つ情報を伝達してくれる。しかしアイコンの方は，今の所，増える一方で統一がとれずに混乱を引き起こしている。昔に比べ，情報の伝達，理解の手段が変化，急増の現代，概念に関するｘつの疑問3の「用語の統一は言語の自由を侵す？」にも関係して来ることになる。これらのテーマは，時宜を得た検討すべき命題であることには間違いはない。

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専門用語研究　№19, 59（2000）

シリーズ特集：Terminology 素朴な疑問 —「概念」に関するｘつの疑問— ⑤

定義は可能？

中山　亮一*　NAKAYAMA Ryoichi

「それは不可能に近い」。これが私の意見，結論である。

まず定義とはを考える。小学館の言泉では「概念の内容や用語の意味を正確に限定すること，またその命題や式」，広辞苑でも「概念の限定」と言う部分は同じであるが，「ある概念の内包を構成する本属件を明らかにし他の概念から区別すること。その概念の属する最も近い類を挙げ，更に種差を挙げて同類の他の概念から区別し命題化すること」とつけ加えてある。

それでは説明とは何か。「事柄の内容をよくわかるように……」とこれまた両辞書共に同じ言葉で書いてある。WEBSTERではdefinition 1. an act of determining or setting. 2. a statement of the meaning of a word or wordgroupとexplainにやや近くCxplainは1. to make clear or plain 2. to give the reason for or cause ofである。「メートル」に対し「長さの単位」と表示したら，これは定義になり得るか，また説明かと言えば誰でも不十分だと思うに違いない。

従って，私の結論を言えば，この辺りを明確にしない限り，定義は不可能である。前述のメートル（メーター）においても，人工的にある長さを１メートルと決めたにも拘わらず，昔と今では，基準が異なるから，基準が書いてあっても，それを確認出来なければ不完全である。「少なくとも現時点では」との但し書きを付けた文を定義と言い得るか疑わしい。平行線も同様に「ユークリッド幾何においては」と，まず適応範囲を限定しなければ，交わらないと限定出来ないからである。３角形も平面上の「１直線上にない」と言う条件の次に，３点の各々を直線で結んだ結果，出来る形と表現して初めて成立する。「意味を正確に限定する」との部分の記述には反対はしないけれども，条件に関しては何も触れていないからである。

即ち，広辞苑で採り挙げた種差と類の概念を適当に選ぶことで，他の用語との対比をどこまで明らかにし得るか，言泉で言う「正確に」が可能かは，追求すればする程，困難である気がする。

さらに，用語の内容は，人々の使い方に依って変化する。「全然」は否定に限定されていたにも拘わらず，肯定的にも使用される様になっている。「手帳」は普通構成迄含めて定義すれば，今の電子手帳に拡大して適応は出来ない。

この様な現実に対応するために，ＪＩＳは，扱う内容を小さくし，さらに時間的に常に改訂する環境を作ることで，時代と共に変化する用語の持つ範囲を限定し，比較的定義に近い文を作っている例であると思う。

*リョウ・プロダクション

ＪＩＳ用語規格制定の動き

情報源："標準化ジャーナル"，1999年1月号－1999年12月号

制定・改正されるＪＩＳ

電気自動車用語―車両（制定）
Glossary of terms relating to electric vehicles - Vehicles
電気自動車用語―電動機・制御装置（制定）
Glossary of terms relating to electric vehicles - Electric motors and controlles
電気自動車用語―電池（制定）
Glossary of terms relating to electric vehicles - Batteries
電気自動車用語―充電器（制定）
Glossary of terms relating to electric vehicles - Charges
断熱用語（制定）
Thermal insulation - Vocabulary
情報処理用語―電子メール（制定）
Information technology - Vocabulary - Electronic mail
情報処理用語―人工知能―機械学習（制定）
Information technology - Vocabulary - Artificial intelligence - Machine learning

B0108-1　往復動内燃機関―用語―第1部：機関設計及び運転用語（制定）
Reciprocating internal combustion engines - Vocabulary - Part 1: Terms for engine design and operation

B0108-2　往復動内燃機関―用語―第2部：機関保全用語（制定）
Reciprocating internal combustion engines - Vocabulary - Part 2: Terms for engine maintenances

B0109-1　往復動内燃機関―要素及びシステム用語―第1部：機関構造及び外部カバー（制定）
Reciprocating internal combustion engines - Vocabulary of components and systems - Part 1: Structure and external covers

B0109-2　往復動内燃機関―要素及びシステム用語―第2部：主要運動部品（制定）
Reciprocating internal combustion engines - Vocabulary of components and systems - Part 2: Main running gear

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B0109-4　往復動内燃機関―要素及びシステム用語―第4部：過給及び吸排気装置（制定）
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Reciprocating internal combustion engines - Vocabulary of components and systems - Part 5: Cooling systems

B0109-6　往復動内燃機関―要素及びシステム用語―第6部：潤滑装置（制定）
Reciprocating internal combustion engines - Vocabulary of components and systems - Part 6: Lubricating systems

B0109-7　往復動内燃機関―要素及びシステム用語―第7部：調速装置（制定）
Reciprocating internal combustion engines - Vocabulary of components and systems - Part 7: Governing systems

B0109-8　往復動内燃機関―要素及びシステム用語―第8部：始動装置（制定）
Reciprocating internal combustion engines - Vocabulary of components and systems - Part 8: Starting systems

B0109-9　往復動内燃機関―要素及びシステム用語―第9部：制御及び監視装置（制定）
Reciprocating internal combustion engines - Vocabulary of components and systems - Part 9: Control and monitoring systems

B0110　往復動内燃機関―特殊項目用語（改正）
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B0135　クレーン用語―種類（改正）
Glossary of terms relating to cranes - Kinds of cranes

C6801　レーザ安全用語（改正）
Glossary of terms used in laser safety

K3600　バイオテクノロジー用語（改正）
Technical terms for biotechnology

L0304　化学繊維機械用語（改正）
Glossary of terms used in chemical fibre machinery

X0014　情報処理用語（信頼性、保守及び可用性）
Glossary of terms used in information processsing (reliability, maintenance and availability)

X0304　国名コード（改正）
Codes for the representation of names of countries

X0305　国際標準図書番号（ISBN）（改正）
International standard book numbering (ISBN)

X0306　国際標準逐次刊行物番号（ISSN）（改正）
International standard serial numbering (ISSN)

官報告示・発行されたＪＩＳ

A0002:99　建築モデュール用語（改正）
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Internal combustion engines - Small diameter piston rings - Part 1: Vocabulary

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Internal combustion engines - Large diameter piston rings - Part 1: Vocabulary

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専門用語研究　№19, 65～69 (2000)

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凡　例

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3．書誌記述

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4．配列

日本十進分類法(NDC) にしたがって、分類順に配列した。

5．例示

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6．その他

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