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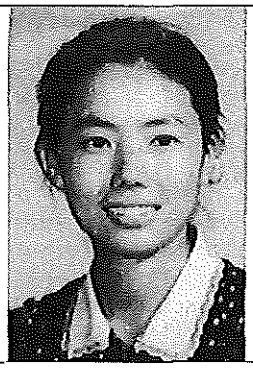
Faceted Classification: A Consideration of its Features as a Paradigm of Knowledge Organization



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From the viewpoint of the Kuhnian scientific revolution, paradigms of knowledge organization are examined. As an influential achievement, Faceted Classification is qualified as a paradigm today and tomorrow. Three features of the paradigm, i.e. features in theory, cognition, and methodology, are described, along with a critical overview of research and practice in our field. (Author)

1. Introduction

The 20th century has seen new theories and methodologies in science and technology emerge one after the other. The field of knowledge organization makes no exception. Among a series of advancements, what is most worth mentioning is the Faceted Classification theory as well as the classification methodology developed by Ranganathan in creating the Colon Classification. During the course of 60 years' development, research and implementation of Faceted Classification have led to most important changes in the theory, concepts, methodology and practice of knowledge organization. In addition to the design and revision of many classification schemes and thesauri, many articles and conferences have shown that we all have more or less felt the influence of Faceted Classification. Nevertheless, it seems that a review of the essence of Faceted Classification in relation to the development of knowledge organization has tended to be an overlooked problem, or at least, that research in this field is in an underdeveloped state.

In the Editorial of IC 1992, No.3, through introducing Kuhn's theory on paradigm, Dr. Dahlberg did an inspiring work. She pointed out the existence of paradigms in the knowledge organization field and took the paradigm shift introduced into our field by Ranganathan as an example (1). This undoubtedly provided a new angle for reviewing and forecasting the development of knowledge organization.

This article is an attempt to examine the phenomenon of Faceted Classification from the paradigm viewpoint. It is hoped that the research toward this dimension will improve our understanding of the essence of Faceted Classification and ultimately promote its further application.

2. The General Feature of a Paradigm

The term 'paradigm' was used by T.S.Kuhn in his famous work *The Structure of Scientific Revolutions* when analyzing the advancement of science. His general notion of a revolution as a shift in paradigm has strongly affected scholars' concepts of changing science and has won for him lasting fame (2). But there have been serious problems in applying the term, for he had used it ambiguously, and even in a number of quite different senses. For example, there are at least 21 different descriptions of paradigm in Kuhn's book according to a statistic compiled by Masterman (3). So it seems unnecessary to agree with Kuhn in every detail when appreciating the real value of his presentation. In order to approach the topic of this article without a hitch, I would like to restrict the meaning of paradigm to the following three aspects:

First, what can be taken as a paradigm must be a scientific achievement; second, the achievement may pertain to theory, cognition, methodology, or all of them at the same time; third, whether a scientific achievement can be qualified as a paradigm depends not only on its character and efficacy, but also on its recognition by the scientific community. It is hoped that this may outline the general features of a paradigm in a way so as not to interpret Kuhn's thesis too rigidly.

When examing 'paradigm' in knowledge organization, a premise that the present author has started from is the consideration that Faceted Classification qualifies as a paradigm, for it is an influential scientific achievement with a strong theoretical, cognitive and methodological background, rather than a simple empirical accumulation and description. Moreover, because of its value in problem solving and explicating it has been discussed, accepted and further developed by scholars and practitioners all over the world. Some comments on its features are given in the following.

3. Faceted Classification as a Theory Paradigm

In most present-day commentaries on Faceted Classification, its importance in theory construction tends to be overlooked in comparison with its other features. Many scholars emphasize its efficacy as a kind of classification technique or approach. For example, Professor Guojun Liu, a pioneer introducer of CC and its theory in China, even concluded that it was essentially a methodology relating to compilatory techniques, especially notation

devices (4). But in my opinion, as a paradigm in knowledge organization, Faceted Classification is first of all a theory paradigm, as can be seen through the following analysis.

3.1 A Brief Review of Theoretical Research before Faceted Classification

The history of classification is a history of man's attempts to recognize, understand and organize concepts and records of knowledge. In this process, research related to knowledge organization was carried out in two dimensions, one of them being philosophical research oriented to knowledge classification, the other, pragmatic research oriented to the classification of recorded knowledge. The early philosophers such as Plato, Aristotle, Bacon, and Kant, to mention some famous ones, also studied the problem of knowledge classification. However, they were mostly interested in studying the sequence of and mutual relations between ideas, and eventually provided their own philosophical systems of knowledge. In fact, the research carried out by them all was of a theoretical nature and represented their cognizance of the state of the universe of knowledge in a given period. If one wishes, the knowledge classification theory put out by some dominant philosophers often played the role of a paradigm at the time concerned. But such a theory is too broad to meet the needs of pragmatic work.

As for research on the classification of recorded knowledge, the situation varied from time to time. What the early classificationists before the 20th century did was making a classification scheme on the basis of a given knowledge classification system without probing into such theoretical problems as the foundation, principle and structure of classification. This led to a gap in the intermediate research of classification theory. Here we can take the preparation of the DDC as striking evidence.

Things changed somewhat around the start of the present century when E.W. Hulme discussed the difference between philosophical classification and recorded knowledge classification (i.e. bibliographical or library classification). He made some contributions to theoretical research on pragmatic classification, as did other classificationists, such as Sayers, too, through formulating some empirical principles. The last one worth mentioning is Henry E. Bliss for his research on classification theory in the course of developing his Bliss Classification (BC). In order to establish a classification scheme with a theoretical background, he devoted himself to the review of various knowledge classification systems. Apart from setting up basic principles such as the collocation of related subjects, subordination of the special to the general and gradation by specialty, he emphasized the existing relation between knowledge classification and bibliographic classification, and even regarded their consistency as the most important principle by pointing out that bibliographic classification is virtually a classification of knowledge and thought (5). Although his attempt to build a foundation for classification was regarded as a positive one, one fatal weakness of his research was pointed out clearly when J.P. Comaromi and M.P. Satija mentioned that H.E. Bliss erred when he thought that he had arrived at a final structure of knowledge for his Bibliographic Classification (6).

Generally speaking, the work of all pragmatic researchers mentioned above was fragmentary and remained in the end within the traditional framework of knowledge classification. In many conflicts, none of these theories proved to have enough inner drive for self-development and for acquiring a hold on the majority of classification. Hence, they could not serve as a theory paradigm in the classification of recorded knowledge.

3.2 Faceted Classification Theory

The conspicuous lack of a general theory in the organization of recorded knowledge resulted in diversified steps in investigation and practice. This might be termed a preparadigmatic state according to Kuhn's categoies. This state persisted till the theory of Faceted Classification emerged through Ranganathan's work of his entire lifetime.

Comparing with the aforementioned tpyes of research, the Faceted Classification theory possesses originality, systematicness and adaptability. It was the first time in history that a classificationist conducted a scientific exploration of knowledge structures, including "wholeness" and "micro" from an angle different from any found in existing knowledge classification systems. Through a large body of writings there was developed a whole series of new concepts, terms, postulations, principles and models to give a systematical and substantial explanation of knowledge organization contradicting the traditional research in epistemology and methodology. This in turn provided helpful guidelines for research at every level. As a dominant theory, Faceted Classification filled in the gaps in the research of intermediate theory, thus enabling us to reach the point where we are no longer limited to some empirical facts, but can discuss wholes of a completely general nature of classification. Through the continuous efforts of many scholars all over the world, Faceted Classification has become a common wealth of human thought and has served as a theory paradigm in our field. This is attested to by the fact that, apart from a high citation rate in reference materials, a positive introduction to Faceted Classification forms part and parcel of the contents of many authority textbooks, and what one finds under the entry 'Theory of classification' in the Encyclopedia of Library and Information Science is nothing but a detailed description of Faceted Classification.

4. Faceted Classification as a Cognitive Paradigm

Generally speaking, any research on the theory of knowledge organization is based on the cognition of knowledge. The most outstanding feature of Faceted Classification lies within the cognition of knowledge and related organization problems, as was reflected in a number of books, especially in *Prolegomena of Library Classifica-*

tion, Elements of Library Classification and the *Colon Classification*.

4.1 Cognition of Knowledge

In the field of knowledge organization, answering the question, just what is the nature of knowledge is as important as the cognition of the state and relation of knowledge in any given case. Through analyzing three states of knowledge, i.e. limited known, unlimited unknown and partly unknown but possibly known in the future, Ranganathan made it clear that the nature of knowledge in general is multidimensional, dynamic and unlimited, which cannot be changed according to any subjective desire. This in fact constitutes the cognitive foundation of Faceted Classification. Along with the popularization of Faceted Classification, more and more people, including those interested in enumerative classification, accepted this dynamic cognition model of knowledge. When reading the assertion by one of the editors of DDC that the structure of knowledge is always in a dynamic continuum (8), one can imagine how far the influence of cognition will reach. It has not only changed the long-standing rigid, static cognition of knowledge in our field, but has added also something to cognitive theory in general. Considering that only few people shared the common view of dynamic, multidimensional and unlimited knowledge half a century ago, the cognition that started from the development of Faceted Classification must be warmly welcomed, and Ranganathan as its originator does indeed deserve a solid reputation in the field of epistemology.

4.2 Cognition of Knowledge Classification

Besides the cognition of knowledge, the development of Faceted Classification also involved a wide range of problems related to the cognition of knowledge classification. Some main aspects will now be discussed.

4.2.1 Necessity of Dynamic and Multidimensional Classification

Following a rethinking and analyzing of the objective and the function of classification, a decisive conclusion was arrived at, namely, that the ideal model of knowledge classification should be dynamic and multidimensional in nature and in accordance with the broad cross-needs of users. When specialization and the multidimensional progress of knowledge succeeded in breaking the back of the traditional enumerative pattern, it became clear that only a new kind of classification with the ability to cope with such changes could supply a resource of justification and rationality of modern knowledge organization. Nowadays, dynamic and multidimensional classification is no longer an ideology, but a cognition foundation of various classification systems of great general benefit. When I read a sentence like "multidimensionality is a phenomenon of classification" in an article by two terminologists (9), I think this may be a common belief drawn out of the cognitive model of Faceted Classification.

4.2.2 The Feasibility of Dynamic and Multidimensional Classification

In order to make the ideal model of knowledge classification feasible, a systematic and concrete probe of basic problems is inevitable. This has led to detailed research on two aspects.

First, the cognition of the essence of knowledge classification and subjects: According to Ranganathan, knowledge classification is in essence subject classification, so the subject should be taken as the basic content and logical start of classification research. Through breaking down a subject into isolated ideas and basic subjects, then translating these into their respective kernel numbers and finally synthesizing the latter into the class number, a classification system may be flexible and expansible in structure as well as practical in the display and ordering of knowledge. In other words, by means of the Meccano-Analogy of Subjects, new subjects or new aspects of well-established subjects may be inserted without dislocating the general sequence of classification, thus making dynamic and multidimensional classification feasible. Here, the cognition of subjects is a decisive factor. Further research in this direction has led to the constitution of a featured body of subject theory and policy, which covers the subject analysis on facets, categories, kinds, models of formation, sequence and citation order. Years of experience have shown its adaptability on a wide scale of knowledge organization, such as in the research of classification systems, in terminology, of subject indexes, thesauri, etc.

Secondly, the cognition of the construction of classification schemes: As a vital and convenient tool used in knowledge organization, classification schemes can be traced back to ancient times; however, for lack of general insight into their construction, various classification schemes were designed in accordance with the desire of a given compiler. A systematic research in the construction of classification schemes started as a part of work aimed at making for dynamic and multidimensional classification. Cognition of the three planes of work, i.e. the idea, verbal and notational planes, was fundamental and led to the establishment of a series of general canons and concepts. This reoriented our thought from a one-sided version of notation or ordering to a systematic coordination of every plane and provided us with a universal standard and guideline in the judgment and compilation of tools for knowledge organization. This changed the non-paradigm state in this sides.

5. Faceted Classification as a Methodology Paradigm

When talking about the feature related to methodology, I mean a set of approaches adopted in research and pragmatical operation. Among them, well worth examining are postulation and facet analysis and synthesis.

5.1 The Postulate Approach

As an important thinking approach in the construction of scientific theory and a model of explaining scientific

discovery, the postulate approach has been widely adopted by many scientists. But in the knowledge organization field, long dominated by the inductive approach, wecould find no traces of its effective usage before the publication of numerous books on Faceted Classification. According to Ranganathan, the concept of facet analysis is best reached through a series of postulates, and the basic postulate is concerned with the concept of fundamental categories (10). In fact, postulates play a very important role which cannot be replaced by any approach in any aspect of the research on Faceted Classification. Without them, not only the cognition of basic canons and principles related to Faceted Classification, but even Faceted Classification itself might never have come into being. It is with the help of postulates that we have been able to get rid of many long-standing arguments over the arrangement of various disciplines, sequences of array, etc., and to pay attention to the cognition of knowledge categories, the verification and justification of classification schemes and improved representation of knowledge units, thus promoting the development of theory and practice. When reviewing the introduction of BC2 and consulting many modern books on classification and thesauri, we could found that postulates have had a firm place in research tradition. The advancement of all research in our field will likewise depend on their further implementation.

5.2 Faceted Analysis and Synthesis

Analysis and synthesis are two basic logical approaches related to each other. But the independent usage of analysis has a long history. The progress of science has shown the principles of analysis to be highly successful in a wide realm of phenomena. By merely glimpsing at modern documents, we will meet may miss the chance to exist such concepts as psychoanalysis, system analysis, constituent analysis, discourse analysis, etc. A book published more than 30 years ago even addressed the 20th century as "The Age of Analysis" (11).

However, from the viewpoint of methodology, any effecti ve probe into the nature of phenomena must depend on the co-existence of analytical and synthetical approaches. As to knowledge organization: because of the interaction between subjects or parts of compound subjects, their representation and organization requires more complicated and systematical analysis and synthesis. The development of facet analysis and synthesis is a result responding to such needs.

Around the beginning of this century, concept analysis and synthesis as a united approach was adopted by Paul Otlet and Henri LaFontaine in preparing the UDC. Through the efforts of Ranganathan, first, the usage of the term 'facet' changed the basic unit of analysis and synthesis into a general one, whereupon, when this approach was made a universal policy, facet analysis and synthesis were able to show their effectiveness in research and practice, thus ultimately becoming the dominating approach in our field by far.

As a research approach, facet analysis and synthesis have cooperated with the postulate to establish the theory and cognitive framework of Faceted Classification. In my opinion, the cognition of the feasibility of Faceted Classification, the creative application of concepts such as category, facet, level, round, phase, as well as the formation of canons and principles have all resulted from this approach. This reflects the inevitable relation between epistemology and methodology. By this approach, we have been able to recognize the essence and existing states of knowledge, as well as the differences, common character and relationships among all branches of learning from a macro and a micro angle, thus providing subject analysis with scientific foundations. As an operative approach, facet analysis and synthesis covers the faceted organization, the representation of subjects, concepts, terms and notations and has become a widely adopted technique in the compilation of tools for knowledge organization, and in indexing and in information retrieval processes.

Its usage in the compilation of tools for knowledge organization constituted an almost complete break with the traditional method of creating fixed pigeonholes for preconceived and precoordinated subjects and brought about a new kind of classification system, i.e. the Faceted Classification system, which differs from the traditional enumerative ones in structure, manifestation and function, and led in 1968 to the emergence of Thesaurofacet, a novel tool based on the integration of a thesaurus and a faceted classification scheme. Moreover, as a well-known fact, facet analysis and synthesis has shown its excellent suitability for the revision of traditional classification systems.

Corresponding to the usage indicated above, facet analysis and synthesis is gradually becoming a necessary technique in everyday indexing and information retrieval processing with the help of the formularization of facet and citation order. This, precisely, is another side of the same pragmatic problem, and also an irreversible trend. Nowadays, various education and training programs in colleges and universities are based on and reflect the conviction that to grasp and make use of facet analysis and synthesis is a rudimental requirement for qualified professionals in our field. Considering the influence of discipline-oriented, rigid organization and the inertia in the adoption of tools that were compiled on the basis of facet analysis and synthesis, there is a long way for us to go in the popularization of facet analysis and synthesis. But it is only through further steps towards its development and potential utilization that we will eventually be able to realize the advantages of a dynamic organization of knowledge.

6. Summarization

The preceding text indicated that from the viewpoint of a paradigm shift, the development of knowledge organization during the past decades indeed appears to have undergone a revolution in the Kuhnian sense. The revolution occurred as soon as Faceted Classification had brought to the fore a new theory, a frame of reference for understand-

ing knowledge and its organization, as well as a series of operative approaches and policies toward the effective utilization of knowledge which previously were not perceived or adopted. But the occasion on which Faceted Classification showed its function as a dominant paradigm in our field occerred only in the 50's. The publication of a memorandum by the Classsification Research Group, entitled *The Need for a Faceted Classification as the Basis of All Methods of Information Retrieval* at the Dorking Conference marked the beginning of its widespread influence. From then on, research and practice in our field have gradually been involved in Faceted Classification, and the activity of "puzzle solving" carried out by many scholars, especially by members of the Classification Research Group and by ISKO, has added to the accepted stock of knowledge organization.

When reviewing the development of knowledge organization, it is not a decisive factor whether we share the common view of a paradigm shift, but Faceted Classification serving as a paradigm is a basic concept that determines or should determine all research and operational processes. As long as modern science is characterized by ever-increasing specialization and is split into innumerable disciplines continually generating new subdisciplines, the improvement and development of Faceted Classification must be at the heart of our further efforts toward the better cognition, explanation and organization of knowledge.

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Multilingual Information Management with MicroISIS

A first announcement and Call for Presentations was recently issued for a conference on the above named topic to take place at the Vienna International Centre (UN Buildings), Vienna, 21-22 Nov. 1994.

Presentations are welcome for plenary sessions as well as for specific workshops on the following topics:

- *library applications*
- *thesaurus and classification management applications*
- *character set solutions (multi-script and multilingual applications)*
- *international data exchange and networking applications*
- *terminology and reference applications*
- *integrated information management applications*
- *full-text and factual database applications*

For expressions of interest and for more information please contact: Dr. Gerhard Budin, Infoterm, Heinestr. 38, A-1020 Vienna, Fax ++43-1-216 32 72, Tel.: ++43-1-26 75 35 310.

TAMA '94. Terminology in Advanced Microcomputer Applications

The 3rd TermNet Symposium has been announced to take place from Nov.24-25, 1994 at the Vienna International Centre, Austria. It is organized by the International Network for Terminology (TermNet) and supported by the International Information Centre for Terminology (Infoterm).

Latest developments in selected terminology management software and integrated applications will be presented and discussed. Individual demonstrations and mini-workshops offer a unique chance to get fully acquainted with innovative products, as well as services and publications.

A preregistration form is being circulated. In case of interest please turn to TermNet, Grüngasse 9/17, A-1050 Vienna, Austria. Fax: ++43 1 56 77 64.

Who's Who in Translation and Terminology

Four organizations, two of them public bodies and the two others private companies have come together to publish such a Who's Who. The project is supported by the Féderation Internationale des Traducteurs (FIT).

It is estimated that some 2000 entries will make up the book to appear at the end of 1994. It will be in English, French, German and Spanish. All data received, whether published or not, will be input into a specially created database.

Anyone interested in the project should contact one of the four partners: Infoterm, Postfach130, A-1021 Wien; Praetorius Ltd. 5 East Circus Street, Nottingham, GNB NG10 1AF; Union Latine, 14 Boulevard Arago, F-75013 Paris; Where + How International, Am Hofgarten 18, D-53014 Bonn.