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Dewey Decimal Classification, Universal Decimal Classification, and the Broad System of Ordering: The Evolution of Universal Ordering Systems

O f the three systems named in the title of this paper, the first is familiar to everyone, even outside the profession of librarianship; the second is much less well known; and the last one is probably still a total stranger. Actually, to say that the Universal Decimal Classification (UDC) is little known in the United States is an understatement. Except for a handful of people who actually use the system, the general notion among many librarians in this country seems to be that the UDC is a quaint, even outlandish system, a transmogrification of Dewey performed by some oddballs in the city of Brussels. American textbooks on classification still call it the "Brussels Extension." Such ignorance and neglect is even more deplorable as the UDC is essentially of genuine American descent, being the offspring of the Dewey Decimal Classification (DDC).

When we celebrate the Dewey centennial, we can at the same time look back on exactly eighty years of UDC. It was in 1895 that two Belgian lawyers, Paul Otlet and Henri La Fontaine, decided to adapt the DDC for their plan of the Institut International de Bibliographie (IIB) as a classification system for the worldwide repertory of all knowledge recorded not only in books, but also in articles, reports, and any other kind of documents.

Their choice was mainly influenced by the features that were then unique to the DDC: (1) the system dealt with concepts and ideas rather than with books, although it was primarily intended for the arrangement of books on shelves; (2) its purely numerical notation constituted a universally understood metalanguage, independent of any natural language; (3) the decimal principle seemed to allow for unlimited expansion for the accommodation of new subjects; and (4) the synthetic devices of number-building and form divisions allowed for the synthesis of specific subject codes with those for recurrent, common and general topics. It was this last feature which appealed most to Otlet and La Fontaine, and they soon developed it into the versatile and elaborate "Auxiliaries," each introduced by its own symbol, thus creating the first "faceted" classification scheme (although this term was then not used).

What was still lacking for their purpose of close classification of minute details was sufficient subdivision in the main tables, and they proceeded immediately to refine the basic scheme. All this was done with the full consent of Dewey himself, who promised his "cooperation and criticizm" for all additions made.[1] So rapid was the pace of adaptation and elaboration that only one year later, in 1896, the UDC tables already contained 40,000 headings, while the DDC (then in its fifth edition) had less than 7,500. Dewey had to admit regretfully that a critical evaluation of these expansions and cooperation in their further development was a task which, for lack of time, he could not take upon himself.

For the next three decades, the two systems developed independently, yet more or less in parallel, with the UDC becoming more and more detailed, but still without changes in the basic framework devised by Dewey. In 1924 it was officially agreed upon to "harmonize" the DDC and UDC, so that the expansions made in Europe would also become an integral part of the American scheme, thus allowing for greater indexing specificity for those who wanted or needed it. In his preface to the twelfth edition of DDC, Dewey stated that the project was "well underway," and he praised the features that were most characteristic of the UDC: the Common Auxiliaries, based on his own Form Divisions, and the synthetic device of putting a colon sign between two or more UDC codes to indicate their relationship (a device which had its origin in Dewey's use of the digit 0 as a number-building device). Dewey

stated that "IIB has devized and uzes injenius simbols" and extolled "their vast practical advantajes," concluding that "obviusly these simbols allow subdivision of the same number in many different ways without confuzion."[2]

However, despite Dewey's enthusiasm for the UDC and his endeavors to amalgamate the two schemes, developments took a different turn. In the late 1930s, and especially after World War II, the DDC and UDC grew further apart. Ironically, the differences occurred not so much in the "Auxiliaries," the feature that made UDC seem so unlike DDC, but rather in the subdivisions of the main schedules, where minute detail could have been achieved without radical departures from the parent scheme. In retrospect, we can only deplore that this was allowed to happen, not only because it led to much duplication of effort (since both schemes inevitably had to accommodate new ideas, inventions and phenomena within their basically still-identical frameworks of ten main classes), but also because a unified scheme might have resulted long ago in a worldwide system for the identification and effective retrieval of recorded information independent of language and terminology barriers. Only now is such a worldwide system about to emerge in the shape of the Unesco-sponsored Broad System of Ordering (to which we shall return later), and it is gratifying to observe that it has its roots in the two great decimal systems.

Even though DDC and UDC could no longer be reconciled, we are now able to perceive that they continued to influence each other: there is an unmistakable trend in the DDC to become less enumerative and more synthetic, more faceted, especially since the seventeenth edition. The gradual transformation of the Form Divisions into the present Standard Subdivisions, and the creation of the various Tables undoubtedly owe much to the development and mode of application of the Auxiliaries in UDC (even though the principle of general applicability of the Tables throughout the whole system has not yet been fully and consistently applied. For example, the Persons Table is not applicable in class 300, (where it would be most appropriate) because the direct subdivisions for persons are retained according to the principle of "integrity of numbers." Conversely, where DDC was better developed or more elaborate than UDC, e.g., in the historical schedules for the two world wars, or in the history and geography subdivisions for the United States and some other countries, the UDC followed the DDC and adopted its schedules in their entirety rather than developing new ones.

The UDC Today

The UDC as it presents itself today is undoubtedly vastly different from its parent scheme, although it still retains nine of the ten main classes of

DDC. The differences lie not only in the very large number of minute subdivisions for almost every subject, but also in the allocation of relative place for several major subjects, especially regarding more recent developments in science and technology such as nuclear science, engineering and computers. Although it has lost some ground to thesauri and specially devised classification schemes, it is still extensively used in Western Europe (particularly in the United Kingdom, Germany, the Netherlands and Belgium), it is being used by the Soviet Union and other East European countries for all scientific and technical publications, and it is widely used in the Latin American countries. The number of libraries, indexing and abstracting services, and individual users has been estimated to be at least 100,000—perhaps more. Only in the United States has the UDC not met with appreciable success, despite the efforts of several large special libraries and of American and Canadian information scientists who were instrumental in demonstrating the potential of the UDC in computerized information retrieval.[3]

Despite its phenomenal growth and apparent success, during the past two decades the UDC has been the subject of severe criticism, both from outside observers (including some who had never been actual users of the scheme and were thus not well qualified to evaluate its merits and demerits) and from within. The minute subdivisions, once thought to be the strength and pride of the system, have been found to be excessive in number, leading to unwanted redundancy and consequently to retrieval failures; classes 5 and 6, devoted to the sciences and technology, are now hopelessly overcrowded (a fate they share with classes 500 and 600 in DDC); finally, the management of the system, while being highly democratic and oriented toward an international clientele, is cumbersome and inefficient, with the result that proposed additions and changes are being made too slowly and infrequently. During the last five years, this criticism has resulted in some significant movement toward change, partly aimed at reform of the existing framework, and partly directed toward radically new solutions to the problem of an international and universal system of information retrieval.

Reform

Since its beginnings, the UDC has been based on the principle of constant ongoing revision in order to keep pace with new developments and new conceptions of the universe of knowledge. Although this has resulted in a rather unwieldy committee structure which often impedes rather than advances needed revisions, every year hundreds of new and revised codes are added, many obsolete ones are deleted, and major expansions of existing main classes are effected. Of course, sometimes radical surgery would be easier

to perform and would give better results, but piecemeal revision and updating are necessary because of the needs of present users, some of which have built up extensive files over the years. Lately, the processes of reform have been brought more in line with the requirements of modern information retrieval, and several specially appointed committees have tried to apply the insights gained from research into the theoretical foundations of classification. Among the tangible results of their work are the following:

1. The procedures for the proposal of additions, deletions or changes and their accomplishment by appropriate committees or experts has been streamlined, leading to a quicker publication of the results.
2. Most parts of class 3 *social sciences* have been largely remodeled, and now constitute not only the most detailed but probably also the best balanced schemes for this field, which is one of the most difficult to handle in any information retrieval system. The difficulties result from its diffuse, imprecise and constantly changing terminology, and because of the ideological differences and diametrically opposed conceptions held by sociologists, economists, educators and politicians in the West, in the communist countries, and in the Third World. The construction of the revised parts of class 3 was undertaken with the collaboration of experts from capitalist and communist countries alike, which should ensure that it will be a truly international tool for information retrieval in the social sciences.
3. Several large and important subject fields have undergone major revisions, most of which could be made *in situ,* i.e., without a change in the main code; among these are 51 *mathematics,* 52 *astronomy,* 624 *civil engineering,* 69 *building construction,* 796 *sport,* and 903 *archeology* (this one transferred from 930.26 and entirely new).

The Basic Medium Edition (BME)

For a long time, the UDC has been published in editions of varying scope. The full editions contain every code (estimated at more than 200,000); the first of these were two French editions, followed by a German one, and now there is also an almost complete (although not entirely updated) full edition in English. Partial full editions exist also in Czech, Polish, Portuguese, Russian, Serbo-Croatian, Spanish and Japanese. These editions are intended for subject experts who need minutely detailed codes for classing documents in their particular field, but they are not practical for classing documents ranging over all or most fields, e.g., in general library collections or for a comprehensive indexing service. Therefore, more than twenty abridged editions have been published over the years in as many languages, ranging in

scope from 10 to 15 percent of the codes contained in a full edition. Incidentally, these abridged editions form a kind of multilingual dictionary, in which concepts and their denoting terms in various languages are linked by the same code numbers.

Unfortunately, abridged editions soon proved to be sufficient only for small libraries or for rather broad classification. In 1967, a medium-sized edition ("Handausgabe") was published in Germany, comprising about 30 percent of the codes in the full edition, and this was soon followed by a similar French "medium" edition. Although the decision about which codes from the full edition should be included in a medium-sized one cannot be based on percentages alone, and must be carefully considered for each class in the light of user needs and of characteristics of the pertinent literature, it is now generally agreed that an edition containing about one-third of the main codes, plus a complete set of auxiliary tables for the common facets, is the most versatile tool for the practical indexer and classifier.

The last English abridged edition was published in 1961, and is now hopelessly out of date. In light of the success of the German and French medium editions, it was decided not to issue another English abridged edition, but to forge ahead with a medium edition which, at the same time, would become the basic master edition on which all others would be modeled. The original goal to produce this Basic Medium Edition (BME) in 1976 as UDC's contribution to the Dewey centennial could unfortunately not be met, but it may be published in 1977. The amount of abridgment for each class has already been established by the general editor in close collaboration with existing committees and subject experts; it will probably have main tables containing about 50,000 codes, to which will be added complete tables of common facets; all additions and changes up until mid-1975 will be incorporated.

Preparations are presently being made to convert the codes of the BME and their English verbal equivalents into machine-readable form, to be later augmented by German, French, and possibly other language equivalents, and to update the resulting master file whenever revisions are being made. It is possible that this master file will be managed by the Library of the Eidgenössische Technische Hochschule in Zürich, where a machine-readable data base of this kind already exists in abbreviated form (mainly for technical and scientific subjects covered by this library).[4] A copy of the master file will also be kept at the headquarters of the International Federation for Documentation (FID) in the Hague, and the tapes will be made available to other users who could produce their own version of UDC tables for specialized purposes, or in languages not covered by the master tape.

The alphabetical index to the BME will be published separately at a later date, and will probably be constructed on the thesaurus principle, thus

producing another variant of the system originally produced for the field of electrical engineering under the name of *Thesaurofacet.*[5] A pilot project for the construction of such an index has already been produced by Belgian experts for class 33 *economics,* and is considered to be better and easier to use than the conventional relative index of the type with which we are familiar in Dewey and in the English abridged edition of 1961. Another possibility is the computer-aided construction of index entries in a KWOC format, recently employed in the index to the Dutch abridged edition, which is much better than the computer-generated index to the German medium edition that was produced by simply extracting keywords from headings without any regard to related terms or synonyms.

A New Class 4

A reform measure not yet implemented is the creation of a new class 4. For more than a decade, this class has been vacant, its contents having been amalgamated with class 8, which now comprises both *literature* and *linguistics.* The intention had been to make an entire main class available for relocation of scientific and technical subjects now squeezed into the overcrowded classes 5 and 6. Several proposals for the repopulation of class 4 have been made; the most recent, as yet existing only in rough outline, has the following subdivisions:

4 *man and his natural environment; material resources*
41 *man as an individual; medical sciences; anthropology; psychology*
42 *general biology; botany; zoology*
43 *agricultural sciences; plants and animals*
44 *animal biology and husbandry* (if 43 for *plants and crops* only)
45 *mineral resources; mining and mineral dressing*
46 *materials; testing, sampling, etc.*
47 *handling and transport of materials and persons*
48 *management: business, household, etc.*

It is, of course, possible to quarrel with this proposal and its juxtaposition of major subjects as much as with any of the earlier proposals, but it seems to come close to the present general consensus on a helpful collocation of topics clustering around man and his environment. If finally adopted and suitably elaborated, it would make room for the reallocation of subjects now suffering from bad notation and unhelpful placement, among them *electrical, nuclear* and *transportation engineering.*

Drastic Revision and a New UDC

The implementation of reform in various parts of the UDC as outlined above will inevitably lead to a complete restructuring and possibly to a New UDC (NUDC). A committee on "drastic revision of the UDC" has been active during the past three years, and its members have produced various outlines for such a reconstruction. The latest version envisages the creation of General Facets which would be applicable throughout the system (similar to, but more systematic than, the present Auxiliaries) such as Attributes, Phenomena, Processes, Methods and Objects; subdivisions of the latter would be Matter, Persons, Organizations, Products, etc., each of which could be further subdivided as needed. There would also be a number of Subject Fields, roughly subdivided into Natural Sciences, Life Sciences, Engineering and Technology, Humanities, and Social Sciences, each further subdivided, but not to the sometimes excessive degree of detail now found in UDC. Common features in each Subject Field would be expressed by Special Facets, i.e., those applicable only to a particular field or topic. All this is, of course, by no means entirely new, and can in fact be traced back to the original ideas on synthesis of numbers as conceived by Dewey, but it would certainly result in a new universal classification scheme which would have little in common with the UDC as we know it now.

The new scheme is already well on its way, and at least some of the General Facets have already been elaborated in detail, or will be taken over more or less completely from the present UDC, e.g., the Materials Facet -03, with whose help any object can be classed according to the material of which it is made, independent of where in the UDC the object has been classed. Other General Facets are the Time Facet (now having the notation "...") and the Space Facet (...), both of which have recently been revised and expanded to cater to the needs not only of geographers and historians, but also of any classifier in need of time, place and space indications. A substantial part of the work with an NUDC will consist in weeding the existing schedules and eliminating direct subdivisions of main codes which can be better expressed by general or special facets. Doing so will make the whole system more flexible and amenable to cope with rapid changes both in science and technology and in the general conceptions of the world we live in.

It will be possible, of course, to handle the NUDC by computers for the purpose of automatic retrieval of information from large systems. The present UDC has shown itself to be amenable to automation, and more than sixty working systems (some of them experimental) have been designed and used.[6] Partial retrieval failures or other shortcomings of these systems were almost always due to the fact that the basically faceted structure of UDC is not uniformly applied throughout the system. Straight decimal subdivision of main

codes (inherited from DDC) is often substituted for synthetic notation, and unnecessary duplication results from denoting recurrent concepts by different kinds of auxiliary notations in various parts of the UDC. The elimination of such incongruencies by judicious weeding of the tables and application of General and Special Facets will make the restructured UDC a much more reliable retrieval tool for mechanized systems.

Broad System of Ordering (BSO)

The worldwide information systems network created by Unesco under the name of UNISIST recommended in its basic policy statement that an internationally applicable classification system be adopted as a means to organize recorded knowledge independent of the many vernaculars in which it is now published all over the world. It was obvious that the UDC would be considered for this role, but it was also pointed out that it was not acceptable in the form in which it then existed. It soon became clear, however, that if anybody could design a suitable classification system, it would have to be the group of people who had the widest experience with an already existing international scheme. Thus, several prominent members of the Central Classification Committee of UDC, together with other experts, were entrusted with the task of designing a Broad System of Ordering with the instruction to create a tool capable of achieving three main objectives: (1) to serve as a connecting link and a switching mechanism between various information systems, services and centers, each of which may have its own indexing and retrieval language (natural or controlled, verbal or numerical, but in most cases incompatible with that of any other system); (2) to be used for internationally standardized "tagging" of subject fields and their main subdivisions, i.e., to serve as a shallow indexing tool; and (3) to be a referral aid for the identification and location of information sources, centers and services of all kinds.

A proposal for BSO was elaborated and submitted to UNISIST in early 1975 for approval and testing. The scheme contains about 2,000 headings, arranged in three levels of hierarchy; approximately 670 of these are in the natural and life sciences (including agriculture and medicine), 530 are in technology, and the rest, about 700, cover the social sciences, humanities and arts. The small number of headings in the BSO (fewer than those in the second edition of Dewey's scheme) was deliberately used in order to keep the system broad, as indicated by its name. BSO is not intended to supersede individual specific headings or codes in existing indexing languages, but to serve primarily as a switching language. An interesting feature in BSO is the separation of the natural sciences from their associated technologies, despite

the often-voiced criticism of this arrangement in DDC, UDC and other classification schemes, and often attributed to the outmoded conceptions prevailing in the late nineteenth century. Both classificationists and subject experts agreed that, on the whole, the advantages of such a separation outweighed the disadvantages; they made an exception only for the life sciences, because of the close ties between biology and its applications in agriculture and medicine. Throughout the proposed BSO, care was taken to ensure that the individual elements could be freely combined in order to accommodate future developments and new knowledge without frequent drastic restructuring of the scheme. This feature would also compensate to some degree for the separation of sciences and technologies.

The scheme is now to be tested by experts in various fields, before final adjustments to the scope and specificity of headings will be made in the light of practical experience. The field trials will test the completeness of coverage and the appropriateness of indexing depth. Initially, the tests will not be aimed at the retrieval of specific documents, but rather at broad groups of documents and "blocks of information" by taking samples from the *World Inventory of Indexing and Abstracting Services* (published by FID in collaboration with the National Federation of Abstracting and Indexing Services, and available in machine-readable format), from other indexes in machine-readable format, and from national directories of information sources.

The designers of BSO wisely refrained from appending a notation to the tentative scheme, in order not to influence the conceptual structure by any constraints exercised by a preconceived ordering device. The notation will be assigned to the headings only after final confirmation of their scope and relative position in the scheme.

If and when this happens, the notation may not be purely numerical, and it may not even be decimal, so that on the face of it there seems to be little, if any, connection between BSO and UDC. Because of the broad nature of BSO, however, a system such as UDC with its greater detail and flexibility will be needed to supplement the "roof code" of BSO for the purpose of indexing and retrieving individual and specific documents. More important still, it is probably no exaggeration to say that without UDC, BSO may not have become a reality, or that it would at least have been vastly more difficult to design such a scheme from scratch. After all, the cumulative experience of hundreds of contributors, and the feedback provided by thousands of users throughout the world over a period of eight decades, together with insights gained from research into the theoretical foundations of classification during the last thirty years, has resulted in a tool that, despite its many shortcomings, remains the most universal, versatile and widely used system for indexing and retrieval of information. The UDC in turn would not have been

possible, but for the genius of Dewey, whose scheme contained the basic building blocks on which all modern retrieval systems have been built.

Perhaps the new BSO will achieve, albeit on a very general level, for the subject organization of documents what has already been accomplished to a large extent in the closely related field of descriptive control by the International Standard Bibliographic Description (ISBD) and other appurtenant elements aimed at standardization in bibliographic control. It may thus become the capstone of the great conception which for 500 years has been the dream of bibliographers and librarians, and which only now is gradually taking shape, namely Universal Bibliographic Control—knowing the sum total of all knowledge that has been recorded in whatever form, and knowing what and where those records are.

REFERENCES

1. Dewey, Melvil. *Dewey Decimal Classification and Relative Index.* 12th ed. Lake Placid Club, N.Y., Forest Press, 1927, p. 40.

2. *Ibid.,* pp. 40-41.

3. Rigby, Malcolm. *Computers and the UDC: A Decade of Progress, 1963-1973.* The Hague, International Federation for Documentation, 1974. (FID 523)

4. Downey, Maurice W. "Data Collection and Transcription in the Cataloguing Section," *Libri* 22:58-76, 1972.

5. Aitchison, Jean, *et al. Thesaurofacet: A Thesaurus and Facetted Classification for Engineering and Related Subjects.* Whetstone, England, English Electric Co., 1969.

6. Rigby, *op. cit.*

ADDITIONAL REFERENCES

Foskett, Anthony C. *The Universal Decimal Classification: The History, Present Status and Future Prospects of a Large General Classification Scheme.* Hamden, Conn., Linnet Books, 1973.

Schmidt, A. F., and Wijn, J. H. de. "Some Possibilities for a New 'Reformed' UDC (Suitable for Extension of the Standard Reference Code)," *DK-Mitteilungen* 16:19-21, 1972.

Van der Laan, Andre, and Wijn, Jan H. de. "UDC Revision and SRC Project: Relations and Feedback," *Unesco Bulletin for Libraries* 28:2-9, Jan.-Feb. 1974.

Wellisch, H. "UDC: Present and Potential," *Drexel Library Quarterly* 10:75-89, Oct. 1974.