A New Scheme for Library Classification

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ABSTRACT

This proposed new classification scheme is based on two main elements: hierarchism and binary theory. Hence, it is called Universal Binary Classification (UBC). Some advantages of this classification are highlighted including subject heading development, construction of a thesaurus, and all terms with meaningful features arranged in tabular form that can help researchers, through a semantic process, to find what they need. This classification scheme is fully consistent with the classification of knowledge. The classification of knowledge is also based on hierarchism and binary principle. Finally, a survey on randomly selected books in McLennan Library of McGill University is presented to compare the codes of this new classification with the currently employed Library of Congress Classification (LCC) numbers in the discipline of Library and Information Sciences.

KEYWORDS: Library classification, classification features, binary system, hierarchism, Library and Information Sciences

INTRODUCTION

Classification is very important to every library administrative system. Without classification, materials cannot be found. Even with the miracle of the Internet, not only have classification systems in libraries remained intact but very important databases have also had to depend strongly on some sort of classification system.1

The aim and objective of this article is to propose a new system for book classification as well as indexing. The author believes that this new classification scheme has many advantages that make it worth consideration. It meets all the needs of a good classification system, although of course it is still at a theoretical stage and therefore subject to revision. As a library teacher and professional, the author has had experience with a wide variety of classification systems after working in university and parliamentary libraries in Iran. As well, in teaching courses on reference sources in B.A. and M.L.S. classes, he has had to introduce the concept of encyclopedia structure, which itself entails a classification of knowledge. From his acquaintance with Islamic Studies, furthermore, the author is familiar with many Muslim philosophers and encyclopedists who developed classification schemes for knowledge management. Some of these scholars followed Aristotle's classification while others developed new ones.

It was while writing an article for the First International Seminar on Mulla Sadra (a renowned Muslim Philosopher) that the author formed the notion that both philosophy and religion seek the Ultimate Truth. He was inspired by one of the verses of the Qur'an, which says:

We will show them Our Signs in the universe, and in their own selves, until it becomes manifest to them that this is the truth.2

The author searched for an explanation of these signs in other verses. He was astonished to discover that these signs are almost always presented in pairs, such as: heaven and earth, sun and moon, day and night, lightness and darkness and even (from a social perspective) those who know and those who do not know. This binary led him to investigate further, and finally he developed a draft structure for classification of knowledge according to the principles of hierarchy and binary. The author published an article on this subject in Persian and Arabic,3 in which he proposed that a new library classification system be developed on the basis of this new scheme.

While pursuing his research at McGill University (May 2002-Sep. 2003), for sabbatical leave, the author focused on the library classification scheme. His colleagues in the school of Library and Information Studies encouraged him and gave him the opportunity to present his new system in two open seminars attended by professors and students. In the course of this project, the author made a comparative study of other classification schemes, especially Dewey Decimal Classification (DDC) and Library of Congress Classification (LCC) and also Library of Congress Subject Headings (LCSH.) To test the proposed new system, which is called Universal Binary Classification (UBC), a survey was launched in the central library of McGill University on the disciplines of Islam and Library and Information Sciences (see Appendix).

Before presenting the proposed new classification scheme, certain points should be made:

- First of all, although LCC and DDC are more than 100 years old, and although both are still widely used and constantly updated, nevertheless in practice some major problems in using them exist. Therefore, since classification schemes have never been regarded as fully complete, new ideas may be of assistance. After all, nothing is absolutely perfect.
- Every new idea in the field of classification should be regarded as a new plant, which cannot of course be compared at this stage with the lofty trees that the older, established systems represent, with their 100 years of support and refinements.
- This new idea is a humble attempt at showing some of the existing problems confronting researchers and information managers today.
- Everything in this project is optional: indeed, it is only a model that is being proposed here, so many terms may change in the process. The author mainly wants to show the possibility of the project. Again, before defining the structure of the new idea, it would be useful to mention some of the positive characteristics of library classification schemes. These, among others, may be defined 4 as:
- To be backed by a philosophy or at least a strong viewpoint. This gives it more stability and permanency.
- To be natural. This means a straightforward approach that conforms to what one feels, sees or touches on an immediate basis.5
- To be universal. That is, it should be applicable to nearly all countries of the world such that everybody may practice it and every nation accept and apply it.
- To be logical. If this is ignored, subjects may be classified at random.
- To have no bias towards or against any religion, country or nation.

- To be in accordance with a recognized classification of knowledge. Indeed, wherever consistency is observed, the classification scheme is more likely to persist.
- To be consistent (in hierarchy and terminology) in its subject headings; otherwise, major problems can arise for both classifiers and users.
- To choose appropriate signs and symbols so that, in addition to their symbolic roles, they semantically (or at least initially) refer to the things and objects they represent. For example, if we choose A as a sign or symbol for apple, it is much more meaningful than choosing D for it.
- To be flexible, such that it may be shortened for use in small libraries.
- To be easy to learn. It is evident that numbers are easier to learn or to be remembered than letters, if one compares for example two digits with two letters and so forth.
- To be as user friendly as possible.

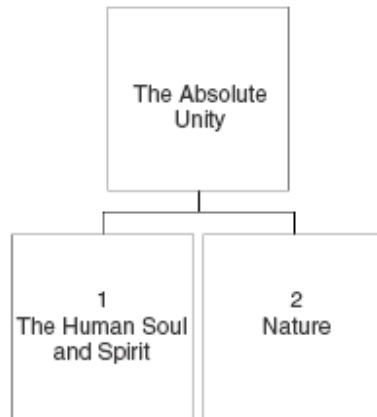### STRUCTURE OF THE PROPOSED NEW SCHEME

Before explaining the structure of the new scheme it should be noted that it is based fully on a theoretical classification of knowledge (see Schedules 1, 2 and 3 in this article). Hence, at the core of the scheme stands a body of recognized knowledge, here meaning disciplines that are accepted universally.

The proposed UBC Classification Scheme codes consist of two signs: numbers and letters. The numbers in turn are arranged in two sequences: an outer and an inner one. Between the two sequences of numbers there are two (occasionally one) letters. These letters represent the disciplines they stand for. An example of such a classification would be **135 LI** *81*(**Number Letter** *Number*), for classification in Library and Information Sciences.
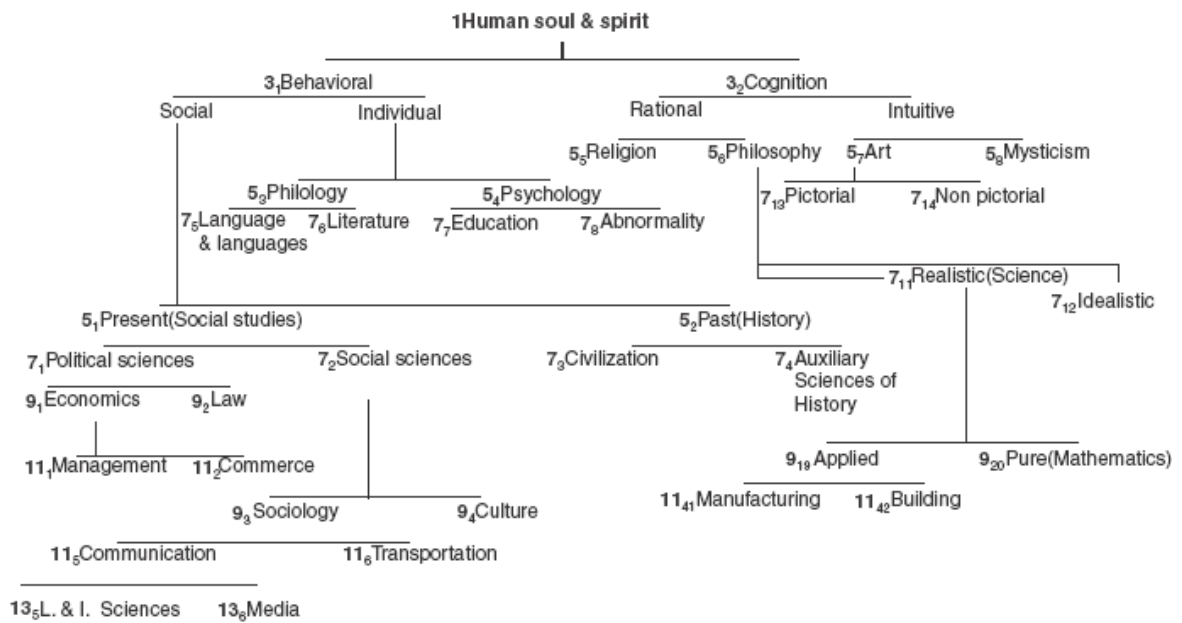
The outer numerical sequence, which should be in bold, is either odd or even, reflecting given disciplines as arranged in hierarchy. Odd numbers represent the more important disciplines (as well as subjects, which will be discussed later) in the hierarchy, where they are arranged on the left side, and even numbers the less important ones, arranged on the right side. The numbers furthermore increase in value as one moves down the hierarchy and into increasing specificity.

The inner number sequence stands for subdivisions of disciplines, which we may call the subjects, and the rules are the same as for the outer sequence. Therefore, for each recognized discipline we can add numerical codes for defined binary subjects. This number in the inner sequence of any discipline increases, too, as one moves down the hierarchy. Therefore, in the main Schedules (see Schedules 1, 2 3), the integer 0 stands for Absolute Unity, while on the left side 1 stands for Human Soul and Spirit (humanities), and 3 for the second row and so on. By contrast, on the right hand side, number 2 stands for Nature, and 4 for the second row, after which the process continues downward.
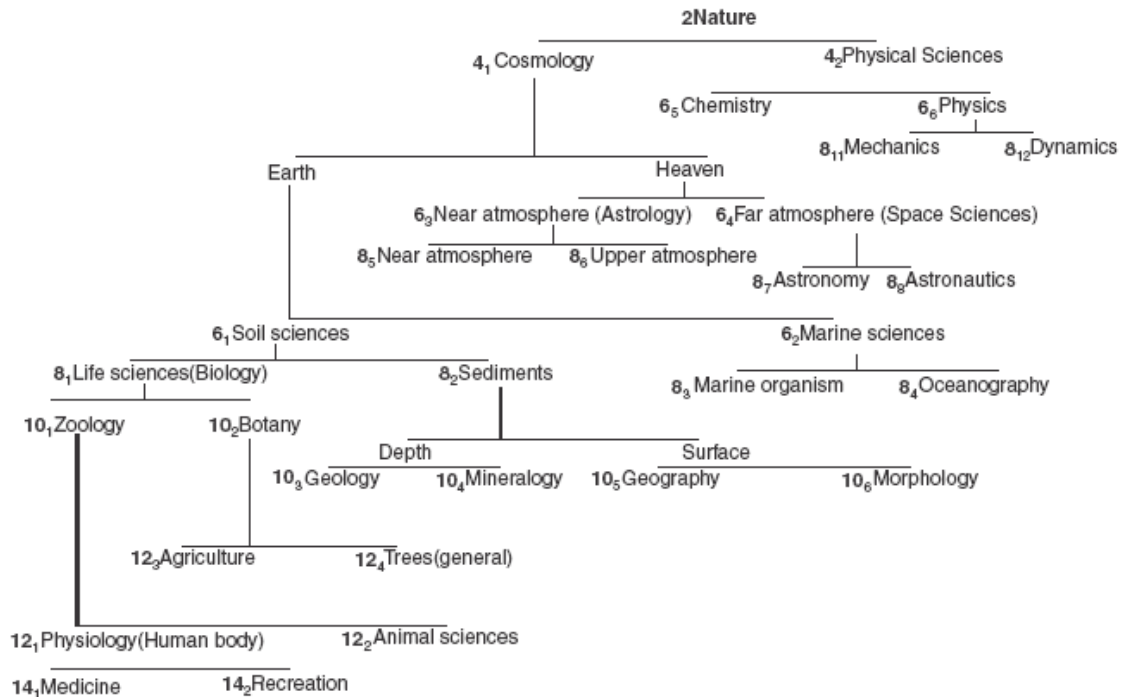
SCHEDULE 1. Human Knowledge According to What One Sees or Touches

SCHEDULE 2. Chart for Human Studies

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SCHEDULE 3. The Chart for Nature Sciences

These outer numbers stand for the hierarchical disciplines. Therefore, at any point in the classification scheme if the number 1 is added to an odd number, and the result is divided by two, the quotient represents the number of levels or classes separating the subordinate discipline from the primary discipline in the schedule.

$$N = (n+1)/2$$

For even numbers in the same position, one need only divide the figure by two to find the primary discipline (see Schedules 2,3,4).

$$N = (n)/2$$

Here, odd and even numbers have a specific significance. They stand for more important or active disciplines/subjects (really or by convention) and less important or subordinate ones, respectively. In the diagrams that follow later in the article, placing odd numbers on the left side and even numbers on the right in any hierarchy further emphasizes this distinction. Some suggested rules for assigning odd and even values may be as follows:

1. In the Human Soul and Spirit division, every discipline or subject that is nearer to the spiritual and intellectual activities of mankind, where we find more distinguished disciplines and subject fields, is adjudged to be more important and is assigned an odd number.

2. In the Nature division, whatever is nearer to life and living activities as well as those things that are considered to be positive in action/reaction capability are put on the left side. But wherever such distinctions are difficult or impossible, this arrangement should be regarded as optional and it makes no difference on which side a subject is put. Of course all of these will be done by expertise's consultancy.

The middle part of the code consists of the letters. These letters are signs or symbols for the disciplines. But here, instead of choosing peculiar and unknown letters to denote the subjects, we choose universally accepted codes for every discipline. For example, if

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chemistry is known by CH, or sociology by SO, we prefer to use these letters, and if the discipline is a compound word or phrase we prefer to choose the initials that are universally accepted. Thus, for example, Library and Information Sciences is represented here by the code **LI**. And if the code is meant to stand for just one of the two disciplines, the letter **L** may easily stand for Library Science, and **I** for Information Science. This makes the codes meaningful instead of being mere signs or symbols for the disciplines and subjects. Again, these letters are printed in bold type.
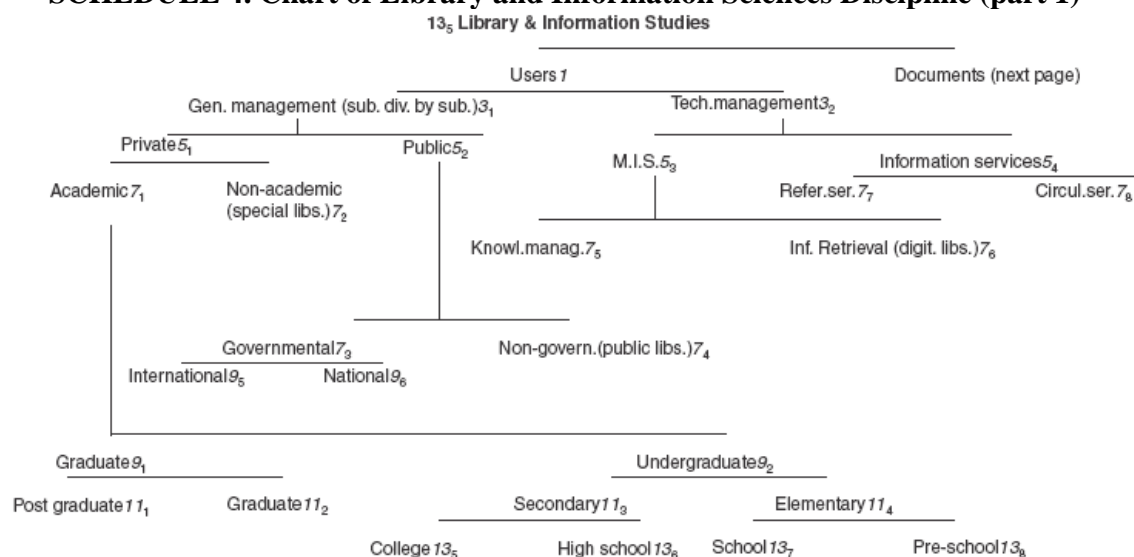
Thus, by referring to the outer number sequence and letters one can file or classify all the books or documents according to well-known disciplines. For instance, if one has books arranged by the subjects of Religion, History, Sociology, and so on, one assigns to them the two digits and one or two meaningful letters in bold type and then the notation and cutter numbers (the notation will be discussed later).
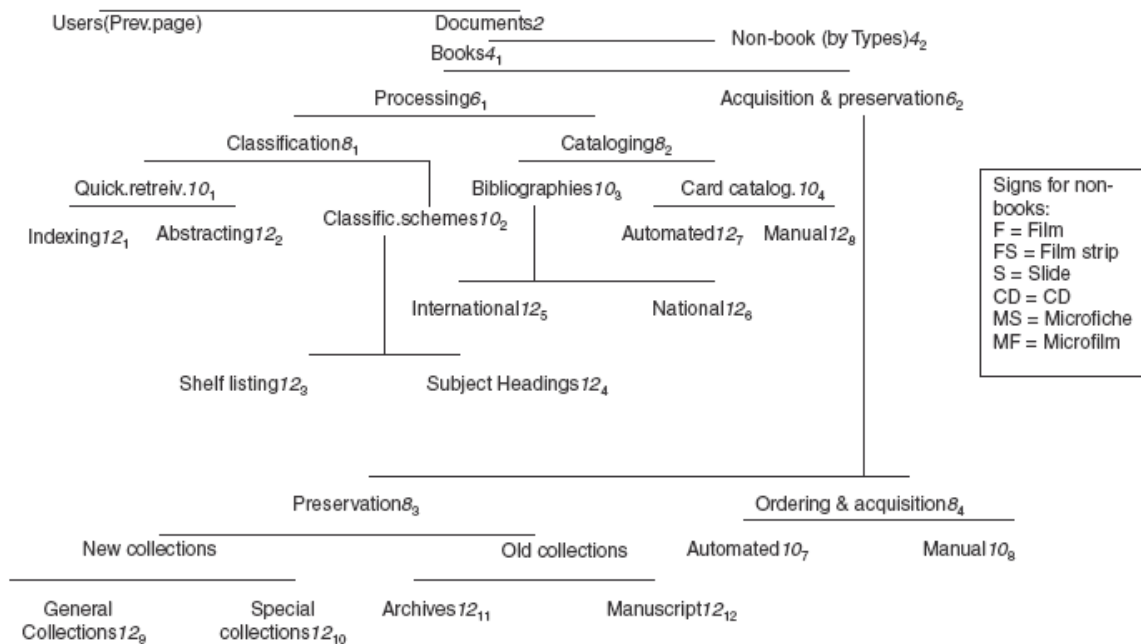
INNER DIVISION OF THE DISCIPLINES

The inner division in every discipline follows the same pattern as the outer part of this scheme, described in the foregoing. That is, the inner part of every discipline is managed according to binary principle and moves down or up to where it makes sense or to wherever subject specialists assign it (see Schedule 4). In the subject division of the inner numerical sequence, the same rule applies as in the case of the outer one. That is, we try to give more important subjects odd numbers and the less important ones even numbers. But here the numbers should be in italic type, to distinguish them from the bold ones. For defining the important and active side of each subject we would do the same as in the case of the outer divisions. Note that the choice of bold numbers and letters and italic numbers for the inner position are simply a suggestion, in order to distinguish between disciplines and sub-disciplines. Other means can be chosen to convey these differences, of course.

Here in the inner sequence, again, every odd number when increased by one and then divided by two shows the number of the row plus the distance of the subject from the main discipline. And in even numbers, merely dividing them by two shows the row and distance of the subject from the main one (see Schedule 4).

SCHEDULE 4. Chart of Library and Information Sciences Discipline (part 1)

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SCHEDULE 4. Chart of Library and Information Sciences Discipline (part 2)

Users(Prev.page) Documents2 Non-book (by Types)4_2

Books4_1

Processing6_1 Acquisition & preservation6_2

Classification8_1 Cataloging8_2

Quick.retreiv.10_1 Bibliographies10_3 Card catalog. 10_4

Indexing12_1 Abstracting12_2 Classific.schemes10_2 Automated12_7 Manual12_8

International12_5 National12_6

Shelf listing12_3 Subject Headings12_4

Preservation8_3 Ordering & acquisition8_4

New collections Old collections Automated 10_7 Manual 10_8

General Collections12_9 Special collections12_{10} Archives12_{11} Manuscript12_{12}

Signs for non-books:
F = Film
FS = Film strip
S = Slide
CD = CD
MS = Microfiche
MF = Microfilm

Up to here, every subject has its own code which comprises numbers and letters in three main parts: the one or two bold digits standing for the hierarchical distance of the well-known discipline to the real root of the knowledge classification in the world of reality, the two (occasionally one) bold letters which stand for the discipline and the two italic digits which denote the distance of subdivisions from each main discipline (link). As in genealogy, where it is very common that parents there may have many sons and daughters, distinguishable by name, age, sex and so on, in classification, where there are many subjects to deal with, we distinguish the terms by other indicators–in this case, small numbers written in subscript immediately after the real numbers. These numbers actually are not part of the classification scheme, but they have two significant roles: one is to keep the disciplines and subjects in an orderly arrangement, as may be expected (the full benefits appear in shelving); the other has a role in counting the features for every term in the whole scheme (see advantages nos.12, 13, and 14 below). Here, for better indexing we count all possible pair clustering and from left we number them. So, we may not have actual and feasible clustering in one or more subdivisions but we reserve its number for future possibility.

TABLES AND STANDARD SUBDIVISIONS

Tables and standard subdivisions are very important in any classification scheme. Standard sub-divisions and tables for languages, literature, history and geography should all be defined. As this new idea of classification may rely on endeavors undertaken up to now, the tables and subdivisions used in DDC will, therefore, be wholly or partially prescribed here. In the tables for geographical places, especially, we may use odd and even numbers, provisionally assigning the northern part of the world and its constituent

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countries odd numbers, and for southern hemisphere even numbers (an idea that must certainly be worked on further).

A CAUTION

In this classification scheme it happens that some subjects are used that are not as scientifically defined as others; these subjects are introduced mainly in order to preserve the binary schedule structure. Hence, although the divisions are usually in the positive form of "either, or," it is sometimes necessary to define binary relations in the form "A and not A" to support the structure. For example, in Schedule 2, after the second row, we have the definitions Social and Individual, as well as Rational and Intuitive. In Schedule 3 we find Earth and Heaven in the third row and Depth and Surface under Sediments in the 6th row, without allocation of any code to them. In this article we present the three main schedules for the overall disciplines and another showing the extension of the discipline of Library and Information Sciences with all its inner divisions.

It should be noted that all the terms and branches as well as numbers and codes were chosen by the author, and although he has drawn on the advice of specialists and received much help from the core literature, like LCSH, the arrangement remains tentative and subject to change in revision.

CLASSIFICATION SCHEME: FOUR DISTINCT PARTS

Mapping the Schedules

Schedules: for every discipline and subject we have a schedule in two parts:

- One part is the map of the discipline, as shown in Schedules 1, 2, and 3. Mapping the schedules is the main concern of this classification scheme. Hence, the 3 main Schedules denote the outer components of all recognized disciplines according to the standard classification of knowledge. The second part is for the inner part of the disciplines. In order to map the inner parts of every discipline, however, much time and effort will be required. Thus only the prototype for Library and Information Sciences as a discipline is given as model (see Schedule 4).

In Schedule 4 (part 2) for Library and Information Sciences, there is a box for the symbols of non-book formats. This means that, if one wants to classify films, one can place an F before the whole classification code or just after the two digits and letters, e.g., bibliographies of films:

F135LI*1*0*3* or **135 LIF** *1*0*3

Main Schedule

The main schedule comprises an extensive table organized according to the codes, with all instructions coming under each item, such as those on building numbers, scope notes, see references, etc. There may be a resemblance here to subject headings, but subject headings are, by definition, arranged alphabetically. For example:

1HU Human Soul and Spirit

Class here general works: For specific aspects class under specific subjects.

2NA Nature

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Subject Headings
Subject headings are derived from the map and arranged alphabetically. In this part all the instructions will be defined. See Also's (SAs), as well as broader terms (BTs), narrower terms (NTs) and related terms (RTs) will be included in this section. By looking to these schedules we can easily create our subjects in the same way that LCSH prescribes in the introduction to the most recent edition. There are four categorized subdivisions: Topical, Form, Chronological, and Geographical.6 All these rules prescribed in LCSH can be used for making the subject headings.

Indexes
Indexes are very important in every classification scheme. In UBC there would be two distinct indexes:
A. Relative Index. This will show the hierarchical arrangement of disciplines and subjects in alphabetical form. It is very important for classifiers as well as researchers.
B. Full index. A full index will help anyone (users) who is not familiar with the hierarchical classification to find what one needs.

The tables in the next pages show the way the subjects are arranged together on the library shelves. Table 1 represents a library with a collection in the Humanities and all related disciplines, while Table 2 shows the order of subjects in a collection focusing on the natural sciences. Finally, Table 3 demonstrates a comprehensive collection with works in all disciplines.

TABLE 1. The Order of Humanties Disciplines as They Would Appear on Library Shelves Classed According to UBC

Human soul & spirit	$1HU$	Science	$7_{11}SC$
Behavioral sciences	3_1BE	Idealism	$7_{12}ID$
Cognitional sciences	3_2CO	Pictorial Art	$7_{13}PA$
Social studies	5_1SO	Non-pictorial art	$7_{14}NA$
History	5_2HI	Economics	9_1EC
Philology	5_3PI	Law	9_2LA
Psychology	5_4PS	Sociology	9_3SO
Religion	5_5RE	Culture	9_4CU
Philosophy	5_6PH	Applied sciences	$9_{19}AP$
Art	5_7AR	Mathematics (Pure sciences)	$9_{20}MA$
Mysticism	5_8MY	Management	11_1MA
Political sciences	7_1PO	Commerce	11_2CE
Social sciences	7_2SS	Communication	11_5CU
Civilization	7_3CI	Transportation	11_6TR
Auxiliary sciences of history	7_4AU	Manufacturing	$11_{41}MA$
Language & languages	7_5LA	Building	$11_{42}BU$
Literature	7_6LI	Library & Information Studies	13_5LI
Education	7_7ED	Medias (Newspaper, Radio . . .)	13_6ME
Abnormality	7_8AB		

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TABLE 2. The Order of Natural Sciences Disciplines as They Would Appear on Library Shelves Classed According to UBC

Nature	$2NA$
Cosmology	4_1CO
Physical sciences	4_2PH
Soil sciences	6_1SO
Marine sciences	6_2MA
Astrology (Near atmosphere)	6_3AS
Space sciences (Far atmosphere)	6_4SP
Chemistry	6_5CH
Physics	6_6PH
Biology (Life sciences)	8_1BI
Sediments	8_2SE
Marine organism	8_3MR
Oceanography	8_4OC
Near atmosphere	8_5NA
Far atmosphere	8_6FA
Astronomy	8_7AM
Astronautics	8_8AT
Mechanics	$8_{11}ME$
Dynamics	$8_{12}DY$
Zoology	10_1ZO
Botany	10_2BO
Geology	10_3GE
Mineralogy	10_4MI
Geography	10_5GE
Morphology	10_6MO
Physiology (Human body)	12_1PH
Animal sciences	12_2AN
Agriculture	12_3AG
Medicine	14_1ME

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TABLE 3. The Full Range of Disciplines as May be Seen in a Large Library Employing UBC

Code	Discipline	Code	Discipline
1HU	Human soul & spirit	7_{11}SC	Science
2NA	Nature	7_{12}ID	Idealism
3_1BE	Behavioral sciences	7_{13}PA	Pictorial Art
3_2CO	Cognitional sciences	7_{14}NA	Non-pictorial art
4_1CO	Cosmology	8_7AM	Astronomy
4_2PH	Physical sciences	8_8AT	Astronautics
5_1SO	Social studies	8_{11}ME	Mechanics
5_2HI	History	8_{12}DY	Dynamics
5_3PI	Philology	9_1EC	Economics
5_4PS	Psychology	9_2LA	Law
5_5RE	Religion	9_3SO	Sociology
5_6PH	Philosophy	9_4CU	Culture
5_7AR	Art	9_{10}AP	Applied sciences
5_8MY	Mysticism	9_{20}MA	Mathematics (Pure sciences)
6_1SO	Soil sciences	10_1ZO	Zoology
6_2MA	Marine sciences	10_2BO	Botany
6_3AS	Astrology (Near atmosphere)	10_3GE	Geology
6_4SP	Space sciences (Far atmosphere)	10_4MI	Mineralogy
6_5CH	Chemistry	10_5GE	Geography
6_6PH	Physics	10_6MO	Morphology
7_1PO	Political sciences	11_1MA	Management
7_2SS	Social sciences	11_2CE	Commerce
7_3CI	Civilization	11_5CU	Communication
7_4AU	Auxiliary sciences of history	11_6TR	Transportation
7_5LA	Language & languages	11_{42}BU	Building
7_6LI	Literature	12_1PH	Physiology (Human body)
7_7ED	Education	12_2AN	Animal sciences
7_8AB	Abnormality	12_3AG	Agriculture
8_1BI	Biology (Life sciences)	12_4TR	Trees
8_2SE	Sediments	13_5LI	Library & Information Studies
8_3MR	Marine organism	13_6ME	Media (Newspaper, Radio...)
8_4OC	Oceanography	14_1ME	Medicine
8_5NA	Near atmosphere	14_2RE	Recreation
8_6FA	Far atmosphere		

CLASSIFICATION SCHEME ADVANTAGES

1. In the first place it has its own philosophy and logic. Hierarchical and binary principles are the two key elements of this scheme. The philosophy of creation determines the hierarchy. According to this philosophy, knowledge of the universe is divided according to what the universe is, not how we imagine it to be. The binary principle means that, as we see in the world that everything is in pairs and that all things ultimately end in one main truth or reality, so should our description of this reality be twofold. This scheme accepts that there may be instances where dividing knowledge into two is difficult or impossible, but it affirms that they are quite exceptional and they may be beyond the

reach of a library classification scheme. When the binary division stops the indexing begins. Hierarchism is also accepted in every classification, and here it is likewise at the core of the scheme.

2. This classification scheme is also natural. This means that the divisions and subdivisions are divided according to what we observe or experience in the world of reality. In the outer part of the human/nature classification, everything is borrowed from natural phenomena, i.e., heaven and earth, soil and sea, behavior and cognition, and so on.

3. As a result of the foregoing, this classification scheme is clearly universal. This is to say that the classification scheme considers the whole universe as well as human beings, and, therefore, it is familiar and applicable to all human beings, whatever their beliefs and backgrounds and wherever they may live. In other words, this classification system is popular, and is defined in pairs according to what we see and touch everywhere and all around us. Therefore, it is not something peculiar or strange to people.

4. In this classification scheme, there is no bias towards any country, language, literature or religion. Every religion, country and nation with all its attributes receives equal treatment.

5. Another advantage of this classification scheme is that it is fully consistent with the classification of knowledge. It would not be wrong in fact to say that they are the same.7 This obviates repetition and waste of time looking for the right subject. Also, the same terminology and codes are chosen for the two systems: this can be seen from the parallels between the classification of knowledge and the Library and Information Science classification scheme.

6. This library classification scheme is in accordance with the proposed subject headings for UBC, because these subject headings are essentially derived from the scheme. Hence, every term chosen for the classification scheme may, with few changes, be chosen for subject headings, too. Hence, many instructions may apply to both classification scheme and subject headings. In the related indexes we can define the UF, SA, NT, BT, RT, social aspect, economic aspect, etc., as well as notes such as "may be subdivided geographically" and so on.

7. In keeping with Ranganathan,8 UBC features a classification scheme in which every character plays more than one role. For example, the first two bold-type digits denote the specific discipline as well as the number of rows in the hierarchy separating it from the top (while these same digits, depending whether they are odd or even, refer to either of two main categories, which have been defined). The letters, moreover, stand for the discipline and they are universally meaningful because they are taken from the actual names of the disciplines themselves. The two italic digits denote the subdivisions as well as the number of the row and the distance of the subdivisions from the main disciplines. What is more, odd and even numbers have special connotations at this level as well.

8. Again following Ranganathan,9 in this classification scheme it is common to find all aspects of subjects near to each other, or at least more so than in the other systems. For example, in the case of "transportation," one may have all historical, social, philosophical and managerial aspects in a single place (which usually does not occur) by adding the related codes to them, such as in: **116TR 5**29356111. Where the subject of transportation is not the main or core topic, the code will of course be different.

9. Flexibility is another advantage of this new system. That is:

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- If very specialized or small libraries do not want to use extra numbers, these can be omitted without affecting the whole system. For example, if the library is solely devoted to library and information studies, the two bold digits before the letter codes can be dropped.
- Also, when moving downwards in the subject schedules, one can stop at any point depending on the amount of detail desired.
- Another benefit is that one can separate the odd numbered books from the even ones. This may be particularly useful in shelving in large size libraries, such as in national and international libraries.
- Also, if certain nations or institutions do not want to use the whole system, they can use the outer parts of the codes, thereby linking all the recognized disciplines in a string of easy numbers in accordance with the way that they are understood all over the world. For example, 65 in UBC, is the universal code for Chemistry, and each library can choose its own signs for the disciplines in the language it commonly uses. Furthermore, if they want, they can classify the inner part of the disciplines according to their wishes.
- It is possible for countries or nations to use their own alphabet instead of the Latin script codes denoting the disciplines, and this does no harm to the classification scheme at all. Moreover, once entered into a computer, these terms can be converted whenever needed to Latin alphabets (of course this is not recommended).

10. As stated in Ranganathan's canon 252,10 learnability is another aspect that enhances any library classification scheme and this can be seen here. That is, numbers at the extreme ends of the code (and also those at the center) not only do not go beyond two digits, but also they hardly ever exceed the number 20. Also, the letter codes are chosen in a way that represents the discipline by taking initials from its recognized name. Therefore, they are easily learned and easily remembered. So, for instance, it is very easy to find materials on History or Philosophy, especially if the same principles for establishing codes are used in all libraries all around the world. Besides, as Taylor11 notes: "In a setting where many languages are involved it is believed that numerical and other symbols can transcend the language barriers imposed upon verbal subject approaches."

11. As this classification scheme is based on two main elements–hierarchy and binary principle–and also, every term designates by two features (see advantages 13,14), it may prove more compatible than other classification schemes to computers. Indeed, as the computer itself is based on binary system and codes, some major problems involved in this area may be solved or diminished.

12. In view of Ranganathan's12 remarks, it can be said that this classification scheme is more user-oriented, and Facet rules are applicable to it. For although in this scheme the codes are ready-made and the figures for every subject are to be mapped in a book or booklets, it is nevertheless very easy for user to make one's own choice in using the subjects. In other words, as Ranganathan proposed in his formula "personality, matter, energy, space and time,"13 one can add all possible aspects for his choice. For example, if one chooses classification as a subject then one can add operational, economic or social aspects by adding a number from the related subjects, while place and time can be added by using the tables for place and time from the related schedules. Therefore, it seems that

this classification scheme has all the potential of traditional classification, which Clarke and Yancey denote as Enumerative, Hierarchal and Analytico-Synthetic.14

Note should be taken that in UBC it is recommended that the numbers in all subjects and sub-subjects and also in notation should follow the same rule in order not to create confusion. For example, if "5" is for History in the main schedule then this number should be applied for historical aspects only.

13. Searching and browsing are also facilitated. By three clicks one can reach to the remote subject defined on the screen of the computer. In this classification scheme every discipline or subject has two basic numbers that identify it. In discipline schedules (see Schedules 1,2, and 3), one number is for the rows and shows the disciplines (horizontal), while the other denotes the vertical position, which is for the order of the disciplines in genealogical form. Hence, all the disciplines have two numbers denoting row and column. For example, Absolute Unity = **AU** 0,0 Philosophy = **PH** 5,6 Chemistry =**CH**6,5 and so on.

Again, within the disciplines all subjects have two features. For the subjects we have two numbers, just as in the case of the disciplines, one of which is typed in bold, which refers to the row and the discipline that this subject belongs to. For example, the feature of Classification in Library Science is **13**5 81 where **13**5 stands for the discipline (that is Library Science) and the two following numbers (italic and ordinary) are its features. Referring to Losee's Grey Code15 in tabular form, here we can have tables with designated features, too.

These numbers can be treated mathematically as the dimensions of the discipline or the subject. In this manner every term in every discipline and subject has its own value, which can be defined by it. The difference in orientation of the features in book shelving and here is in the order and arrangement. Thus, in shelving by disciplines one places the one or two digits before the coded letters but in retrieval one considers the two digits after it, e.g., Religion = **55RE** and **RE 5**,5. This is helpful for researchers in that it allows them to choose what they are looking for. Suppose one wants to search for works on classification, and this term is used in several disciplines such as Philosophy, Biology, Zoology, and Library Science. The process is as follows:

E.g., in searching the classification the terms below may appear:

Philosophy	Biology	Zoology	Library Science
5_6	8_1	10_1	13_5

One selects Library science, →

More subdivisions needed, Yes   No   →

If one chooses yes, one comes to **13**5$81,$ after which one can browse alphabetically by:

Author   Title   Subject   Index

One can choose whichever of the above is convenient, and it will browse for the patron. Considered from the other direction, if one does not know any discipline or subject one can try all the numbers from 1 to 20, but if one knows the number it can be entered, which yields all the associated disciplines and subjects. E.g., on entering 5, one finds:

5_1(Social Sciences) 5_2(History) 5_3(Philology) 5_4(Psychology)
5_5(Religion) 5_6(Philosophy) 5_7(Art) 5_8(Mysticism)

Also in the example above, one can use a Boolean model to specify the desired topic, e.g., in order to find the works on classification one can specify:

Philosophy **and** Library Science
Philosophy **or** Library Science
Philosophy **not** Library Science

14. Indexing is certainly another advantage of this new library classification scheme. This applies to every discipline but mainly in subjects where, in consultation with subject specialists, we must try to define them further and divide them into pairs, at least insofar as they do not exceed the definition of the discipline and subject accepted by those specialists. Next is the place for index terms. Here, all the related words and terms which cannot be put in two separate sections can be gathered at the bottom of the specialized subjects, arranged alphabetically. This denotes the hierarchical position of the indexed words and terms. This obviously affects precision when we recall, because every word has its own meaning in a distinguished discipline and as we saw in article 13, every word is vital and has its own value. So, the value does not merely mean the dictionary meaning of the words but the technical and semantic meanings used by subject specialists. Also the special names can be defined in this manner. Furthermore, there is the possibility of selecting the opposite adjectives for the terms. Hence, in every case where it makes sense, we can define our disciplines and subjects by adjectives such as high and low, big and small, masculine and feminine, hot and cold, positive and negative, etc. For example, in Physics (electricity) we have high pressure, and there is an index term, which cannot be put in an independent subject with two features and yet we want to distinguish it from low pressure, after the special code for the term. Suppose the related code is *6652*, we can then add P for pressure and an odd number (because according to our general rule of classification, even numbers represent the inferior in every pair) or any other conventional signs which can denote the "high" pressure after it.

15. The greater ease in constructing a thesaurus is another advantage of this classification scheme. Terms are chosen according to recognized values, allowing one to extend core terms hierarchically or arrange them alphabetically. This means that the value of the technical terms is the same in the classification scheme and in the thesaurus. This is actually of great help to the librarians, documentation specialists and researchers as well. The library and the documentation center may be in two places but the values for the subjects and informative terms all follow the same scheme.

16. The possibility of changing as well as extending in this classification scheme is an additional bonus. If one changes the name of the discipline or the subject, nothing changes except the letter codes; if the rows are changed, only the number will be changed and the inner divisions will be preserved. And even if one wants to add a new discipline or subject to the scheme, there are many reserved places in the rows and columns where it can be applied. It should be considered, however, that, at the very beginning of making the basic schedules, careful attention by specialists may insure that there will be no need for changes for a long time.

17. Saving time and money is another advantage of this classification. As the subject headings and classification schemes are consistent with each other and may be collected in a single book, there is potentially a great saving in time and, as a result, the saving of money. Also, as it may be more compatible with computers, there would be a lot more advantages in this area. Bringing together all classification of knowledge, classification of Library and Information Sciences, subject headings and thesaurus in a single direction is a great advantage and saves a lot of energy and money. Besides, if every term gets its value features and is treated as a vital object, it will really affect the time and energy of researchers in finding their needs.

18. The UBC scheme is especially useful in preventing distortion of true pattern of relationships especially on the shelves.

19. Another minor benefit in shelving is that in a classified library one must not reserve more shelf space for books yet to arrive.16

As for two above-mentioned problems, this classification scheme presents fewer difficulties. This is because in every row where there are few topics, especially in the upper rows, one cannot move down to the subdivisions unless one has finished work with them. Besides, these topics are divided in two (odd and even), changes may take place sooner than in DDC and LCC. If one moves down one must change the row; therefore, it seems that less space is needed for the future extension.

20. The last advantage that the author would like to note is the fact that this new classification scheme acknowledges the contributions of all previous arrangements proposed by specialists in all disciplines, especially in Library and Information sciences. In writing this article the author received considerable help from LCSH and DDC and LCC.17,18 Also, expressions used by Ranganathan were of assistance in defining the facet, and so on. Certainly, in fixing the basic structure of this scheme all the experiences will be needed.

CONCLUSION AND SUMMARY OF ADVANTAGES

Given the advantages of the UBC classification scheme described here, the author believes that it can be of service to any library in the world, large or small. It is constructed according to what is, not what we think; it shows real hierarchy; it defines the position of every discipline or subject from its root; the digits and letters are meaningful, while even the odd and even numbers have their own roles; it is easy to learn and the main digits in both discipline and subject hardly exceed two in number and hardly ever surpass 20 in numerical value; it defines the relationships of disciplines and subjects with one another; it has no bias towards anything or anybody; it applies the same rules throughout the scheme; it has the potential of flexibility; it is arranged according to the classification of knowledge; it can be applied by computer; every discipline and subject is defined by two sets of meaningful numbers; it consists of subject headings that are integral to the classification scheme, while subject headings follow the same rule and can be gathered in one volume; users can search by subject and numbers and can use Boolean searching as well.

Nevertheless, the author appreciates all endeavors made up to now, all over the world, by true and sincere specialists and humbly confirms that this scheme is at the beginning of its journey; indeed, this article only tries to show its potential. So, every comment will be appreciated, just as every branch of each discipline or subject as well as the

terminologies can be subject to change. A most practical suggestion is to find financial support in order to undertake consultations with subject specialists so as to develop and nurture the project, and the author appeals to subject specialists and librarians to help in nurturing this seedling. Certainly, the next step is to prepare the detailed schedules for every discipline in accordance with a reasonable methodology, like Delphi, which is performed successfully with the discipline of library and information sciences, or something similar, and to work more on notation, and then have more practical tests in libraries.

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APPENDIX
The Comparative Classification by LCC, DDC, and UBC in Library and Information Science Discipline

No.	Subject	LCC. No.	DDC .no	UBC .no	Subject
1	Library science	Z665	020	13_5L	Library science
2	Ranganathan, S. R.1892-1927	Z665.214	020#	13_5L8	
3	Library science	Z665	020	13_5L	Library science
4	Information science	Z665	020	13_5I	Library science
5	Public libraries	Z665	020#	13_5L7	Library science
6	Bibliography	Z1001	010	13_5L10	Bibliography
7	Winsor, Justin, 1831-1897	Z674	025.52	13_5L5	Information services
8	Dewey, Melvil, 1851-1931	Z720D4	020.92	13_5L10	Librarians
9	Library science	Z670	020#	13_5L	Library services
10	Wormann, Curt David, 1900-	Z674	025.52#	13_55_4	Library services
11	Library science	Z721	027.009	13_5L7	Libraries–History
12	Library science	Z673	020#	13_5L	Library science
13	Library science	Z115.5	411.7#	13_5L	Paleography
14	Libraries–United States	Z665	020#	13_5L3	Library science
15	Library schools	Z669.5	020#	13_5L9	Library science
16	Books and reading	Z710	025.31	13_5L7	Library catalogs
17	Library science	Z665	020#	13_5L	Library science
18	Library science	Z665	020	13_5L	Library science
19	Library science	Z670	020	13_5L	Library science
20	Library science	Z665	020	13_5L	Library science
21	Library science	Z665	020	13_5L	Library science
22	Cataloging	Z695	025.32#	13_5L8	Descriptive catalog.
23	Library science	Z320	070.509	13_5L	Publishers &publishing

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