The Representation of Knowledge in Library Classification Schemes

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ABSTRACT: This article explores the representation of knowledge through the discursive practice of 'general' or 'universal' classification schemes. These classification schemes were constructed within a philosophical framework which viewed 'man' as the central focus in the universe, which believed in progress through science and research, and which privileged written documentation over other forms. All major classification schemes are built on clearly identifiable systems of knowledge, and all classification schemes, as discursive formations, regulate the ways in which knowledge is made accessible. Of particular interest in determining how knowledge is represented in classification schemes are the following:

- **Main classes:** classification theorists have attempted to 'discipline epistemology' in the sense of imposing main class structures with the view to simplifying access to knowledge in documents for library users.
- **Notational language:** a number of classification theorists were particularly interested in the establishment of symbolic languages through notation.

The article considers these aspects of classification theory in relation to: the Dewey Decimal Classification scheme; Otlet and La Fontaine's Universal Bibliographic Classification and the International Institute of Bibliography; Henry Evelyn Bliss's Bibliographic Classification; and S.R. Ranganathan's Colon Classification.

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Foucault began 'The Order of Things' by quoting a passage from Borges, on the monstrous classification of animals in 'a certain Chinese encyclopaedia'. In this monstrous classification animals are divided into:

> ''(a) belonging to the Emperor, (b) embalmed, (c) tame, (d) sucking pigs, (e) sirens, (f) fabulous, (g) stray dogs, (h) included in the present classification, (i) frenzied, (j) innumerable, (k) drawn with a very fine camelhair brush, (l) et cetera, (m) having just broken the water pitcher, (n) that from a long way off look like flies.' In the wonderment of this taxonomy, the thing we apprehend in one great leap, the thing that, by means of the fable, is demonstrated as the exotic charm of another system of thought, is the limitation of our own, the stark impossibility of thinking *that.*' (Foucault 1974, xv)

Foucault argued that within this taxonomy what really 'transgresses the boundaries of all imagination, of all possible thought, is simply that alphabetical series (a, b, c, d) which links each of these categories to all the others.' (Foucault 1974, xvi) The use of the alphabetical symbols suggests that relationships exist or should exist between the categories thus linked, because of the conventions of the Arabic alphabet, but

in relation to our system of thought, that does not appear to be happening. For Foucault the other 'monstrous quality' running through Borges' taxonomy is the fact that these categories could only exist in and through language. They could not be juxtaposed in any other sense, in any other place, in any material site. Borges' monstrous encyclopaedic classification is an important starting point for Foucault in his investigations into the historical contingency of discourses of order, power and control. Foucault's investigations of the operations of power through localised institutions and practices are the starting point of this paper which explores the order and juxtaposition of ideal concepts through the discursive practice of classification schemes.

The philosophy of librarianship might be characterised as positivist, embracing science and research, and modern, rooted in an optimistic interpretation of science and society. In the early days of the profession, librarians tended to take the view that progress would be inevitable if knowledge is made accessible. During this period knowledge organisation solutions took the form of large-scale library classification systems which were described as *general*, or in the case of UDC, *universal*. These classification schemes were constructed within a philosophical framework which viewed *man* as the central focus in the universe, which believed in progress through science and research, and which privileged written documentation over other forms.

Librarians have traditionally combined high purpose and idealist aspirations with pragmatic practical solutions. Their creative genius embodied in library classification schemes attempts at one and the same time to map knowledge, to represent 'the order of things' in relation to the ideal, and to organise the material – books on shelves – within the everyday confines of the library building.

The General Classification Schemes

General classification schemes for libraries are concerned with mapping knowledge so that subjects are differentiated from each other and the relationships between subjects are spatially represented. Classification theorists believe that there is some sort of 'order of things' and that the order, which relates to the abstract world of ideas, can be made material in the form of highly conventionalised, symbolically annotated classification schemes. The general library classification system developed into a tool consisting of a system of classes, made up of Main Classes, each of which was divided into increasingly specialised subclasses; a series of symbols, called notation, which operate as signs signifying the classes; and an index which links subject terms and the notational signs. The classification notation in effect becomes a symbolic language built on what Ranganathan terms 'natural language'. Method, order and objectivity, which carry with them the connotations of 'science', are achieved in the general library classification scheme through the rational structures and conventions of Main Classes which assert forms of logical taxonomy, and through the artificially constructed symbols which bear with them connotations of algebraic languages. These taxonomies are the product of rational, and often pragmatic and functionalist, worldviews.

Berwick Sayers whose highly influential 'Manual of Library Classification' was first published in 1926 argued that the arrangement of books by men [sic] was 'merely a part of the divine instinct that 'order is Heaven's first law'; for arrangement, or classification as we call it, lies at the base of every well-managed life and occupation.' (Berwick-Sayers 1955,1) For Berwick Sayers the process of classification is natural, but that natural operation is the function of a divine intervention. Men [sic] are thus defined in relation to an assumed god. Unsurprisingly, given the interest in education, the explosion of knowledge, and the modern faith in science and method, the late 19th and early 20th centuries was a particularly fertile time in the history of general classification systems. During this time Melvil Dewey produced the Dewey Decimal Classification scheme which was first published 1876 and is probably still the world's best known scheme; Otlet and La Fontaine's International Institute of Bibliography was set up in 1895; Henry Evelyn Bliss's Bibliographic Classification was published between 1940 and 1953; and perhaps the most intriguing of all the general schemes, S.R. Ranganathan's Colon Classification was published in 1933.

The creators of these systems had in common a desire to facilitate access to knowledge in books and a belief in the value of science, organisation and method. They often emphasised the practical purpose of their classification schemes. In the introduction to the 1961 abridged English edition of UDC, the editors claimed that the UDC should 'not be regarded as a philosophical classification of knowledge, nor is the order of subjects of primary importance.' (BS 1000A

1961, 6) But UDC was built on a system of knowledge: UDC main class order was built on top of the order of main classes developed by Melvil Dewey which in turn was based on Francis Bacon's rationalist representation of orders of knowledge. Commentators on classification theory have tended to adopt fairly ambivalent views about the relationship between library classification and philosophical systems of knowledge. Berwick Sayers argued that classification systems are built on philosophical foundations, but emphasised the practical and pragmatic function of library classification. The 4th edition of Berwick Sayers 'Manual of Classification' published in 1967, which was heavily edited and revised by Arthur Maltby, omitted much of the background material which outlined the philosophical foundations and history of library classification schemes. But despite this ambivalence, all major classification schemes are built on clearly identifiable systems of knowledge, and all classification schemes, as discursive formations, regulate the ways in which knowledge is made accessible.

That all classification schemes are built on clearly identifiable systems of knowledge, epistemological assumptions, is itself the assumption upon which this paper rests. Moreover, through their interest in the signifying practices of notation, some classification theorists might be considered philosophers of communication. Within this paper I would like to focus attention on the philosophies and ideologies of classification theorists.

This paper explores the representation of knowledge in classification schemes in relation to:

- **Main classes:** classification theorists have attempted to *discipline epistemology* in the sense of imposing main class structures with the view to simplifying access to knowledge in documents for library users. This practice establishes the epistemological worldview upon which the classification scheme is built, a practice which is ideological and dominating, and at the same time liberates the user through facilitating open access libraries which enable the user to locate specific documents held by the library. This is a nice example of the dominating and enabling power of a very localised knowledge/ power regime.
- **Notational language:** a number of classification theorists were particularly interested in the establishment of symbolic languages through notation. This approach to language is extremely idealist and seems to view what Ranganathan called 'natural language', that is socialised language developed in and through communities of speakers, as unscientific and imprecise.

Main Classes and Disciplining Epistemology

Although in his Canons of Classification (Berwick Sayers 1955, 79) he asserted that the order of classes in a classification scheme is built on a theory of knowledge, Berwick-Sayers argued, following on from Edward Edwards, that there are two classes of library classifications: those which have a metaphysical basis and those which are merely practical and convenient arrangements, made without reference to any ideal order of knowledge. In the former category he placed Dewey's Decimal Classification. In the latter category he included the French system, otherwise known as the System of the Paris Booksellers, which was first used in the early 18th century and was further developed and refined by Jacques-Charles Brunet. Yet if we examine the base of the 'schemes without a philosophical base' (Berwick Sayers 1955, 96), it is clear that an order of knowledge developed from a particular worldview underpins the structure of each of these schemes. Berwick Sayers referred to remarks made in an 1904 L.A. Record article by W.R. B. Prideaux (Berwick Sayers 1955, 96) about the system adopted by the Jesuits at the end of the 17th century which differentiated between the 'resplendently bound collection of choice and exquisite authors' and 'the unhappy books of the heretics placed in mourning and dirt, and indeed bound by black skins or black parchment, and all coloured on top with black colouring.' (Berwick Sayers 1955, 97) Clearly, although the philosophical base of this classification system might not be explicitly acknowledged in any written document, it was built on the basis of a certain worldview pertaining to differences and hierarchical binary distinctions between choice and heretical authors.

Berwick Sayers quoted Gustave Mouravit's praise of Brunet's French system at some length.[1] Mouravit outlined the order of knowledge that he perceived to be operating within the system arguing that the *divisions* or classes begin with theological subjects because 'At the summit of things, man first beholds God, his Author and End' (Berwick Sayers 1955, 98). The second division is Jurisprudence, as man [sic] has returned to the world and met 'men, his familiars'. The relationship between man and the natural world gives

rise to the third division of sciences and arts. The human mind, asserted Mouravit, has a *life of its own* which has a vision of the ideal signified in the system by the fourth division of Belles-Lettres. After God, justice, the external world and the mind, man then looks to the destiny of humanity in the form of the historical sciences which make up the fifth division. Finally the 'investigating torch' of bibliography makes up the sixth division, and that which cannot be conveniently placed elsewhere may be placed in the final division of polygraphy and collection.

Berwick Sayers's gloss on this exposition was to comment on the inaccurate elevation to divisions of the sixth and seventh classes which are subordinates to History in the scheme, and to suggest that Mouravit's theory about the underlying logic of the system was 'clearly fanciful'. He argued that:

> 'tradition has consecrated the view that man first beholds God, but that he immediately turns from God to the contemplation of ideas of Justice and Law is extremely debatable. These considerations were probably not present in the mind of the deviser of the scheme, and appear to be an ingenious after-apologia.' (Berwick Sayers 1955, 99)

What is of interest here is Berwick Sayers's assumption that this theory of knowledge is debatable, as if other structures were not. It may be that we have no written evidence to determine whether the structure developed by Brunet, following on from the French bibliographers, was explicitly and consciously organised in that specific order, or whether the order was arrived at by accident and chance, but it seems unlikely that the order could be entirely random: Berwick Sayers himself stated that tradition has consecrated the privileging of theology which is evidence that a particular worldview underpinned the order and content of main classes in the French system. Despite claims by Edwards and Berwick Sayers to the contrary, the order of classes in Brunet's system is a constructed, ideal view of knowledge. Choices about order, about what subjects are privileged and what subjects are subordinated are always ideological, that is always the product of particular worldviews which, on the level of the ideal, reflect and reinforce the structures and organisation of material society.

Berwick Sayers historicised classification and pointed to the constructed nature of orders of knowledge, even when he referred to the practical library classification systems. What we can gather from Berwick Sayers is that main classes within library classification schemes are:

- always constructed;
- 'ideal' formations rather than 'representative' of the 'natural' world;
- historically constituted and contingent.

Main classes, indeed class schemes in general, are ideological constructs, and while they are not representative in the sense of any bloc of class marks exactly corresponding to elements in the material world, the symbolic construction of class schemes has consequences in cultural political terms, in that it marks out what is symbolically classed in libraries, and what is not, and what is considered of main or primary importance, and what is of secondary or subsidiary importance. The discourse of the classification schemes sets limits, rules and regulations about what and how things can be referred to within libraries, and this has consequences in wider social terms because libraries are primary institutions of learning and of acculturalization.

Library classification schemes like all other social constructs shift and change over time reflecting and influencing the logonomic systems within which they operate. The treatment of particular disciplines and topics is subject to diachronic transformation. The treatment of fiction in library classification schemes offers an interesting example of what is classed and what is not, and how this might change over time. Dewey's treatment of fictional works is to place them using historical and geographical markers. This does not begin to address issues relating to meaning and subject analysis of fiction. Fiction analysis and classification has historically been the poor relation, but in recent years this has changed as innovative retrieval systems such as Bookhouse and Book Forager attempt to address the questions of meaning and subject analysis in fiction. This shift in attitude towards fiction by information retrievalists and librarians is linked to the treatment of fiction more generally within the academy, and beyond that within contemporary western society.

The turn to language evident in socially motivated academic disciplines influenced by post-structuralist theory has encouraged broad exploration of epistemology generally, and widened the scope of what is considered academically legitimate, with the result that there are now degree courses, often based on

critical theory and cultural studies, which examine popular literature and many other cultural artefacts. But the interest in fiction does not come only from critical theorists interested in commodification and critique: fiction has to be published, sold and consumed before it becomes an interesting subject of critique in the first place. Reading novels for pleasure is no longer considered morally dangerous or time-wasting in a capitalist society which encourages the commodification of leisure and leisure products. Fiction has economic and ideological value in contemporary capitalism. Librarians are increasingly interested in retrieval systems which facilitate access and encourage fiction reading, perhaps influenced by the sophisticated retrieval tools created and implemented by Amazon.com, a commercial site which sees the value of investing in information (bibliographic information) and interpretation (e.g. readers' reviews) for material and economic ends. The treatment of fiction in libraries both mirrors the treatment of fiction in society at large, and influences society at large through acculturalization, specifically through teaching library users about the way that society at any given specific historical juncture regards fiction and the consumption of published fiction.

Library Classification: Pragmatic or Philosophical?

Library classification schemes are products of their times and their creators, who themselves are products of the socio-political and historical moments in which they live. Librarians emphasise the pragmatic nature of their library classification schemes, but pragmatism is a slippery term. It is sometimes defined as that which is good or that which works, but a critical approach might ask for whom is it good, and for whom does it work? Pragmatism is often concerned with maintaining the status quo, which in library classification terms might mean reflecting, and in turn imparting, the dominant ideology through decisions about main classes, divisions, sub-divisions and the order of things.

The American librarian and classification theorist Melvil Dewey was more than anything else a pragmatist whose interests spanned not only library management, but also other schemes of improvement related to intellectual and symbolic life, which included the desire to simplify the spelling of English and to introduce the Metric System of weights and measures. But even the classification scheme created by the pragmatic Dewey had to rest on some philosophical, and ideological, view of knowledge.

Melvil Dewey was indebted to the work of W.T. Harris who created a system of classification for the public school library of St Louis in 1870. Harris based his Main Classes on those developed by Francis Bacon to produce what is known as the first of the 'inverted Baconian' schemes. Bacon's 'Chart of Learning' was composed of the following classes: History, Poesy and Philosophy. The following diagram is based on Maltby's discussion of the elements of the 'Chart of Learning'. These elements formed the basis of the inverted Baconian classification schemes:

Class I History	*Memory*
Class II Poesy	*Imagination*
Class III Philosophy	*Reason*

(Maltby 1967, 116-117)[2]

The inverted schemes organised these in the following order: Philosophy, Poesy and History.

The system originally developed by Bacon in 1605 derived from a worldview which took man [sic] as the centre point of the universe and attempted to organise the structure of knowledge, the 'order of things', around human understanding. Bacon asserted that three distinct mental fountains emanate from man: Memory, Imagination and Reason, and his divisions of knowledge were based on the types of knowledge emanating from each of the three mental fountains. Bacon's scheme was built on rational and subjective epistemological assertions. Harris took and embellished this structure. The following table, taken from Berwick-Sayers, shows the relationship of the Harris and Dewey Main Classes to each other and to the Bacon original and inverted Baconian schemes:

Bacon original	Bacon inverted	Harris *Science*	Dewey
History	Philosophy	Philosophy	General Works
		Religion	Philosophy
		Social and Political Science	Religion
		Natural Sciences and Useful Arts	Sociology
			Philology
			Science
			Useful Arts

		Art	
Poesy	Poesy	Fine Arts	Fine Arts
		Poetry	Literature
		Pure Fiction	
		Literary Miscellany	
		History	
Philosophy	History	Geography and Travel	History
		Civil History	Biography
		Biography	Geography and Travel
		Appendix	
		Miscellany	

(Berwick Sayers 1955, 113)

Berwick Sayers argued that the Dewey scheme was not based on any modern order of studies, nor did it represent 'the modern consensus or the order in which scholars arrange the main studies and sciences'. (Berwick Sayers 1955, 113) So for Berwick Sayers, as for Dewey, it went without saying that a consensus or an expert view of the relationships between subjects exists and should be the basis for organising the material artefacts within which knowledge in the form of written text resides. Berwick Sayers' appraisal was concerned only with how up to date the order of knowledge was.

Even a pragmatic classification scheme rests on a philosophical view of knowledge, and that view of knowledge will be informed by, and inform a cultural-political position. Dewey's system has been criticised for its culturally determined viewpoint; for example, Christianity is privileged in the Religion class. Dewey's system is ideological as all such formations are, and in that sense is one of many discourses through which society is fixed, ordered and regulated. Dewey's system is significant because it is so very popular and has lasted for so long. As it operates in libraries, it both imposes and legitimises its particular worldview, and offers maps and guides to finding knowledge in documents. Dewey's classification scheme is both dominating and enabling. It enables users to access documents without mediation but it imposes on users the necessity of understanding and searching through knowledge in documents from within its particular viewpoint. This Janus-faced quality it shares with all library classification schemes. Its ideology relates to rationalism, pragmatism and common-sense, its worldview is westernised, ideal and positivist, and the 'order of knowledge' it disseminates, it does on a vast scale, through its global use by all manners of libraries and librarians, and through its everyday status as *merely* a practical information retrieval tool.

Henry Evelyn Bliss, another American, critiqued Dewey's Baconian rationalism. Working in the positivist scientific philosophical framework of the early 20th century, his approach was to construct main classes built on scholarly and academic consensus. Bliss did not believe Dewey's argument that it does not much matter where in the scheme a subject is placed as long as it is efficiently indexed; he described the inverted Baconian order as unphilosophical and unpractical because the main sciences became separated and 'mangled' (Bliss 1939, 205); and he criticised the notation as being uneconomical and complex.

Another Perspective: Bliss, Science and the Order of Things

Henry Evelyn Bliss strongly believed in the need for academic and philosophical underpinnings in library classification. It was not enough that the library classification scheme could be useful in a practical and instrumental fashion to organise books on library shelves, such a scheme should have educational value also. He was of the belief that although no individual could master the whole of knowledge, understanding the relationships between the different branches of knowledge would give the individual an overview of the whole world of ideas.

In his book 'The Organization of Knowledge in Libraries' (1939), Bliss undertook a critical survey of what he called the established library classifications. Amongst the reasons for his dissatisfaction with existing schemes, he cited the fact that 'Their main divisions and subdivisions are too largely arbitrary and unauthentic.' (Bliss 1939, 309) For Bliss, an order of knowledge existed which was somehow natural, and authentic. This natural authenticity appears to be dependent on academic consensus. Bliss believed that 'knowledge should be organized in consistency with the scientific and educational consensus, which is relatively stable and tends to become so as theory and system become more definitely established in general and increasingly in detail.' (Berwick Sayers 1955, 190) Bliss based his scheme on an unquestioning acceptance of established westernised academic conventions, of

the notion of true order, and of the principle of hierarchical organisation. As far as Bliss was concerned the right order of things is determined by its usefulness to the practitioners of the branches of knowledge: the order of things which drives the structure of the classification scheme is in the end a matter of disciplinary common sense.

Berwick Sayers summarised the principles of classification according to Bliss:

1. That the order of things can be established.
2. That the order of things is the basis of the classification of knowledge.
3. That the order is determined by its use by, and usefulness to, the thinkers and workers in the various branches of knowledge.

(Berwick Sayers 1955, 189)

It could be argued that the major limitation of these principles is that for Bliss they were absolute and *natural* rather than relative and historically determined. But knowledge and its representation is always a product of the logonomic system within which it operates. For example, Derek Langridge cited the outline of the classification used in the People's University of China to demonstrate the importance of the relationships of subjects to each other in determining classification schemes. From our point of view, what is really interesting is that this very different representation of knowledge weakens Bliss's assertions relating to expert consensus. The following is an outline of the main classes within the scheme:

'Part 1. *Theory of Knowledge*
1 Marxism, Leninism, Mao Tse-tung thought.
2 Philosophy and materialism, historical and dialectical materialism, religion, atheism.
Part 2. Knowledge of the Class Struggle.
3 Social science, political science
4 Politics, Economics.
5 State defence, Military science
6 State and law
7 Culture and Education
8 Arts
9 Language
10 Literature
11 History and History of the Revolution
12 Geography
Part 3 Knowledge of the Productive Struggle
13 Natural science
14 Medicine
15 Technology
16 Agriculture.

(Langridge 1989, 4)

Bliss believed that the more 'definite the concepts, the relations, and the principles of science, philosophy, and education becomes, the clearer and more stable the order of the sciences and studies in relation to learning and to life; and so the scientific and educational consensus becomes more dominant and more permanent.'[3] (Bliss 1939, 37) His was a positivist and optimistic view which placed great faith in the idea that stability and order will grow from objective scholarship and universal knowledge. It is perhaps less easy in our post-structuralist, post-Second World War western society to be confident that sciences and scholarship will tend towards a scientific and educational consensus that will become more dominant, more permanent and universal.

Notational Languages and Translation

Knowledge organisation systems are first and foremost concerned with surrogates, in the case of library classification schemes, of symbolic notation standing in place of subject terms representing concepts. For Berwick Sayers, despite the lack of brevity in the notation of the Decimal Classification system, the reason for its longevity and world-wide use is its notation, which being based on Arabic numerals, is 'an international 'language' understood by all nations' (Berwick Sayers 1955, 126). Other classification theorists developed highly complex articulated symbolic languages which mimicked 'natural languages' in employing syntagmatic devices to translate natural language into symbolic notation.

Paul Otlet and Henri La Fontaine, in their UDC project, and S.R. Ranganathan were all concerned with the question of translation. Otlet and La Fontaine were interested in the translation of languages in order to facilitate international understanding. It is interesting that this project should have developed at approximately the same historical juncture as the beginnings of the analytical philosophy approach to language developed by Bertrand Russell and Ludwig Wittgenstein. Analytical philosophy is sometimes attacked for being overly disconnected from the real world with commentators pointing out that while the

philosophers in Cambridge worried about the meaning of words, Europe was plunging into World War 1. However, the international bibliography project of Otlet and La Fontaine, despite its limited success, might suggest that there was a 'structure of feeling' at the end of the 19th century and the beginning of the 20th century which believed in translation, communication and shared understanding of language as prerequisites for progress, civilisation and ultimately, peace. S.R. Ranganathan, whose system was founded on a completely different view of main classes and the order of knowledge, was interested in the translation of the private languages of individual consciousness, and of that consciousness as it becomes one with the world, into a pure, synthetic, symbolic language.

The notion of translation depends on classification notation being theorised as a particular form of communicative semiotic practice. Semiotic theory as it is generally understood today is based on the pioneering work of Ferdinand de Saussure and Charles Peirce. Saussure and Peirce were both interested in the sign as the basic unit of analysis in language. For Saussure, the sign was composed of signifier and signified which together form the sign. For Peirce, the sign was made up of: the *Representamen*: the form which the sign takes (not necessarily material); an *Interpretant*: not an interpreter but rather the sense made of the sign; an *Object*: to which the sign refers. Peirce referred to three different types of signs within his semiotic system. There are: the *index* which is a sign which is not arbitrary but in some way is connected with the signified/object, for example thunder or medical symptoms; the *icon* where the sign is seen as resembling the signified/object, for example a portrait, a scale-model; and the *symbol* where the sign is arbitrary or conventional so that the meaning of the sign must be learned, for example language, traffic lights. Semiotic approaches to language very often emphasise the arbitrary aspects of language arguing that language is symbolic and has to be learned. Saussure's approach was structuralist in perspective and did not focus on the diachronic and intersubjective aspects of language. The Russian linguist V.N. Volosinov's philosophy of language tried to bridge the objectivity of Saussure and the emphasis on subjectivity of phenomenological linguists by arguing that language is always dialogic and communicative.

Classification notation can be theorised within the framework of dialogic communicative practice as a particular form of semiotic communication. It is doubly articulated. Classification notation is symbolic but the important point is that classification theorists generally use symbolic signs which already exist and have meaning in other semiotic systems. The symbols might be Arabic numbers or letters or Greek symbols or punctuation marks, or a combination of these symbols, which can be manipulated paradigmatically and syntagmatically. Meaningful units can be constructed from the syntagmatic linking of individual symbols. Classification notation is an interesting semiotic activity because it is built on a semiotic system, language, and the signified itself (the subject term) is a symbolic signifier at the level of language. The system is further complicated by the fact that classification is based on the analysis and description of knowledge recorded in documents as interpreted by human indexers so that the issue of interpretation and matching is significant in information retrieval.

Volosinov argued that human beings think through signs, that they are born into signifying practice. Amongst classification theorists, Paul Otlet and S. R. Ranganathan were particularly interested in classification notation as signifying practice. For Otlet, the European socialist and pacifist working at the turn of the 19th century, the focus was on intersubjective communication. Ranganathan saw the possibility of notation forming an international language, but influenced by a metaphysical philosophy, he was also interested in the possibility of producing signs which signify aspects of individual consciousness not signified in and through language. For Ranganathan classification notation offered the potential for the construction of a sign system which was purer than existing natural language.

Paul Otlet and International Language

Paul Otlet and Henri La Fontaine were Belgian lawyers, bibliographers and internationalists. Otlet was to become revered in information science circles as a pioneer of information retrieval and an anticipator of the theory of hypertext, while La Fontaine received the Nobel Peace Prize in 1913 for, amongst other things, his work in the International Peace Bureau and in the founding of International Institute of Bibliography with Paul Otlet. The Institute was a vast information retrieval scheme, in which was to be filed and indexed anything of note published anywhere in the world. The initial interest in building up this bibliography came from the concerns that Otlet and La Fontaine had about the disorganised state of the litera-

ture of social sciences. The cataloguing of this vast project needed a detailed analytical information retrieval tool to facilitate easy access, and it was decided that the Dewey Decimal scheme was to be adopted as the foundation for the classificatory language, but that it would be developed, using a faceted approach, to enable highly detailed subject analysis to be undertaken. The resulting scheme, known as the Universal Decimal Classification, is extremely complicated and designed to be used not on the spine of books but in a representative index.

Boyd Rayward has argued that although Otlet was practical in thought and deed, he was nevertheless motivated by a utopian and emancipatory vision of what the world could become if there was more effective international access to knowledge, and if the intellectual and political forces in the world were coordinated according to plans that he himself had drawn up. These plans related to the creation and operation of international institutions which would communicate and work together for future peace, built along the same lines as the League of Nations. Rayward commented that this vision became increasingly divorced from reality, and although his plans absorbed much of his energy in later years, it was impossible for Otlet to control the political, organisational and social realities of the world into which he had been born.

Otlet was particularly interested in capturing the essential meaning of documents and in the relationships between documents. He was of the view that people do not have enough time to read through the huge proliferation of information in documents, and that they could be helped in the business of scholarly linking by the construction of a massive bibliography consisting of summaries of the content of documents. He was enough of a positivist to believe that within documents, despite the errors and opinions therein, lies the kernel of truth in the form of facts, and it was the facts that he was interested in identifying and representing. He envisaged his classificatory language becoming used to represent the skeleton of meaning in the form of facts found within the flabbiness of the original document. Essentially, the symbols of UDC were to form a scientific language with which one could cut through the ambiguities and complexities of natural language.

Otlet and La Fontaine's Institute was originally housed in the Musee des Beaux Arts in Brussels in 1895, but as their collection grew they were moved to the Palais Mondial. Apart from a spell in Paris during the First World War, they remained there until 1923 when they were turned out of the Institute by the Belgian government to make room for a Rubber Trade exhibition, allowing Berwick Sayers to make bitter comments about a society in which caoutchout ousts learning. (Berwick Sayers 1955, 180) Although the Institute, which became known as F.I.D., had to abandon the card catalogue which included more than 12 million entries by 1921, the legacy of Otlet and La Fontaine continues in the material forms of the UDC classification scheme, and the F.I.D (International Federation of Documentation) which still operates as an international organization promoting and encouraging the study of the practice and theory of information science.

S.R. Ranganathan and the Metaphysics of Notation

For Ranganathan, notational language could at least theoretically function as a system of material signs signifying aspects of individual experience not translatable into 'natural language'. S.R. Ranganathan was an Indian librarian who studied under Berwick Sayers at UCL's School of Librarianship. His Colon Classification scheme, based on faceted principles, was a completely novel approach to organising knowledge in libraries. Colon classification was not a hierarchically derived scheme: it was rather a set of independent tables for subjects, for relations, forms and other aspects of classification, each one of which could be used in combination with other tables to sub-divide. (Berwick Sayers 1955, 206) Berwick Sayers described these tables as parts of a 'Meccano set which by the use of nuts and bolts can be used for many different constructions.' (206) All division of subjects in this scheme is determined by what Ranganathan calls the 'fundamental concepts': Time, Space, Energy, Matter and Personality, but the specific meanings of these concepts are determined by the context in which they occur.

This philosophical approach is similar to the one underpinning R.G. Collingwood's 'Speculum Mentis, or, The Map of Knowledge' (1924). The idealist philosopher and historian, R.G. Collingwood posited that the structure of knowledge should be conceived of as five forms of knowledge: philosophy, science, history, religion and art, each of which has its own conventions and its own assumptions. As Langridge put it:

> 'Beauty, god, Natural Law, he goes on, are said to be aspects of a single reality, what is this reality? For art it is beauty and nothing else, for religion it is simply God, and for science it is nothing but natural law. The exclusiveness of these various objects is an essential part of their nature, he says, and they cannot be combined because each is an implicit denial of all the rest. The scientist has no need of God as a hypothesis and the religious man had no need of natural law, not because God and natural law are distinct parts of reality but because they are rival way of conceiving the whole.' (Langridge 1989, 22)

This approach offers an interesting way of thinking about the disciplinary boundaries, assumptions and discourse that exist within academic subjects and knowledge domains. It also suggests that the conventions of each discipline are really based on the arbitrary assumptions chosen by the practitioners of the subject or discipline to justify and, in a sense, to police the boundaries of their subject: the signifier 'discipline' as a synonym for 'subject' would seem particularly appropriate in this context.

Ranganathan's metaphysical approach to epistemology and knowledge organisation is evident in the following extract from his 'Philosophy of Library Classification' (1951):

> 'An enumerative scheme with a superficial foundation can be suitable and even economical for a closed system of knowledge. For example, such a scheme will work well for Ancient Greek or Indian Philosophy both of which had become crystallised and fixed in far-off days... What distinguishes the universe of current knowledge is that it is a dynamical continuum. It is ever-growing; new branches may stem from any of its infinity of points at any time; they are unknowable at present. They can not therefore be enumerated here and now; nor can they be anticipated, their filiations can be determined only after they appear.' (Ranganathan 1951, 87)

Thus the development of knowledge, rather than being rooted in the concrete research and scholarly works of specific human beings, takes on an abstract life of its own. Like a tree, knowledge somehow grows new branches, but these branches cannot be anticipated at present. There seems to be little relationship in this view of knowledge between that which passes for knowledge at present, and the development of knowledge in the future.

Ranganathan believed in intuitive knowledge, intuitive classifiers and the notion that the idea was separated from the word in natural language, and sometimes could not be expressed in 'natural language, but could still be experienced in the individual consciousness. He wrote about Indian symbolism which has been developed to express that which 'not easily expressible, if not inexpressible, in words.' (Ranganathan 1951, 27)

Ranganathan took the view that the classificatory language that he was developing was able to articulate ideas which could not be denoted in natural language. The following is a quotation from Ranganathan's writings about consciousness, language and classification notation. The quote is a long one, but is worth including as the full flavour of Ranganathan's philosophy is best experienced through his own words. He wrote that:

> 'This reminds one of a statement of Goethe that a divine language alone can express the deeper experiences of a poet and that an expression in a natural language misses the depth, the aroma and the infinitude of experience. It is this incommensurability between idea and human expression which gives rise to the concept of mysticism. Ramkrishna Paramahamsa had said that he was eager to express to his friends that profound experience in his deep Samadhi state (usually translated as trance-state) which brought him supreme delight. But he remarked that, as he reached towards that state, the differentiated manifestations of the phenomenological world gradually shed their differences, and reduced themselves to fewer and fewer patterns, that when the number of patterns fell below a certain number they were so unfamiliar to the ordinary folk that the natural language, which alone was intelligible to them, had not thought of any term to denote them and that ultimately, when the pattern was about to be reduced to a single one, his own identity also was lost in the one; with the result, when he recovered from that depth, he could say nothing, in words intelligible to us, of experiences below a certain depth.' (Ranganathan 1951, 69)

Ranganathan's story about the metaphysical experiences of the realised soul is so very subjective that it becomes extremely difficult to comment on it. The notion that the idea exists before the sign, and in extreme cases might not be possible to articulate through material signs, is close to what Volosinov would term subjective individualism. (Volosinov 1973, 48) It is not possible to comment critically on notions relating to the assimilation of individual identity or essence into phenomenological universality because such notions are based on testimony, and ultimately on faith and belief. For our purposes what is important is to note that from this subjective position, Ranganathan proceeds to assert that from the 'testimony of poets like Goethe, realised souls like Ramakrishna, and the Vedas' we gather that idea can and does exist without a word to denote it 'in its bareness and purity' but that when the idea is considered in the context of different subjects, its different 'contextual transforms' can be expressed by different words. (Ranganathan 1951, 70)

The testimony of any individual, whether poet, realised soul or one of the 'ordinary folk,' is in the end only testimony, itself articulated in and through language. What is interesting about the whole passage is that it shows how worldview and philosophy can prove to be the foundation for the realised structure of the library classification scheme, worldview and philosophy themselves being determined by the material and historical circumstances within which subjects find themselves. Ranganathan's interest in notation and meaning inclined towards a reification of notation. One has the feeling that for some of the early classification theorists, the pragmatic purpose of classification schemes is sometimes sacrificed to the joys of coding and synthetic language construction. It is ironic, given the assertions of pragmatism articulated by so many of the early classification theorists that the fascination and intellectual satisfaction of designing and constructing library and bibliographic classification schemes could lead to the subordination of issues relating to pragmatic implementation.

And Where Now?

Questions relating to the representation of knowledge continue to interest the information profession. Classification theorists are responding to the development of hypertext and the Internet by exploring the role of traditional classification schemes in contemporary information systems and speculating on their role in future developments.[4] Hypertexts offer challenges to the information profession in relation to the organisation of knowledge. Hypertext theorists emphasise the ways in which hypertext networks reconfigure textual structures and the roles of writers and readers. Hypertexts are not 'linear' in the same way that the book is, nor is the document, itself undergoing shifts from textual to multimodal discourse (Kress and Van Leeuwen , 2001), necessarily complete and finished. Snyder (1997) reflects on the ways in which the ideas of poststructuralist literary and critical theorists such as Roland Barthes (theories relating to the writerly text, and the distinctions between 'work' as a closed and complete document, and 'text' as interwoven intertextual webs of language); Jacques Derrida (on deconstruction, decentring and marginalia); and Stanley Fish (reader-reception) have been literalised through hypertext.

A number of hypertext theorists draw on the metaphor of the 'rhizome' developed by the postmodern critical theorists and psychologists, Gilles Deleuze and Felix Guattari (1988), to describe and explain the interlinking, interwoven nature of hypertext networks. For Deleuze and Guattari, the traditional 'arborescent culture', in which the model of discourse is the hierarchical tree, is shifting to a culture in which the model of discourse is the 'rhizome', a subterranean non-hierarchical stem whose roots and shoots are all connected, but which does not have one central authoritative 'branch'. Classification theory today may have to take as its metaphorical signifiers not the 'tree of porphyry' and the root and branch hierarchies of inverted Baconian systems, nor even the Meccano set of Ranganathan's Colon classification, but the 'labyrinths' and 'networks', the 'nodes', 'links', and discourses of collaboration, incompleteness and intertextuality which are increasingly dominating the theory of hypertext.

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Notes

1 This section of the Manual was omitted from the Fourth Edition revised by Arthur Maltby.

2 In the 1955 edition, Berwick Sayers included a representative diagram of the Baconian system in which he ordered the classes 1) History; 2) Philosophy; 3) Poetry, but this order was corrected and elaborated by Maltby in the 1967 revised 4th edition.

3 Bliss's order of classes was as follows:
Classes 1-9 – Universe of knowledge, Communications.
Class A – Philosophy; Logic; Mathematics; Statistics.
Class B – Physics; Physics based technology.
Class C – Chemistry; Materials technology.
Class D – Astronomy and space science; Earth sciences; Geography.
Class E-G – Biology; Botany; Zoology.
Class H-I – Health sciences; Psychology.
Class J – Education.
Class K – Sociology; Customs; Folklore; Ethnography.
Classes L-O – History.
Class P – Religion; the Occult; Morals and Ethics.
Class Q- Applied Social Science and Ethics.
Class R – Political science.
Class S – Jurisprudence and Law.
Class T – Economics; Management.
Class U – Arts: useful, industrial and less scientific technology.
Class V – Fine arts.
Class W/Y – Philology, languages and literature.
Class z – Bibliobiology, Bibliography and Libraries.

4 For example Rita Marcella and Arthur Maltby have recently edited a book entitled The Future of Classification.