

A SHORT BIOGRAPHY OF HENRY EVELYN BLISS (1870-1955)

by

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Youth and Education

H.E. Bliss was born on January 29th 1870 at the old Grand Union Hotel on 42nd St. and Park Avenue (then called Fourth Avenue), New York City. The site is now occupied by the Pershing Square Building opposite Grand Central Station. His parents were Henry Hale Bliss and Evelyn Matilda Livingston (née Davis) both descended from English families who settled on the Eastern seaboard of North America during the colonial era. His earliest traceable ancestor was Thomas Bliss, who settled in Hartford, Conn., in 1639. Henry Hale Bliss was a real estate broker specializing in work for the Astors, Vanderbilts, Goulds, and other wealthy families. He had been married before, and had had children (who had died) by the earlier marriage. Bliss's mother had also been married before and had a daughter by her first marriage. Bliss had one sister, Florence.

His first seven years were spent mostly in the city of New York, and the next six on his mother's estate at Tom's River, New Jersey. Until he was eleven he was educated at home by his mother, who 'taught him to read, write, sing and read the catechism'. Later he was taught by governesses. In 1883 the family returned to live in New York City and he attended two successive grammar schools, leaving the second in 1885. In that year he enrolled in the classical course (which was much wider than the title might suggest, including mathematics, science, logic, philosophy and a modern language) at the College (formerly the Academy) of the City of New York, now the City College of the City University of New York. He left in 1888 without graduating because he was disappointed with the course. His father disapproved of his son's life, and interest in learning and insisted that he went into business. Bliss tried business and also teaching.

Early years as a librarian

In 1891 he was invited to return to the College as Deputy Librarian. Bliss's early duties included advice to students on reading, and in this way he came to know a number of people who, later, became well-known. He soon found that the classification used in the library was inadequate; none of the then available schemes seemed suitable. He wanted at first to improve Cutter's *Expansive Classification*, but soon gave that up. The accepted American thinking on classification and cataloguing, with its heavy bias to Dewey's *Decimal Classification* and to the dictionary catalogue, did not impress him. He seems to have considered Dewey's scheme insufficiently based in scholarship, and realised the need for a better general classification, to be applied in classified catalogues and bibliographies. This was the beginning of his *Bibliographic Classification*. His only formal training as a librarian was a summer course on classification in 1903; he also discussed classification that year with Charles A. Cutter.

Marriage

On June 1st 1901 Bliss was married to Ellen de Koster of New York, born on the 24th September 1876, daughter of John de Koster of Rotterdam, and Ellen Lynch of New York City. She was a teacher; it was apparently, on the whole, a deeply happy marriage.

Relations with the College authorities

These were, at least up to the end of the first World War, pretty unhappy. The nominal librarian also held a chair, and he was so 'in with' the authorities at Tammany Hall (which then controlled New York City) that few people dared oppose him. Bliss seems to have become the *de facto* Librarian fairly early, but it was not a large library, and he had only one assistant. His efforts to improve the library met with little help or response. In his son's words:

'Deputy Librarians, or anything else, are and always have been, perhaps ... unfortunately, quite common in this country. This is a technique by which those who know what it is all about professionally can be frustrated by those who do not but have the interest of the establishment ... especially be they politicians, at heart.

‘Bliss's immersion in library work following some teaching was both an escape from the tragedy of his mother's death and family offences [his mother was poisoned and his half-sister, who led a questionable life, was tried for the murder and acquitted] and an attempt to identify with something more worth-while to him, than the (as it had been experienced by him) usual American involvement with business, with a life of material things, with the seeking and exploiting of wealth and its power... All this in the end confirmed the judgements Bliss made, partly with the aid of the... imported socialist-fringed German Kultur then rampant in New York.’ (Reference 1)

Bliss seems to have been a curious compound of socialist and aristocrat. He took his children picnicking on other people's estates because he did not believe they should have them for themselves, yet

‘my father was at heart an aristocrat, and he retained the tastes of one who has been brought up in this background, however decrepit. This is the background you see portrayed in the first part of Jennie, (Reference 2) of the Jeromes, of Churchill's mother. His mother was of the Davises you see in Burr. (Reference 3) My father was not a democrat. He may not have pushed a society of the survival of the fittest, but he did believe in the selection of the best; that the engineer, the scientist, the educator, the artist, the author and the editor should be (and knowledge and the ability to use it would make him) the leader, the ruler. He might be a socialist of sorts, but no advocate of the supremacy of the proletariat, and shy of rule of the majority.’

Nothing much seems to have happened at the College library until 1915, when the Librarian retired, and Bliss became Acting Librarian; he served as such until at least 1917. He applied for the post of Librarian, but a Dr. Goodrich was appointed, from the University of Michigan.

‘... why was my father rejected, passed over at the College for Librarian? Yes, the socialism bit was part of it. But my father was "hard to take" as the American expression goes. He was no diplomat. He was very uncompromising and critical, he was not cooperative, he had to have his way, was ... almost arrogant in his insistence on being right. It was difficult for him to work with or for another, and he made it very difficult to work with him. And he fought the [American] Library Association as a money-making enterprise, and they were influential. The people at the college were afraid of father, because of his ideas and his independence; they kept him, because ... he might some day make them famous. But in fairness, he was not the man to pick if you wanted someone to administer your policy, or to get along with people. Dr. Goodrich was the Librarian for many years. We all knew him. He and father were close friends. Goodrich was a very fine and a very kind man; just the man to cope with my father in peace and friendship.’

Bliss made attempts, especially about 1918, to secure for himself a full college librarian's position. ‘His peers expressed their sympathy with his lack of appreciation,’ but he never got what he sought.

Reasons for dedication to scholarship

These facts are given to show why his unhappy service to the College, with other factors, made him devote himself more and more to scholarly work. The other factors were (1) the death in 1918 of his beloved elder daughter Enid, ‘who was the embodiment through the consummation of an idyllic marriage of all the youthful, otherwise frustrated idealism of his romantic world’; (2) the sad end of his parents (‘The involvement of his own mother and her family with some of the leading families in New York had ended in tragedy ... had led to a life of ... misery amid a struggle to maintain her position ... ’ Bliss's father ended ‘old, sad, broke, and perhaps given to his cups’); (3) his half-sister's scandalous life which was a perpetual thorn in his side; and perhaps (4) his deafness, which started after 1918.

Hobbies and sports

As a teenage boy on Barnaget Bay, near Toins River, Bliss was proficient, even in rough weather with the "sneak box" or cat boat. He was catcher and star batter for a sand-lot baseball team in Harlem while it was still a country residential area. He played a very good game of tennis well into his forties. He was also Secretary and Treasurer of a hiking and country outing group. Some of his close friends were naturalists.

Bliss had seriously considered being a singer (he had a good baritone voice). Though not a churchgoer, and apparently without religion, he sang, often solo, in the Dobbs Ferry church choir for many years, and helped organize its parish singing club. His deafness put an end to this. He was a skilled cabinet-maker, and loved to work with his hands after long confining hours working with the mind.

Work of classification

Bliss had announced his intention to develop a new general classification in the *Library Quarterly* in 1910. The announcement met with bitter hostility, not from Melvil Dewey (Bliss always said that his personal relations with Dewey were cordial, according to a letter to me from Mr. Howard Haycraft, then President of The H.W. Wilson Company, in November 1955) but from some of Dewey's disciples. Bliss gradually became a rather solitary figure in the American library scene, and his later work met with apathy. In his approach to classification, which was not limited to library classification,

'he reasoned that the reader and the researcher are best served by a classification which places in proximity the subject matters that are most likely to be wanted together (the principle he calls "collocation for maximal efficiency"); which groups smaller, related subjects under the relevant, more general subjects ("subordination"); and which provides for revision according to changes or new developments ... ("adaptability"). He found "that realities exist and subsist in a system of relations". With this thought and purpose, "to discover the relations, and to systemize the knowledge of the realities and their relations," Bliss developed his system.' (Reference 4, Article in *Current Biography*.)

To further his fundamental studies, the College gave him from 1921 three years leave of absence with pay. In these years he laid the foundations of his two books on the organization of knowledge. On rejoining he was made Head of Departmental Libraries, and worked on the unification of these.

'I recollect as a boy [John Bliss was born in 1908], from talk at home, and work father brought home, and occasional visits to the library itself, that father was deeply involved with the actual administration, with the acquisition and actual classification of books, and, whenever he found an exceptionally promising student, [with] his guidance in mastery of the use to a scholar of a library, and actual guidance in his reading and use of books and knowledge.'

In 1928 Bliss was made Associate Librarian, and was thereafter freed from routine work to a varying extent. He held this post until his retirement. This was 'really almost a form of subsidizing his life work'.

Bliss's first book, *The Organization of knowledge and the system of the sciences*, was published in 1929 by Henry Holt & Co., New York, after he had failed to interest the American Library Association in it. Only three of Bliss's papers were ever published by the Association, and two of those were condensed. It was through Halsey Wilson, and The H.W. Wilson Company that Bliss got a real hearing in the library world. The American Library Association, after negotiations lasting several years, refused to publish his second book without a generous subsidy from the author sufficient to cover all publishing costs. *The Organization of knowledge in libraries and the subject approach to books* was published in 1933 by The H.W. Wilson Company which later took over the stocks of his first book, and published all his later works except his book of poems. The two books (a second edition of the second appeared in 1939) and the outline version of his scheme, *A System of bibliographic classification* (1935, 2nd ed., 1936) won him a reputation in many parts of the world as an original thinker of great power, and a classificationist who was not afraid to tread out new paths.

To quote Berwick Sayers, (Reference 5) already referred to, the original author of Sayers' *Manual of classification*:

'The bases of the order and method of the BC are to be found in the first volume ... [title given above]. A more severe preparation for the main work could hardly have been undergone. This book, as its readers know, is exacting; its closely-packed prose responds to no casual reading; the author uses words with an exactitude which is almost mathematical in its precision. As its title implies, it presents results of an unusually exhaustive examination of the ways in which men in their social, philosophical, scientific, professional, industrial and educational relations have organized things. Several orders of knowledge were reached both by induction and deduction. On these, but particularly on the educational and scientific consensus revealed, Bliss rested his classification order. Things are the subject of classification; in realities things exist in relations; a classification for books or for any things that can be arranged should express those relations in its schedules.

'This was not new ... but, and it is a big but, no one has ever progressed through so many forms of organization to arrive at the essential characteristics, "the consensus", in Bliss's now classic phrase. His classification schedule became a new verbal map of universal knowledge, its territories in their real order, each a broad ascertained expanse of the universe of things.'

The *System* (but not the full scheme, see below) was reproduced from Bliss's own typescript. It gave only the main classes and primary divisions, with a number of auxiliary schedules; those for geographical areas, bibliographical forms and languages were applicable anywhere in the system. It was the first major scheme to introduce alternative placings for subjects, but a librarian using the scheme had to decide, once and for all, which place to use.

Bliss was a man of amazingly wide reading; he had systematically read at least one major work in every field. As a result of his studies he came to believe that there is 'an educational and scientific consensus' among most educated men, as to the relations between subjects and their relative placing, but he realised that this was incomplete and varied with time and place. (Geography, for example, is taught in Britain, but not in the USA, as a unitary subject, the parts of which belong together). He realized, too, that specialization sometimes makes it necessary to group ideas in ways quite unsuitable for a

general library. For these and many other reasons, notably its obvious foundation in scholarship and the helpful notes on the relations between subjects and the meanings of terms, the first edition of BC was an unusually good and flexible system; perhaps that is why so many special libraries have adopted it.

‘But it was the men connected with the ... City College, who were so much a part of Bliss's thought-life. As fellow students, as teachers, as students who came under his influence in the library, these men influenced and were influenced by Bliss: Bernard Baruch, Robert Wagner, Arthur Schlesinger, Felix Frankfurter and many others, many who became the great liberals of the Roosevelt age ... These influences, this trend in commitments and antagonisms, were very evident in the work of Bliss ... Perhaps the degree to which they militated against his acceptance in this country, perhaps towards his effectual rejection by the American Library Association, has been greatly undervalued.’

Publication of the Bibliographic Classification

Bliss retired from the College in 1940, after nearly fifty years' service. But he still had a great deal of work to do, to prepare for publication the full schedules of BC. In the same year appeared the first volume: *A Bibliographic classification, extended by auxiliary schedules for complete specification and notation. Vol. 1, Introduction, anterior tables and systematic schedules, and classes A-G (Philosophy, logic, mathematics and the natural sciences)*.

The death of his beloved wife from cancer in 1943 dealt him a great blow, but he recovered with his usual fortitude.

In 1947 appeared *Vol. 2, Classes H-K, The human sciences*. The new classification, though still incomplete, aroused considerable interest and admiration, and was adopted by a number of British libraries, many of them small and mostly special libraries, and also by the Australian National University, Canberra, and the University of Otago (New Zealand).

He laboured on in his eighties, without secretarial help, to complete the task he had set himself, and to keep faith with those who believed in him. In 1953 the final volumes were published: *Vol. 3, Classes L-Z, The special human studies: history of peoples and nations, religion, ethics, and special social studies, literature, bibliography and libraries*, and *Vol. 4, General Index*. There was also a 'second edition' of vols. 1 and 2 in one volume, but this was really a corrected reprint. The forthcoming British edition is rightly called the second edition.

Volumes 2 and 3 of the first edition each had its own introduction, discussing the classification of the subjects included.

‘More emphasis should be put on the factor of collaboration, which world-wide, dominated development of the final expanded extensions of the Bliss system as it was last published. As one who was perhaps influential in persuading my father that if his work was to achieve the stature he hoped for it as an accomplished tool rather than a projected theory, it would take many specialists to develop it, for he could not hope to conquer all knowledge in its minutiae as a one-man operation. My brother never did develop much respect for his work for this reason, which irked my father. Perhaps I was more patient and tolerant, and used the highly technical examples the construction industry offered as persuasive examples of our point. Perhaps the personal factor was more persuasive than what I am sure must have been offered by the [library] profession. What influence my brother and I had on my father and his work is of course hard to say. Our house was an almost constant battleground of argument, even when we were children. When I got through with Harvard, my brother with Cornell and, after her marriage broke up, my sister with Barnard, it was indeed a testing ground for any idea, even any fact. Perhaps my mother had the most perceptive and balanced mind of any of us, but her thoughts were gentler ... When the intellectual arena got too acrimonious, she would retire. When I was a little boy, she used to read to my father. But my mother was very religious, and this was all it took to alienate my father intellectually.’

Last years

In retirement, Bliss first lived with, and then near, his daughter in Pasadena, California. He spent several months in New York in 1947 when the second volume was going through the press. From mid-1947 until the spring of 1952 he lived in Florida, first at Orlando and later at Winter Park. From the spring of 1952 until his death he lived at 602 East Front St., Plainfield, New Jersey, a few blocks away from his married son John, and was able to enjoy the pleasure of seeing some of his grandchildren grow up.

He had developed an interest in his ancestry, and did research into his own descent, and studies of the lives of several distinguished relatives. The New York Public Library contains two privately printed works, (References 6, 7) on the Bliss ancestry, one by a John Homer Bliss, and also an unpublished work by Henry E. Bliss on the ancestry of the Bliss and Livingston families. He continued hiking into his eighties, and once said he had hiked a thousand miles in a year. He had written poetry, some of which was published by Putnam in 1937 under the title Better late than never. If in later years he lived alone, bought and cooked his own food, mended his clothes and cleaned his own rooms, it was certainly not due to

any misanthropic tendency, because he was a sociable man who made friends easily and had many of them. He corresponded with a wide range of people.

‘When young [he] had always made and kept many friends, and as he grew older and more mellow, he developed more and more. His correspondence is fascinating, and is a record of 65 years of trends in this age, revealed by many prominent, interesting people from all walks of life. His ... acquaintance with Albert Shaw, Oswald Garrison Villard, Augustus Tack, John Finley, editor [Grover] Orth of Williams and Wilkins, Dorothy Canfield and so many others, evidenced the ease with which people involved themselves on a friendly basis with Bliss. This list may indicate his obsession with celebrity, identification with "top drawer" ... But although he might charm many as a sweet old man, to be accepted, it could be important that you agreed with him, and lined up with his way of life. Many closest to him, and certainly his own family, could be shut out on these grounds ... Towards the end, when he had mellowed, and some success, professional acceptance and even a little profit from his work had come his way, he lived alone because experience had taught him it suited him best. He had lived with his daughter in California for some years, and her children, and not without some complications; in the end he was near one unit of his family, but did not live with them, with constantly decreasing complications, and not a little affection from my wife, and especially our two children, a situation which he grew to respect and cherish, and was solicitous not to upset.’

Two of his British correspondents, W.C. Berwick Sayers and C.C. Barnard, Librarian of the London School of Hygiene and author of a medical classification, though they never met him in the flesh, both developed close friendships with, and feelings of affection for him. Sayers called him 'a sweet old man', and Barnard wrote in an obituary: (Reference 9)

‘I feel I have lost a real and affectionate old friend in H.E. Bliss.’

S.R. Ranganathan in another obituary (Reference 10) remembered

‘the appreciative and encouraging letters he wrote to me in 1933 when my Colon Classification was published. This was in spite of my being an utter stranger to him and so much his junior in age and experience.’

When the present author wrote to Bliss in 1952, with a view to organizing users of BC to improve and maintain the classification, he found him very ready to listen to ideas. Sometimes an idea was uncongenial to his thinking, as is only natural in a man of eighty-two, but if a good case was put to him, he, never failed to accept it. The appeal by Campbell and Freeman (Reference 11) to users to co-operate met with modest success, and a warm welcome both from Bliss and The H.W. Wilson Company, and one result was the election of the first British Committee for the Bibliographic Classification, to represent the views of British users to The H.W. Wilson Company, which in turn agreed to distribute free of charge to users and others interested, a Bliss Classification Bulletin containing news, revisions and detailed amendments. The first three issues were edited by Bliss. The BCB is still published annually by the Bliss Classification Association, and edited by Mr. Jack Mills.

Bliss's last years were very happy. In his last days he was honoured by being invited to the Library of Congress and ‘made a fuss of’, and also at the Rutgers University School of Librarianship, which asked him to give a seminar on classification in the next academic year; this his death prevented. After a minor indisposition a day or two before, he took an ‘afternoon nap’, on August 9th 1955, from which he never woke. It was his good fortune to die in his sleep, without any pain.

He left two sons, John Hale Bliss and Conrad de Koster Bliss, and a divorced daughter, Mrs. Margaret Bliss Treat. None of his children followed him into librarianship. Mr. John Bliss made his career in the construction industry, and after serving in the US Navy, founded his own consulting firm. Mr. Conrad Bliss (now dead) was a chemist, metallurgist and production engineer of distinction who contributed greatly to the American war effort in World War II, and allied fields later. Mr. John Bliss has two daughters and two grandsons, and Mrs. Treat a son, a daughter, and two grandchildren. Most of Henry Bliss's papers are held by Mr. John H. Bliss, but some were lodged after his father's death with the Columbia University Library School. Mr. John H. Bliss has now lodged those papers relating to librarianship with the Library Association, London.

Comments on the man and his work

A pleasant article (Reference 12) by Eugene Garfield of the Institute of Scientific Information called: ‘The “other” immortal : a memorable day with Henry E. Bliss’ (actually it describes several meetings) tells of the contacts of a modern machine-oriented documentalist with the aged Bliss, and what they said to each other (Garfield had to shout a good deal as Bliss was by now very deaf), prints their letters to each other, and gives Garfield's views on Bliss. To quote:

‘Mr. Bliss was a true scholar. His goals and aspirations were different from those of Melvil Dewey, whom he certainly surpassed in intellectual ability, but by whom he was dwarfed in organizational ability and drive. Dewey was a

businessman, but he was in no sense as profound in his accomplishments. It is true that Dewey's classification filled a terrible void. As Mr. Bliss said, if it had come a few years later the entire course of classification history might have been changed. Many years later, when the Library of Congress was acutely aware of the terrible shortcomings of Dewey for the research scholar, Mr. Bliss was on the scene; but here again he lacked what Dewey possessed, and failed to press the issue of his own system.

‘According to Mr. Bliss, he had a conversation with Librarian of Congress, Herbert Putnam a few years after the LC scheme was started, and Putnam confessed he had not known of the Bliss system. He felt he had probably overlooked a good thing because a comprehensive system of classification based on the encyclopedic knowledge of science [here Garfield obviously did not mean natural science] would have been useful. It would make LC aware of its lacks, in contrast to the LC scheme which merely reflected its holdings, and so would aid in collection building ... One also wonders how many libraries would adopt LC if it were not for the obvious advantage of having the LC card service at their disposal. Mr. Bliss mentioned that he had tried rather feebly to get LC to include Bliss class numbers on newly cataloged books, but nothing ever came of it. He felt that this factor was one of the strongest working against the adoption of new classification schemes ...

‘I don't think we will again encounter so profound a library theorist as Mr. Bliss, because in the span of his lifetime it had already become impossible for anyone to attempt what he had accomplished ... Individuals live on in the works they leave behind. Bliss's work deserves to be continued and its potentialities fully explored. Since we can no longer depend on Bliss himself, I hope others will be stimulated to carry on his work. Henry Bliss is dead. Long live Bliss.’

His son may be allowed the final comment:

‘In an odd way, he was very competitive, for all his outcry against the American competitive way of life ...; in all ways, as a person, he wanted to excel ... He was a perfectionist, and loved not only to repair the furniture, or re-shingle our high-peaked roof (of course always with the free-labor assistance of his bounden children, who, he explained thus, were to learn patience, care, and the true values therefrom); my father did not always apply good psychology or have a sense of humor. We did learn these things! Also [we] were "turned off".

‘His own family life was overcome by his effort to produce something worthy to be remembered, to let him forget what he hated to remember, but his close family pretty well understood him in the end, and he did leave behind a monumental pile of evidence of the friendliness and respect of a multitude of persons of all allegiances.’

Stages leading up to the present edition

Brief discussion of these is not irrelevant to a short biography of Bliss because BC was his main life work, and he was extremely anxious that it should not die, as other general schemes have died.

In 1956 a new and strengthened British Committee was elected. In 1960 Mr. Jack Mills became Chairman of the Committee and Honorary Editor of the *Bliss Classification Bulletin*. He was and is familiar with the ideas of Ranganathan, Vickery and other pioneers of faceted classification. The number of libraries in the British Commonwealth adopting the scheme grew gradually (including, notably, the Senate House Library of the University of London) and it was taken up by libraries in Holland, India and Norway. In 1967 the Bliss Classification Association was formed, with Mr. Mills in the same offices, and The H.W. Wilson Company, recognizing that any future edition could be better and more cheaply compiled in Britain than in the USA, very generously gave the copyrights in *BC* and in the *Bulletin* to the Association. Plans were soon laid for a new edition. An appeal to users and interested persons in 1968 raised a useful sum. Work began in 1969 at the School of Librarianship, North-Western Polytechnic, now The Polytechnic of North London, and it should be clearly stated that the Polytechnic has borne most of the cost of compiling the new edition, with the remainder paid by the BCA; the Polytechnic intends to maintain the scheme.

The Committee of the Association has frequently been asked to advise on points of policy. However the new edition is the work of Mr. Mills and Mrs. Vanda Broughton, with help from many others, notably Miss Valerie Lang. It is definitely true to say that but for the energy, work and determination of Mr. Mills it could ever have appeared. He is Deputy Principal and Head of Research of the School of Librarianship, as well as a former user of the scheme, who assisted Mr. Bliss with the development of Class T (Economics and business).

It was originally intended to publish the new edition in three volumes, but this would have meant some classes being ready, but unavailable, while others, and the general index, were prepared. The idea of publication in parts came from Mr.

G.W. Geoghegan, Librarian of the Reading University Institute of Education, and was an ingenious solution of several difficulties. It will mean that special libraries need only buy the parts they need, and will facilitate issuing revisions.

Acknowledgements

It is a real pleasure to thank Mr. John H. Bliss for his letters, for the detailed information so freely given in answer to my enquiries, and for the loan of documents; also to acknowledge help and information, given in the past by Mr. Howard Haycraft, then President of The H.W. Wilson Company, and then more recently by Mr. John Jamieson, until recently Editor of General Publications of that company, both of whom, of course, knew Bliss well. Mr. Jamieson was so kind as to write that a draft of this biography was 'well balanced and accurate as far as I can tell'. (The obituary of Bliss written by the present author for the *Library Association Record* (November 1955) was largely based for personal details of Mr. Bliss's life on a conversation with Mr. Haycraft over the luncheon table, when it was hardly possible to take notes; consequently one or two errors and misemphases crept in. Mr. Haycraft did not feel that these were important enough to be corrected in print at the time, but they have been corrected in this account.)

It is also a pleasure to thank Mr. Samuel Allen Streit, in charge of archives and special collections of the City College, who searched the personal file on Bliss's career there and other sources, and who also sent information about the College at the time Bliss enrolled as a student. However, the section of this biography 'Relations with the College authorities' is entirely based on information given and documents lent by Mr. John Bliss; a letter to the College was not answered. I wish also to thank the staff of New York Public Library, and Mr. Bernard Crystal, Assistant Librarian for Rare Books and Manuscripts in the libraries of Columbia University, for information. The quotations from the *Wilson Library Bulletin* are reproduced by permission of The H.W. Wilson Company, from Mr. Eugene Garfield's article by his kind permission, and from Mr. Berwick Sayers's article by permission of his eldest son, Mr. John Berwick-Sayers.

It seems appropriate to conclude this biography by quoting one of Mr. Bliss's sonnets, as a taste of his quality in another side of his life. It is the culmination of a cycle of fourteen sonnets, the subjects of which are touched on in the first seven lines.

THE BOOK (Thought)

Mind within man reveals the radiant face
Of Nature and Life's bosom warm unveils:
In crystal and in star, in cloud that sails
The skies, in hills and rivers that enlase
The lands, in trees and birds, in flowers and grace
Of childhood, in woman's love – a thousand tales
Of nature, life, and beauty we may trace;
The mind in life falters but never fails.
Man's knowledge, thought, and purpose are in books
Embodied, his microcosm, his heritage,
That weaves from mind to mind, from age to age.
Books lead, they stir, they solace, and they show
The paths of nature's life, the past that looks
Into the future – to the ways that man should go.

References

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12. Garfield, Eugene. The "other" immortal : a memorable day with Henry E. Bliss. *Wilson Library Bulletin*, 49(4), 1974, 288-292.

2. THE BIBLIOGRAPHIC CLASSIFICATION (BC) : HISTORY, PUBLICATION AND MAINTENANCE

- 2.1 Some of the main facts regarding H.E. Bliss's motives for producing the BC and the dates of its editions have already been given in Dr. Campbell's Memoir (Section 1). The following notes concentrate on the BC itself, the relations of the new edition to the original and the arrangements for its future maintenance.
- 2.2 The BC was first published in outline form in 1935, as *A System of bibliographic classification*. It consisted of the main classes 1/9 A/Z (the latter being taken to two letters in notation, i.e. AA-AZ, BA-BZ and so on) together with four systematic or auxiliary schedules of general application (Forms of presentation, Place, Time and Language) and a number of special auxiliary schedules, for classes such as History, Religion, Language and Literature. This was soon revised and a second edition appeared in 1936. A number of libraries began to adopt the scheme on the basis of these outlines. In 1940 the first volume of full schedules appeared (Classes A/G) under an amended title, *A Bibliographic classification, extended by systematic auxiliary schedules for composite specification and notation*. The changed title, Bliss explained, indicated 'an advance in the development of the principle of Systematic Schedules'. He claimed that these were more efficient and economical than the number-building of Dewey, UDC and Ranganathan and the auxiliary tables of Cutter and Brown.
- In 1947 the second volume (Classes H/K) and in 1953 the third volume (Classes L/Z) appeared. Together with the latter was published a corrected and slightly revised version of classes A/K, in one volume, and, as Volume IV, an A/Z index to the whole scheme. The classification was now complete, in three volumes.
- 2.3 In 1954, the publishers, The H.W. Wilson Company, began to issue *The Bliss Classification Bulletin* in which additions and amendments were noted and problems of application and maintenance discussed. Bliss himself edited the first three issues. After his death, in 1955, Dr. Campbell became editor when the British Committee for the Bibliographic Classification took over responsibility for it. Eventually, from 1963 onwards, it became a regular annual publication.
- 2.4 From 1963 onwards the *Bulletin* produced substantial new schedules for a number of subjects – e.g. Nuclear reactor engineering, Electronics, Sound reproduction and recording, Astronautics, Food preservation, Painting, Gardening and Fruit growing.
- 2.41 All of these new schedules reflected clearly the methods of designing documentary classification developed in the 1950s and 1960s and based on the ideas of facet analysis first introduced by S.R. Ranganathan in the 1930s. Conceptually, they were completely consistent with the theories of bibliographic classification advanced by Bliss, but may be said to have introduced a more rigorous analysis and a more consistent pattern than the original BC sometimes showed.
- 2.42 Notationally, the new schedules introduced a feature which Bliss had used only sporadically; this was the principle of retroactive notation for synthesis – i.e., classmark building for compound classes (see section 6.422). Bliss had relied for synthesis partly on this – e.g. when reserving places for the insertion of classmarks from Systematic Schedules – but also on the use of the comma, the hyphen and in the one case of the common schedule for Place, the use of different characters – i.e. lower case letters as distinct from the capital letters normally used. However, the provision for complete hospitality in synthesis – i.e. giving specific classmarks for all possible compounds was somewhat defective in the original BC and the new system was designed to remedy this.
- 2.5 After the formation of the Bliss Classification Association in 1967 the decision was taken to produce a new edition of the whole scheme. A major problem was how radical the revision should be. If the new schedules which had been provided in the *Bulletin* were to be taken as models for the revision of the whole scheme, this revision would clearly be quite drastic. This in turn would face those libraries already using the BC with formidable problems of adjustment.
- 2.51 A memorandum was prepared for consideration by members (and subsequently published in the *Bulletin*, December 1969). It is reproduced here largely as it appeared then.
- 2.52 Memorandum on preparation of a new edition of the BC
- 2.521 Broadly speaking, there are two more or less distinct features to consider:
- Bringing BC up to date in its vocabulary – by expansion to accommodate new subjects and possible reduction to exclude or reduce obsolete ones;
- Revision of BC in the sense of improving its structure and its consistency.

2.522 Expansion and updating

The main issue here is one of degree – how much detail is aimed at. A number of factors need to be considered:

- 2.522.1 The whole history of bibliographical classification testifies to the desirability of a detailed vocabulary. The precision with which our shelf arrangements and our indexes can be searched rests entirely on this point. Its relevance to the use made of a scheme can be put very simply. If detail is provided, those who do not want it need not use it. If detail is not provided, those who want it have no such alternative – individual improvisation raises very serious practical problems and is inconsistent with the notion of a single common system.
- 2.522.2 We assume that the new BC should at least equal, and frequently exceed, the detail provided by DC and LC. Using as a rough guideline the literary warrant demonstrated by the cumulations of the *British National Bibliography* since 1950 should ensure this. It will automatically take care of newly developing complexes like Space Sciences, Ocean Sciences, etc., as well as developments within existing classes.
- 2.522.3 Many users of BC have a need for special detail in some areas. Ideally, this would suggest a scheme as comprehensively detailed as UDC. This does not seem to be feasible in the circumstances. However, we can go a long way towards this ideal by providing a structure which gives a maximum facility for extension. This can be achieved by thorough facet analysis. In all classes all the relevant facets will, of course, be clearly provided, but as far as possible all subfacets too will be at least exposed and explicitly named, even if they do not get a detailed enumeration of their constituent classes. For example, in a schedule for Clothing Industry a subfacet Kind of clothing by season when worn might appear even if no enumeration of individual seasons follows.

2.523 Revision

This raises more serious problems and again a number of factors need to be considered. A modern classification should, for any class involving a degree of subdivision, provide the following:

- 2.523.1 A helpful context for that class (i.e., the overall order of the scheme should be satisfactory).
- 2.523.2 A clear and explicit display of the class's facets and subfacets.
- 2.523.3 Clear and explicit rules for classifying compound classes (i.e., classes reflecting more than one facet or subfacet).
- 2.523.4 An overall filing order of the subclasses which is at least as helpful as any other for the majority of users (although other orders might be as good).
- 2.523.5 A notation which allows maximum precision in representing those subclasses.
- 2.523.6 A notation which is of maximum simplicity possible in the circumstances.
- 2.523.7 A thorough A/Z index to the terms in the schedule.
- 2.524 BC already meets some of these criteria in many classes. However, to make the whole scheme consistently good, radical revision is needed in many classes. In accepting the inevitability of this, the following factors should be remembered:
- 2.524.1 BC will have gone some 20 years without a comprehensive revision.
- 2.524.2 We cannot expect BC to be revised as frequently as DC or LC. So this one must look correspondingly further ahead.
- 2.524.3 If a library has to reclassify a given class to any degree it is often the case that a complete revision would not take significantly longer.
- 2.524.4 A radical revision of the kind being prepared will produce a far more enduringly satisfying scheme than a piecemeal, patching-up operation.
- 2.524.5 Moreover, a revised scheme with a clear facet structure in each class and clear rules for consistent classifying is far easier to maintain and revise than an enumerated one not enjoying these features.
- 2.524.6 We assume that present users of BC already use a wide variety of the alternatives offered by the scheme as well as amendments and expansions of their own. As a result, whatever form the revision takes it will inevitably involve many users in varying degrees of reclassification. So we might as well make the best possible job of it.

- 2.524.7 A number of positive steps will be taken to minimise the work involved in reclassification. The scope and definition of classes will be indicated with maximum clarity and the crucial problem of compound classes will be met by clear and explicit rules for practical classification.
- 2.525 Some major features of the revision work are as follows:
- 2.525.1 The general pattern of BC will remain as it is.
- 2.525.2 General pattern of revision within a class:
- 2.525.21 If the existing facet structure is faulty (i.e., terms from different facets or subfacets are mixed up with those from others) this will be straightened out.
- 2.525.22 Where circumstances allow it, the whole schedule will reflect the citation order in its filing order also – i.e., by 'inversion' and retroactive compounding to ensure consistent subordination and a consistent general-before-special sequence.
- 2.525.3 Synthesis: any scheme depends largely on this for its ability to specify classes with precision.
- 2.525.31 The Systematic Schedules will be retained in principle (and perhaps extended) as a particular form of synthesis. But radical revision is likely in some of them to make them clearer and more consistent; e.g., a common facet of Economic and Business aspects in industry will be developed for the Systematic Schedule serving the Applied Sciences and Technology, and this will not be mixed up with the technical operations facets in the other systematic schedules serving these subjects.
- 2.525.32 A comprehensive synthesising facility will be built into all classes as demonstrated in the *Bulletin* schedules.
- 2.525.33 There are extensive possibilities for rationalisation by allowing the repetitive use (in a 'divide like' device) of many classes not usually recognised as 'common'. For example, the various forms of information-bearing records (books, mss., microforms, films, tapes, gramophone occur in a number of contexts (Librarianship, Communications, Education, Bookselling, Reprography, etc.). In such a case a detailed schedule will be developed once only and be drawn on for any special application.
- 2.525.34 Phase relations will be provided in Schedule 1.
- 2.525.35 Common facets: these will be expanded considerably, e.g.,
- 2.525.351 Schedule 1 will be revised to accommodate not merely the existing common form divisions but also the common 'subject' divisions found in the Supplementary Schedules of BNB.
- 2.525.352 A definite facet indicator will be reserved both for Time (history) and Place.
- 2.525.353 Schedule 2 will be expanded to include 'non-political place' as in UDC, BNB, etc.
- 2.526 Alternatives
- As a distinctive feature of the BC these will be kept available where thought desirable (it is proposed to drop those in Schedule 1, for example). But they will be removed from the main schedules, which will show simply one complete, 'preferred' order, whose rationale and pattern will not be confused by numerous insertions (as, for example, by the present lengthy Psychology schedule in AI).
- 2.527 Anterior numeral classes 1/9
- These are only partially consistent with the forms of presentation (used for qualifying classes rather than knowledge in general) in Schedule 1. It is possible that this area will be developed more thoroughly as a true generalia class, including the general notion of communication and the organisation of knowledge.
- 2.6 The case for a comprehensive and radical revision presented in the memorandum was accepted by the BCA. An appeal was made to the libraries using the BC for contributions to a special fund to enable the work to be done. Mr. J. Mills, Reader at the School of librarianship, The North Western Polytechnic, who had been Hon. Editor since 1963, was appointed editor, responsible to the Committee of the BCA elected to oversee the production of the new edition. The Polytechnic (which later became The Polytechnic of North London) made available a full-time research assistantship and the BCA fund was used to supplement the relatively modest salary thus provided so as to enable a librarian experienced in classification design to be appointed. Miss Valerie Lang, who had collaborated with Mr. Kenneth Vernon in the compiling of the London Business Classification, was then appointed in Autumn 1969.
- 2.61 The work of revision and expansion proceeded more slowly than had been hoped, largely because of the editor's other heavy commitments at the Polytechnic. In 1972 Miss Lang left to take up a permanent appointment. The

Polytechnic subsequently agreed to increase its support by making available a Research Fellowship and Mrs. Vanda Broughton was appointed to succeed Miss Lang.

- 2.62 Although a steady stream of detailed draft schedules, very carefully designed in accordance with the principles set out in the memorandum, were issued for discussion and comment, the work of completion was disappointingly slow. In late 1974, Mr. G. Geoghegan, Librarian of Reading University Education Library and a member of the BCA committee suggested that the substantial body of work so far done should be made available as it was completed rather than wait on the production of the rest of the scheme. This implied publication of BC in parts and a memorandum setting out the pros and cons of this was circulated to all BCA members. The advantages of publication in part were seen clearly to outweigh the disadvantages and there was almost unanimous support for the proposal, not only from BCA members but from many other librarians consulted.
- 2.621 A provisional programme was prepared based on publication of the complete BC in some 18 separate subject groups, together with a comprehensive introductory volume (to include a detailed explanation of the scheme and its practical applications as well as the common auxiliary schedules in full) and a consolidated A/Z index.
- 2.7 Maintenance of the BC is the responsibility of the Bliss Classification Association which represents users of the scheme and other interested persons and organisations. The BCA is a registered charity with over 100 members, mainly libraries using the BC. It holds an annual general meeting in London and publishes annually the *Bliss Classification Bulletin*. The *Bliss Classification Bulletin*, issued free to members, provides a regular maintenance service for the classification. It gives full additions and amendments to the scheme and offers a forum for discussion of problems of classification. The BCA holds the copyright of the BC, generously made over to it in 1968 by The H.W. Wilson Company. All royalties from the new edition, and from the sale of the *Bulletin* will be devoted to the work of producing regular additions to the scheme in the *Bulletin* and of producing new editions of the individual parts as these become necessary.
- 2.71 Publication in parts greatly eases the problem of publishing new editions and this has been one of the decisive reasons for adopting this publication policy.
- 2.72 An important element in the case originally made out for a very thorough and comprehensive revision was the impact this would have on the problem of future maintenance. Not only does the new BC start with a full and completely up-to-date vocabulary but the fully faceted structure of the new BC itself facilitates revision. Facets and arrays are relatively stable concepts. The growth of new knowledge is rarely, if ever, *sui generis*; it develops from what is already known. The incorporation of new concepts will in the great majority of cases be a question of recognising the existing facet and array to which it belongs, and this process is considerably eased by the fact that in every class the facets and arrays are clearly and explicitly articulated.
- 2.73 Future revision of BC will attempt a realistic matching of the need. on the one hand, for new vocabulary and the adjustment of schedule structure to new developments in subjects, and on the other of the difficulties libraries have in undertaking the radical alterations in their records which such adjustments demand. It is assumed, however, as was implied in 2.72, that adjustments of structure are likely to be relatively rare.

3. RELATIONS BETWEEN BC EDITION 1, EDITION 2 AND FUTURE EDITIONS

- 3.1 The general relationship between Edition 1 (BC1) and this edition (BC2) has been described in Section 2. This indicated that the present edition represents a very radical revision of Edition 1, necessitated by the long period of time which has elapsed since the first edition and the need to make the new edition completely hospitable in structure and vocabulary to the demands of large, modern and dynamic collections.

This section will describe the differences between the two editions in some detail and indicate the policy for revision to be followed in future. Of necessity, this section will use a few technical terms and refer to some points of theory which are explained in Sections 4 and 5 and some readers may prefer to read those sections first.

3.2 Revision of broad outline

A major feature of BC1 was the excellence of its broad conception and order; so not surprisingly, these remain virtually untouched, except for the removal of most of the anterior numeral classes 2/9 (which simply provided a notation for special collections within a library and did not represent true subject classes). However, BC2 has added a number of features which affect the location of material in the main class sequence, some of them being quite new classes, some relocations of existing classes while others reflect an extended provision of alternatives.

- 3.21 A new and comprehensive general class has been made for phenomena (entities, activities and processes, attributes) to take multi-disciplinary studies of these. BC1 made only fragmentary provision for such material – e.g. for comprehensive studies of a particular locality in classes L/O. These phenomena classes are located at 4/9.
- 3.22 The Documentation and library science class in BC1 (located at Z but with an option to put it at 2) has been greatly extended in scope to include all communication and information studies. All aspects of the problem are now collected at 7/8 and it thus constitutes a special ‘phenomenon’ class centred on the phenomenon of knowledge and information itself, rather than a normal aspect or discipline class.
- 3.23 Recognition of disciplines as classes reflecting distinct forms of knowledge has led to three new main classes being distinguished. Morals and ethics, previously subsumed under Religion, now follows the latter as a separate main class (PY). The Occult, previously subsumed largely under Folklore in K, now has its own unitary class at PX. Recreation, previously dispersed over Health and hygiene (H), Social welfare (Q) and Fine arts (V), now has its own main class at UY.
- 3.24 The growth of knowledge has led to at least two major new clusters of subjects: Systemology, including Systems theory, Cybernetics, Organisation theory and so on, is located at the very beginning of the empirical sciences at AN; Space science is located at the end of Astronomy and immediately preceding the Earth sciences, at DG.
- 3.25 Some further major alternatives have been added:
- 3.251 Whereas BC1 located the ‘more scientific’ technologies with their science in Physics (B) and Chemistry (C) and provided only partial alternatives for certain of them in Technology (U), the option is now made a comprehensive one, and all technology may be kept together in class U if a library so wishes. Now that purpose is recognised as a major principle of citation order in BC2, it would seem to be consistent to recognize the difference in purpose between the natural sciences and technology (or useful arts, as Bliss tended to call it).
- 3.252 It was always a matter of some surprise that BC1, which scatters the various forms of geography, did not provide an alternative for libraries wishing to collocate them, despite the fact that Bliss argued the case for their dispersal at some length. It might be argued that special forms of geography, such as economic geography or urban geography are applications of one discipline to another; and in principle DC2 prefers in such cases to locate all applications under the subject to which another is applied. However, the consensus for the keeping together of geography is strong and is therefore acknowledged by the provision of a unitary class following the Earth science (DS/DY).
- 3.253 An option to collocate Applied Biology (Agriculture, etc.) with Biology was provided in BC1 at EU. This option located it after General biology (E) but before Botany and Zoology (F/G); this was inconsistent with the usual treatment of applications, which is to make them follow their theoretical base, not precede it. The option has been moved in BC2 to the end of Biology (in GW/GZ). Use of this option would tend to obscure the clear and theoretically satisfying sequence of Biology – Zoology – Anthropology; but this is the price one pays for intercalating technologies with their sciences and demonstrates a major argument for keeping all technology together in class U.

3.254 An option is now provided for locating Religion, The Occult and Morals and ethics at Z instead of at P. This would have the advantage of collocating the 'imaginative' and symbolic disciplines within the humanities (classes V/Y comprising the Arts) and so reducing the distribution of the humanities in the main class order (the rational discipline of Philosophy remaining at A and the descriptive and interpretative discipline of History at L/O).

3.3 Revision of individual classes

3.31 The introduction to each individual class considers in some detail any differences between the revised and the original class. Libraries using BC1 will have received copies of all relevant draft schedules of BC2, in which the original BC1 classmarks are given on the right hand side of every line in which a BC1 term appears although the scale of the expansion in BC2 means that very many terms were not in BC1 at all.

For reasons of economy in scheduling and of clarity of presentation, these old classmarks have not been repeated in this published edition. An outline table of equivalents is given at the end of this section (3.5) which provides a summary picture of the major changes. Because the revision procedures were the same for all classes and reflect a limited number of consistent steps these are described below with examples; it is hoped that this, taken in conjunction with the outline table in Section 3.5 and the detailed comparisons given with each separate class will enable a clear picture to be gained of the nature of the reconstruction in each class.

3.32 Revision of facet structure

3.321 The central feature of revision in each class has been the rigorous organisation of all its terms into their broad facets and specific arrays. For definitions and explanations of these and other technical terms see Section 5 and the Glossary (Section 8). This means that wherever in BC1 the terms of a facet or array were found to be scattered in several places these have been collected together. For example, in class J Education, on examining the structure of the Person educated ('educand') facet, the following situation was found: the major part of the facet, reflecting Persons by age (or stage of education) appeared in classes JL/JU (JL Elementary education, JN Secondary education ... JU Adult education). But this sequence included one class, JQ Education of women, based on the specific principle of the educand's sex rather than age; moreover, this principle of division had not been exhausted – i.e., there was no place for the education of men. On further examination of the whole of class J, the following classes belonging to the Educand facet but separated from its main body were found: JBS Coeducation of the sexes, JBT Coeducation of races, JGJ/JGN Handicapped students, JGO Problem children, JGQ/S Special categories, such as exceptionally gifted persons, JGT/JGU Boys and youths, girls and young women.

3.322 This situation raised two problems for the revision. First, which of the various parts were to be moved in order to bring all the classes of the same facet together and how would they file in relation to each other? Second, were there any other principles distinguishing particular types of educands, in addition to those present in BC1? The first problem depended on a third question and the most fundamental one – which was that of the citation order to be observed when classifying compounds, whether these are compounds of a term from the Educand facet with one from another facet, or compounds of two terms from the Educand facet, but from different arrays within it – e.g. the education of deaf children.

3.323 A similar procedure was followed in the case of every facet in class J Education. For example, the Subject-or-behaviour-taught facet was found mainly in classes JJ/JK Curriculum. But elements from the same facet were found scattered at J3EG The seven liberal arts, J3ET Chivalric education, most, but not all, of the classes in the sequence JAC/JAV Education for character, for culture and scholarship, etc., and a number of the classes in the sequence JBD/JBV Education for citizenship, etc. Again, the problem raised for the revision was how to bring together these classes, all reflecting the same broad principle of division – that of the thing taught.

3.324 The procedure of facet analysis demonstrated above was applied to every class, whatever fundamental discipline, or form of knowledge, it reflected – natural sciences, social sciences, history, philosophy, art, religion, morals and ethics and so on. In every case, the problems raised for the revision depended for their solution on a further step – deciding the citation order.

3.33 Revision of citation order

3.331 When all the facets and arrays within a given class had been sorted out, an overall citation order was decided, so that a clear and consistent rule can be observed when locating compound classes, whether these are of intersecting facets – e.g. Visual aids in primary education, or intersecting arrays – e.g. Adolescent immigrants.

3.332 Naturally, the citation order used in BC1 was the one the revision hoped to follow. However, a major problem usually arose at this point, in that BC1 rarely had a comprehensive citation order. Usually, a broad citation order was distinguished whereby the primary facet (the one to be cited first) was evident from examination of the various clues. But in many cases, guidance did not go much beyond that. These clues were:

- 3.332.1 Systematic auxiliary schedules: e.g., Schedule 8 in Class C provides for subdivision under any element or compound – implying that Substance (element or compound) is the primary facet in Chemistry. Schedule 9 provides for subdivision under any chemical industry or product – implying that Product is the primary facet in Chemical technology. Similarly, auxiliary schedules providing for subdivision under any astronomical body (Schedule 10), any botanic class (Schedule 11), any disease or disorder (Schedule 13) any type of school, defined by age of educand or stage (Schedule 14 and its adaptations) all implied that the facets to be subdivided (chemical substances, astronomical bodies, etc.) constituted the facet to be cited earlier in the class concerned.
- 3.332.2 Enumeration of compounds under particular classes: e.g., CEH Electrolytic dissociation, enumerated in a subclass of CE Electrochemistry, implies that in Chemistry, the reaction mechanism of decomposition by dissociation is cited after the energy system involved, in this case Electrochemistry. Or, JLW Open air schools enumerated as a subclass of Elementary education implies that a school characterised by its physical conditions is cited after (subordinated to), one characterised by the age of the educand. Or, VEG Classical Greek sculpture enumerated as a subclass under VE, Sculpture implies that the Style of art, characterised by place and period, is cited after Medium of art.
- 3.332.3 Explicit instructions: e.g. a note under JI Methods of teaching, "For 'special methods' see JK, Teaching special subjects," implies that the Subject taught facet is cited before Methods of teaching. The most prominent examples of explicit instructions of this kind are probably those found in classes providing extensive alternatives; in both History and Literature, the alternatives possible in citing Place, Period or Subject (in History) or Language, Form or Period (in literature) are discussed and provided for notationally.
- 3.333 The fragmentary and incomplete provision for citation order indicated above meant that for the revision it was necessary to extend this single step and to supply a comprehensive rule covering all eventualities in a given class. The primary facet (the first-cited one) in BC1 nearly always reflected the 'end-product', or object of study, or 'whole system' within a class; e.g. the product in chemical technology, the person educated in Education, the religious system in Religion, the organism in Biology. This meant that the primary facet in BC1 was nearly always the one that the 'standard' citation order also regards as primary, so a broad consistency with BC1 was clearly possible if this citation order were observed. It was therefore decided to adopt the 'standard' citation order throughout so far as this was possible.
- 3.333.1 One of the outstanding features of this order is that, given the primary facet, the secondary, tertiary, etc. facets fall into place with predictable and consistent regularity according to the action of dependence (see Section 5.734). An example of this can be seen in Class J Education. The citation order in the revised class is:
- (1) Educand (person educated) -
 - (2) Subject or skill or behaviour taught (curriculum) -
 - (3) Method of teaching -
 - (4) Agents of teaching: teaching aids -
 - (5) Agents of teaching: teachers -
 - (6) Educational context: activities and attributes of students -
 - (7) Educational context: psychology of the learning and teaching process -
 - (8) Common operations: administration, management, etc. -
 - (9) Agents of these: personnel, buildings, equipment -
 - (10) Viewpoints from which education itself is studied (theory, philosophy, etc.) -
 - (11) Common subdivisions: Place, Time, Form of presentation.

This order approximates closely with that in BC1 if the latter is regarded as an 'inverted' schedule in which citation order is the reverse of filing order. (see 3.341.2 below)

- 3.333.2 The above example also demonstrates the degree to which modification of the standard citation has been allowed in order to retain consistency with the order of BC1. It is arguable that facets (6) and (7) should be cited immediately after facet (1) in that they reflect characteristics and processes within the educand. However, the relationships here are rather complex, in that it is very difficult to draw a line between the teaching and learning processes. Many student activities, in particular the student's academic work, is an integral part of the teaching process, as is their psychology. BC1 reflected this latter argument and the decision was taken to accept it, on the grounds that where two solutions had equal merit the one already used in BC1 should be followed.

3.34 Revision of filing order

- 3.341 In common with most other library classifications BC1 usually filed the primary facet last, e.g., the substances in Chemistry, the organisms in Biology, the places in History, the media in Art. But BC1 gave no evidence of the principle of inversion being observed systematically beyond this broad provision, apart from the filing of the

common facets (Form of presentation, Period, Place) at the beginning of most classes (whereas, of course, they cite last).

- 3.342 The principle of general-before-special in filing order requires that the first-cited facet files last, the second-cited facet files next to last, and so on. This is called the principle of inversion and is explained fully in Section 5.742. BC2 observes this principle consistently; so having decided the detailed citation order, both between facets and between arrays, the filing order of the revised schedule followed automatically. The first problem stated in Section 3.322 was therefore resolved at this stage.
- 3.343 The position of the primary facet resulting from this decision has generally been unaltered, as can be seen by examining the outline comparison in Section 3.5. The position of some of the other facets was, however frequently changed as a result and this is one of the main reasons for the changed appearance within particular classes (the other being, of course, the very large increase in the number of detailed classes). The second of the problems mentioned in Section 3.322 – need to incorporate further arrays of terms within many facets – has been an important source of this new vocabulary.
- 3.344 Filing orders in array (see Section 5.741) have generally been left intact as they were in BC1. In some classes the arrays in the primary facet are very large indeed and their conformity with BC1 represents one of the features in which BC2 has changed relatively little. Examples are the order of chemical substances in CI/CS, the order of plants and animals in F and G, the order of countries in L/O and in the Common auxiliary schedule 2 for Place, the order of religions systems in P and of languages in X/Y. But even in these cases, developments in our knowledge of the classes concerned and in the classes themselves (as for example in political states in L/O and Schedule 2) have usually meant some alteration.
- 3.35 Revision of notation
- 3.351 Changes in notation are, of course, largely a reflection of the changes in order of classes described above and in the great increase in the number of classes.
- 3.352 Also important, however, has been the need to make the notation fully faceted – i.e. to allow full compounding of terms from different facets and different arrays whilst locating resulting compound classes in a consistent and predictable order.

- 3.352.1 Provision for comprehensive compounding ('composite specification' as Bliss called it) was not fully worked out in BC1 (see *Bliss Classification Bulletin*, March 1957). Although the common subdivisions of Place, Period and Form each had their own distinctive facet indicator, only the comma was available, usually, to indicate added concepts within a particular class. The only way a single character can cope with all possible compounding within a class is by using it to link complete classmarks; e.g. in Class J Education JM is Primary education, JKD is Reading in the curriculum, JIO is Laboratory (practical) methods in teaching, and compounds could be formed to represent Reading in the primary school curriculum (JM,JKD) or Laboratory teaching methods in primary education (JM,JIO).

Bliss, however, did not advocate this method; he developed instead special auxiliary schedules for particular classes. For example, for JM Primary education, Schedule 14 was provided, giving such classmarks as -O Curriculum and -LT Teaching methods (the hyphen here simply indicating that they were to be added to JM or its divisions and would not stand on their own). Using this schedule, compounds could be represented for Curriculum in the primary school (JMO) or Teaching methods in the primary school (JML T). Compounds of Primary education with specific classes within the Curriculum facet (e.g. Reading) or within the Teaching methods facet (e.g. Laboratory methods) were not possible unless the classifier improvised them and to some extent abandoned the straightforward use of the systematic schedule.

- 3.352.2 BC2 meets this critical problem of full hospitality by the use of retroactive notation (see Section 6.422.1). BC1 had used this to some extent, but not consistently. For example, the structure of Schedule 14 was as follows:

- A/R Special classes for qualifying JM Primary education in general or specific types of primary education, such as JMZ Parochial schools e.g.,
- LT Teaching methods
- O Curriculum

The class JM Primary education received its first subdivisions as follows:

- JMS/JMZ Special types of primary school – e.g.
- JMS Schools special in organisation (e.g. Dalton plan)
- JMZ Parochial schools

Compounds could now be built such as Curriculum in parochial schools JMZ,O. No confusion was possible between letters representing qualifying classes and letters representing types of school since enumeration of the latter was confined to JMS/JMZ – all the earlier letters JMA/R had been 'reserved' to indicate qualifying concepts from Schedule 14.

- 3.352.3 Retroactive notation in BC2 follows the same principle; but instead of superimposing an unnecessary special schedule consisting of a selection only of the full range of potential qualifying concepts, all the concepts preceding a given class may be added directly to that class, dropping the initial letter which is common to them all; e.g.

J	Education
JC	School administration
JK	Curriculum
JKH	Reading
JM	Primary education

from which can be built such compounds as

JMC	Primary school administration
JMK H	Reading in the primary school curriculum.

Enumerated subclasses of Primary education (i.e. types of primary school) can now begin at the classmark JMM since reservation of the divisions JMA/JL is sufficient to take care of all preceding classes.

- 3.352.4 Fully retroactive notation not only provides complete hospitality in compounding but it does this without using any characters other than the numbers and letters; so the comma is no longer necessary. This constitutes a simplification of notation.
- 3.353 Although the retroactive notation renders redundant the special auxiliary schedules of BC1, a few of these have been retained, purely to clarify presentation, in the case of classes (notably Language and Literature) in which particularly elaborate provision for alternatives is made.
- 3.354 The use of the common auxiliaries of Place, Period and Language in BC1 was a potential source of ambiguity, e.g. the classmark JSF,L might represent both French university faculties and French universities in the French Revolutionary period. This has now been removed by a ruling that letters from these facets are always introduced by a numeral from Schedule 1 (7 for Period, 8 for Place, 2X for Language of the document). An incidental effect of this rule is to render unnecessary the use of lower-case letters for Place and this is a further simplification in notation.
- 3.355 BC1 was the first classification to use a purely ordinal notation and the great advantages of this have been fully exploited in BC2. Classmarks are assigned to a large extent on the basis of the amount of literature in a class and the likelihood of it being qualified by other concepts to form compounds. This makes for maximum brevity in length of classmark and maximum ease of insertion of new classes in future.
- 3.356 The use of the hyphen to link independent classmarks has been retained. Phase-relations (linkages of concepts, such as the influence of one subject on another, not covered by the normal facet relations are now all distinctively notated within Schedule 1 (at 9C/9J). So the sole use of the hyphen will be in the making of multiple-entry classified catalogues or bibliographies (see Section 7.62).
- 3.357 A minor, but effective simplification in the presentation of notation is the rule now observed that a space be left after every third character of a classmark.
- 3.358 Revision of common auxiliary schedules

These are most conveniently considered here since their main significance is that of a synthetic provision for constantly used concepts of wide applicability.

- 3.358.1 As in BC1, the revised Schedule 1 contains the enumerated classes of the common form facet and the facet indicators of a number of other facets (Place, etc.) which are then enumerated separately, in another schedule, for convenience. Since all these schedules appear in Section 11 of this Introductory Volume and their nature and scope is most readily seen by direct examination, only the following general comment seems to be called for here.

- 3.358.2 All have been greatly extended in scope and detail and where applicable – e.g. in the Form divisions – they have been organized in facets and arrays, with explicit citation orders and an inverted filing order.
- 3.358.3 The Common Form subdivisions have been greatly extended and purely physical forms are distinguished from others. To these form divisions have been added a limited number of Common subject subdivisions – e.g. organisation in the subject, persons and organisations in the subject.
- 3.358.4 The Common Place subdivisions have been greatly extended and now include a wide range of place concepts other than political place – e.g. physiographic concepts. The political place – i.e. nation states – array now includes places of the ancient world as well as the modern world.
- 3.358.5 The Common Period subdivisions now provide for very specific representation of period (down to individual years if necessary).
- 3.36 Revision of the A/Z index
- 3.361 The A/Z index to BC1 was probably the least satisfactory feature of the whole system. The very first principle of an A/Z index is that it allows the user as far as possible to locate concepts by direct reference to their natural name as distinct from locating them by a series of hierarchical steps within some containing class. So the classifier wanting to know where the schedule locates Arid farming or Collective farming or Dry farming or Subsistence farming, etc. should expect to find entries for these under their direct forms. BC1, however, had nothing in its A/Z index under these terms (Arid, Collective, etc.), but located them all under the class heading Farming.
- 3.362 This is not to say that the A/Z index does not require any rules as to form of headings since in numerous cases a subject has several forms of name, each arguably as 'natural' as the others – e.g. Child psychology and Psychology of children. In such cases a clear and consistent rule is needed if the A/Z index is not to become overloaded with variant forms of the same subject name.
- 3.363 The A/Z index to BC2 seeks both to avoid the confusion between alphabetical and classed entry evident in the example in 3.361 and to provide clear and simple rules for meeting the problem. The latter it does by observance of chain procedure – i.e. a term may be qualified only by terms superordinate to it in the classification and never by its own divisions in the classification. So Children: Psychology is accepted and Psychology: Children is rejected, since in the latter case Children constitutes a division of the class Psychology and as such may be found in the schedule on consulting the class Psychology. Whilst chain indexing, because of its great economy in the number of entries, has serious disadvantages in some situations (e.g. the exhaustive indexing of a very large special collection) it is highly suitable for the job of indexing a classification schedule.
- 3.364 The A/Z index to BC2 does not attempt to provide ready-made entries for compound classes; e.g., Probation officers and Psychiatric nursing do not appear in the index to Class Q; it is assumed that the classifier knows how to use the BC including the fact that classmarks for such compounds must be synthesised according to consistent rules and will not be found enumerated in the schedules.
- 3.365 The construction of an A/Z index to a given collection is, of course, a different matter and it is assumed that all compound classes represented in the collection will get their appropriate entries.
- 3.4 Future revision
- 3.41 It is assumed that the BC will never again require such a comprehensive and radical overhaul as the one represented by BC2. The reasons for this are implicit in the arguments presented for the revision of BC1 in Section 2.52.
- 3.42 Publication in parts has the great advantage of allowing revision of different parts of the field of knowledge to be effected as and when developments in the different fields call for it.
- 3.43 The BC Bulletin will publish regular additions to the vocabulary of all classes and such amendments as are called for as the result of users' experience of the system. When the amendments are of sufficient seriousness to warrant a new edition of a complete class the intention is to provide that new edition as promptly as possible.
- 3.44 The practical librarian's dilemma in this matter is too obvious to require extended discussion. Amending a classification calls for time-consuming effort; but if that effort is delayed to an excessive degree the effectiveness of the day-to-day operation of the system is impaired and the greater the effort ultimately needed to rectify its weaknesses. The new BC will attempt to strike a sensible and economical balance in the demands it makes on its users in the matter of altered classmarks.

3.5 Table of comparison: the table below gives in parallel the main classes and their divisions in BC1 and BC2 in order to give users of BC1 a broad view of the changes. Where a class has been moved completely from a given context so that its new location is not clear from a glance at the revised arrangement in the opposite column the new classmark (sometimes only an approximate one) is given in parentheses – e.g. QU Recreation (UY) means that the class Recreation has been removed completely from class Q.

SUMMARY TABLE OF COMPARISON OF BC1 AND BC2

* Detailed accounting for all BC1 classmarks will be found in the draft schedules circulated to members of BCA.

* A fuller outline of BC2 will be found in Section 11.

* N.B. Notation is ordinal; a classmark usually includes all subsequent classmarks up to the next one – e.g. in BC1, Class 2G includes 2G/2K.

BC Edition 1		BC Edition 2	
1	Reading room collections (i.e. Generalia)	2/3 4/9 7	Generalia Phenomena: attributes, activities, Universe of knowledge Communication and information Information sciences and technologies Data processing
2	Bibliology, documentation, libraries * <u>Alternative</u> to Z (latter preferred by Bliss – put here for easier comparison)	8	Records, documentation Types of records
2C	Making, publishing, selling of books		Publishing, selling
2F	Documentation, types of documents		
2G	Bibliography and bibliographies	8G	Bibliography, bibliographies
2M	Libraries and librarianship	8M	Libraries and librarianship
		9	Direct and mass communication
3/9	Special collections in the library		
A	Philosophy	A	Philosophy
AA	History	AA	Viewpoints, branches (general)
AF	Philosophy in general	AB	Western philosophy
AG	Systematic (i.e., viewpoints)	AD	History
AH	Metaphysics ... (i.e., branches)	AI	Eastern philosophy
AK	Science	AK	Science and mathematics
AL	Logic	AL	Logic
AM	Mathematics	AM	Mathematics
AN	Arithmetic	AN	Set theory ...
AO	Algebra	AO	Algebra
AR	Analysis, functions	AR	Analysis
AT	Geometry	AT	Geometry, topology
AW	Mensuration, metrology		
AY	Statistics	AW	Statistics and probability
		AX	Systemology, organisation theory
		AY	Science and technology Methods, instrumentation, metrology ...
		AZ	Science, empirical science
AZ	Physical science	AZB	Physical science
B	Physics	B	Physics
BA	Theoretical, mathematical	BA	Mathematical, theoretical
BB	Experimental & practical	BB	Experimental
BC	Mechanics	BC	Thermodynamics, mechanics
BE	Atomic, nuclear, molecular	BE	Electricity & magnetism
BF	Radiation, radioactivity	BF	Radiation physics

BG	Properties & states of matter		Wave & particle
BH	Heat, light	BM	Nuclear, atomic, molecular
BJ	Electricity & magnetism	BO	Bulk matter physics
BM	Electrical technology	BP	Properties: acoustics, thermal
BO	Communications technology	BQ	States of matter
BP	Sound	BR	Technologies (physics based)
BQ	Fluid mechanics & technology		Nuclear
BR	Hydraulics, aeronautics	BS	Electrical, electronic
BU	Physical technology	BW	Thermal
	* Alternatives to UN/UP	BX	Mechanical engineering
		BY	Crystallography
			* <u>Alternative</u> to CHC
C	Chemistry	C	Chemistry
CA	Theoretical, practical	CA	Practical, analytical
CB	Physical	CC	Physical chemistry
CD	Chemical dynamics		Reactions, kinetics
CDP	Thermochemistry, electrochemistry	CD	Thermochemistry, electrochemistry
CF	Radiochemistry, photochemistry		Radiochemistry, radiation chemistry
CG	Chemical analysis	CG	Matter, substance
CH	Mineralogy & crystallography		Energy, structure, bonds ... (Types of substances)
	* <u>Alternative</u> to DN	CHP	By various characteristics
CL	Inorganic chemistry	CL	Inorganic
CO	Organic chemistry	CO	Organic
CT	Applied chemistry	CT	Materials science & technology
CTB	Chemical technology	CTC	Chemical engineering
CTE	Chemical engineering	CTM	Chemical technology
CU	Products, industries	CTP	Products, industries
D	Astronomy	D	Astronomy
DB	Practical	DB	Practical
DC	Theoretical : celestial mechanics	DC	Astrophysics, astrochemistry
DD	Cosmology, stellar astronomy	DD	Bodies & systems
DE	Solar system	DE	Solar system
DG	Geology	DG	Space science
DI	Historical, stratigraphy	DH	Earth sciences
DK	Geomorphology	DHL	Lithosphere, geology
DL	Geographical geology	DI	Stratigraphy
DN	Rocks, petrography	DK	Geomorphology
DO	Economic geology	DN	Rocks, minerals, soils
DQ	Geography	DO	Economic geology
DR	Physical	DR	Hydrosphere
DS	Meteorology	DS	Atmosphere, meteorology
DT	Regional	DT	Geography
			Regional
		DU	Systematic
			Physical geography
		DV	Human geography
DU	Natural history	DY	Natural history
DW	Microscopy (AY)		
E	Biological sciences	E	(Biological sciences)
EA	Theoretical, biophysics	EB	Biophysics, biochemistry

EB	Experimental biology (EA)	EE	Genetics
EC	Cytology, morphology, histology embryology	EH	Developmental biology
		EJ	Anatomy, Physiology, Pathology (general)
EH	Biochemistry, Physiological chemistry	EL	Constituents: cells, tissues (Parts, organs, systems)
EJ	Physiology	EN	Regional
EL	Ecology, distribution, adaptation	EP	Functional
EN	Genetics, phylogeny	ET	Environmental biology, ecology
EP	Paleontology		(Organisms)
ET	Biogeography		Microbiology
EU	Economic biology	EV	Botany
EWB	Microorganisms (general)	F	Zoology
F	Botany	G	Economic biology
G	Zoology	GZ	* <u>Alternative</u> to UA/UC
H	Anthropology	H	Anthropology
HB	Physical, somatology	HB	Physical, somatology
HD	Anatomy & physiology	HD	Anatomy & physiology (general)
HE	Organs, systems, tissues, functions	HE	Cells, tissues (Parts, organs, systems) <i>see</i> Medicine HP
HH	Hygiene, health, dietetics	HH	Health sciences
HI	Public hygiene, health	HI	Public health & safety
HJ	Physical training, athletics	HL	Personal health
HK	Sports & recreation (UY)		
HM	Medicine	HM	Medicine
HN	Therapeutics	HMN	Social medicine, health services
HO	Hospitals & nursing	HO	Hospitals & nursing
HP	Pathology : general & special	HP	(Parts, organs, systems)
		HS	Pediatrics, geriatrics
HS	Surgery	HT	Pathology
HT	Gynecology, obstetrics	HX	Clinical medicine
HU	Pediatrics	HY	Environmental medicine
HV	Dermatology, ophthalmology		
HX	Otology, Dentistry		
I	Psychology	I	Psychology
IA	Systems, schools	IC	Schools, systems, viewpoints
		ID	Physiological psychology
IB	Physiological, neurological	IF	Mental processes
IC	Mental processes	IJ	The unconscious
IG	Personality, differential psychology	IJU	Parapsychology
IJ	Mental hygiene	IK	The individual, personality
IK	Subconscious, psychoanalysis	IL	Differential psychology
IL	Abnormal psychology, psychiatry	IM	Social psychology
IO	Parapsychology		* Alternative to KB
IP	Social psychology	IMS	Applied psychology
	* Alternative to KB	IMV	Psychiatry
IV	Child psychology	IT	Communication faculty
IW	Applied psychology	IU	Sight, hearing ...
J	Education	J	Education
JA	Principles & philosophy	JA	Principles & philosophy
JC	Science of education	JB	Administration

JE	Educational psychology, tests	JE	Educational psychology, tests
JG	Students: characteristics, types	JG	Students: characteristics, activities
JH	Teaching & teachers	JH	Teaching & teachers
JI	Methods & aids	JI	Methods & aids
JJ	Curriculum (Stages & types of education)	JK	Curriculum (Stages of education & types of educands)
JL	Primary	JL	Primary
JN	Secondary	JN	Secondary
JO	Vocational	JP	Further vocational education
JQ	Education of women		
JR	Higher education	JR	Higher education
JT	Professional education	JT	Vocational, professional
JU	Adult education	JU	Adult education
JW	Museums (8)	JV	Exceptional educands
K	Social sciences	K	Social sciences
KA	Sociology: systems, schools	KA	Sociology
KB	Social psychology * <u>Alternative</u> is IP	KB	Social psychology * <u>Alternative</u> is IM
KC	Descriptive: social processes, groups, control	KC	Cultural, social anthropology
KCS	Institutions, sex and family relations, change	KCF	Social structure & processes
KE	Social anthropology, ethnology	KG	Collectivities, groups
KEE	Folkways, sex and family relations, material culture	KI	Institutions Sociology of disciplines Sex, marriage, family Everyday life, life cycle
KF	Primitive culture and ethnic archeology	KK	Customs (as for institutions)
KG	Ethnic culture, psychology	KM	Folklore (as for Institutions)
KI	Folklore and customs	KNL	Folk literature
KO	Ethnography	KO	Ethnography
KT	Human geography, ecology	KT	Environment, social ecology
		KX	Human geography * Alternative to DV
KU/KY	Travels, by place	KY	Travel and description
L	Social-political history	L	History
L8	Ancillary studies: genealogy, biography, archeology ...	L9	Biography
LG	General history	LA	Ancillaries: archaeology ...
LI	Ancient, medieval	LG	By subject.. political, economic ...
LY	Modern	LI	Ancient, medieval
M/O	By place: Europe, America ...	LY	Modern
		M/O	By place: Europe, America ...
P	Religion	P	Religion
PB	Theology: systematic, natural	PB	Systematic theology
PD	Worship, devotional religion	PD	Practice of religion, worship
PE	Ethics and morals	PF	Religious systems Institutions, ecclesiology
PF	History of religion, comparative religion	PG	Religions and mythologies
PG	Mythology	PGB	By form of belief: pantheistic ...
PH	Asiatic religions, Islam, Judaism, Christianity	PGJ	Ancient and dead religions
PX	Religious institutions & societies	PI	Modern: Hinduism, Buddhism, Judaism, Christianity, Islam ...
Q	Social welfare, amelioration	Q	Social welfare
QB	Services to persons in need	QAG	Administration, agencies, personnel
QC	Organisation of charity and relief	QD	Social work: Procedures, methods

QE	Emergencies, disasters	QE	Social services: what aid is given
QH	Housing	QG	Causes of need, persons in need
QI	Backward peoples		Disasters, deprivation, housing ...
QJ	Social eugenics	QJ	Persons by various characteristics
QK	Social pathology		Sex, race, class, marital state
QKD	Handicapped persons	QL	By age: children ...
QL	Vice, addictions	QM	By mental or physical disadvantage
QO	Criminals, penology	QN	Deviants
QS	Welfare agencies, societies	QO	Criminals, penology
QU	Recreation (UY)		
QV	Children (general)		
QW	Women (general)		
QX	Socialism (RJ)		
QY	Internationalism (RL)		
R	Political science	R	Political science
RA	Political philosophy, freedom, rights, the State	RA	Political theory, rights and duties
RB	Government, constitution	RB	Government, constitution
RD	By place, individual states	RD	Branches of government: legislature, parties ...
RE	Branches of government: legislature ...	RF	Political practice: Violence, censorship ...
RI	International relations, law	RH	Internal politics
RK	Colonialism, immigration & emigration	RI	External politics
RM	Armed services (US)		* <u>Alternative</u> is RL
		RJ	Political systems (various characteristics)
		RJS	Historical: capitalist, socialist ...
		RK	By place, individual states
		RL	External politics: peace & war
			* <u>Alternative</u> is RI
RP	Public services: police, postal ...	RO	Public administration
		RQ	Individual states
		RR	Central
RS	Local & municipal government	RS	Regional & local
RU	Cities, towns: political & economic aspects		
RW	Practical politics, parties, elections		
S	Law	S	Law
SA	Jurisprudence	SA	Jurisprudence, comparative law
	<u>Alternatives for</u>		
SB	International, constitutional & administrative law	SB	Practice. procedure: administration of justice
		SBF	Subjects of law: private and public law
		SD	Jurisdictions
			(By political authority)
		SDD	International
		SDF	National, municipal law
SE	English & American law	SE	Common law systems
SEE	English law	SEE	English law
SH	Common law, equity		
SJ	Civil, municipal		
SL	Subject: persons, property ...		
SP	Practice, procedure	SR	Other common law systems
ST	Other national systems	ST	Civil law systems
		SZ	(By religious authority)

T	Economics
T8	History of economic theory, schools
TA	Theory, economic concepts
TB	Social economics: planning, consumption, population, cooperation, distribution
TC	Land and capital
TD	Industry, production
TG	Labour economics
TI	Machine industry, manufacturing
TJ	Business, advertising
TL	Corporations, monopoly
TM	Exchange, commerce, trade
TN	Transportation (UO)
TO	Accounting (TXI)
TP	Finance, banking, insurance
TT	State economics, Public economy Public finance, taxation
TW	By place, national economies
TX	Special business * For miscellaneous industries, etc. not easily located by function in Class U and elsewhere

U	Arts (general), useful arts
UA	Agriculture, forestry, animal industries
UD	Mining industries
UE	Engineering
UEK	Civil and structural
UF	Materials of construction
UG	Municipal, road and railroad
UJ	Hydraulic engineering * <u>Alternative</u> to BR
UK	Boats and ships
UL	Aeronautics * <u>Alternative</u> to BT
UM	Military and naval science * <u>Alternative</u> to RM
UO	Mechanical engineering
US	Mechanic arts and trades: woodwork, metalwork...
UT	Manual arts and trades: masonry, glasswork.....
UU	Textile technology
UV	Other industries: clothing, food, paper, furniture ...

T	Economies
TA	Theory: viewpoints, methods
TAG	By broad period, school, writer
TAK	Economic behaviour & decisions
TB	Economic history, conditions
TBC	Growth and development
TBP	Social economics: policy planning ...
TC	Consumption: demand and supply
TD	Production and distribution
TDF	Factors: land, capital, labour
TI	Production systems, mass production
TK	Distribution of wealth
TL	Costs and prices: value theory ...
TM	Exchange, commerce, trade
TN	Finance, banking, insurance
TT	Economic systems, sectors
TU	Regional, national: public finance ...
TV	International economics
TW	Historical systems: capitalism ...
TX	Management of enterprises
TXJ	Financial: accounting ...
TXS	Marketing, advertising
TY	Particular industries * <u>Alternative</u> to subordinating economic aspects to the industry (in class U and elsewhere)

U	Technology, useful arts
UA	Agriculture, forestry, animal industries
UD	Mining technology
UE	Engineering
UEP	Production technology
UET	Materials handling
UF	Materials science and technology * <u>Alternative</u> to CT
UG	Technologies based primarily on physics * <u>Alternative</u> to BR
UH	Environmental technologies
UHC	Construction technologies
UHD	Civil engineering
UHV	Architecture, planning, building
UJ	Architectural design, practice
UJG	Building construction
UM	Physical planning: regional, urban
UN	Public health engineering
UNS	Illumination engineering
UO	Transport technology)
US	Military science and technology
UT	Other technologies, by product * As the whole classification
UU	Basic needs: food, clothing, shelter
UW	Housing

UX	Household and home	UX	House and home, household management
UY	Houses: building, fitting ...	UY	Recreative arts Entertainments, sports
V	Arts, fine arts	V	Arts, fine arts
V8	Aesthetics, elements of art	V7	Aesthetics
V8M	Subjects in art	V7R	Subjects in art
		V8	Style in art
		V9	By period
VA	Architecture: by period	VA	By place
		VD	Architecture: periods, places * <u>Alternative</u> to UJ
VB	By place		
VC	Practice and design (UT)		
VCN	Types of buildings		
VD	Architectural detail		
VDT	Interior decoration		
VE	Sculpture and plastic arts	VE	Plastic arts: sculpture, glyptics, ceramics
VJ	Pictorial and graphic arts	VJ	Graphic arts: painting, drawing, calligraphy, commercial art
VP	Engraving, reproduction, photography	VP	Reproductive arts, printmaking, photography (as an art)
VS	Calligraphy (VL)		
VT	Printing		
VU	Textile arts	VU	Decorative arts and craft: needlework ...
VV	Music	VV	Music
VW	Musicology: elements, forms, instruments	VW	Techniques, character and function, elements and forms, instruments
		VWY	Afro-American music Non-European tradition
VX	Scores	VX	Scores
VY	Recreative arts, indoor amusements (UY)	VY	Performing arts: theatre, ballet, cinema, broadcasting
W	Philology	W	Philology
WAB	Linguistics	WA	Linguistics
WB	Phonology, writing, morphology, semantics, grammar	WAC	Theory: psycholinguistics, models of grammar ...
		WAZ	Descriptive: phonology
		WG	Comparative, diachronic linguistics Language varieties (by various characteristics)
		WH	Literature (general and comparative) * <u>Alternative</u> is YU (Individual languages and then literatures)
WH	Artificial	WI	Artificial
WJ	American-Indian, African, Malayo- Polynesian	WJ	American Indian, African, Malayo- Polynesian
WN	Oriental, Asian	WN	Oriental, Asian
X	Indo-European	X	Indo-European
Y	English	Y	English, or preferred language
YU	Literature in general	YU	Literature (general and comparative)
YUB	Criticism, composition	YUB	Criticism, composition
YV	Journalism (9)		
YW	Forms: poetry, drama ...	YW	Forms: poetry, drama ...
Z	Bibliology, documentation, libraries (8) * <u>Alternative</u> to 2		

4. ORGANISATION, INFORMATION AND THE ROLE OF BIBLIOGRAPHIC CLASSIFICATION

4.1 A library (which term may stand for any sort of information service) is a store of information. The object of bibliographic classification is to make that information easily available.

The arrangement of library stock in the linear order of a classification goes some way towards the easy retrieval of information. But this alone is, for a number of reasons, insufficient and is invariably backed up by the provision of catalogues and indexes. These tell us all that the library has on a given subject, as distinct from what is immediately available at a given point on the shelf, and provide additional approaches to the material – by author, for example, when the physical arrangement is by subject.

Even this step assists retrieval only within the limits of the particular library system, whereas this is only part of a wider context of information existing in the community and the world at large. Awareness of these wider resources is effected by the production of bibliographies and indexes of all kinds, general and special, current and retrospective.

4.2 In the organisation of the library, of catalogues, bibliographies or other information sources, a main criterion of effectiveness is the ability to locate easily and quickly the particular items having the information sought.

4.3 Except in a very few cases – e.g. that of a small, selective current awareness bulletin – the searcher in a library, or catalogue or bibliography, does not reckon to examine the whole system when he wants information. He wants only to find the relatively few items which are relevant to his need, and these may be thought of as a subset of the system – the class of documents defined by his need. Recognition of the store as an aggregate of classes of information is fundamental to all retrieval. Bearing this in mind, the operation of retrieving information may be described briefly as follows.

4.31 The searcher decides in his mind the most likely point at which to begin looking; this will be that part of the system most likely to contain the class he is interested in. Having begun to look, one of four situations can arise: the searcher finds exactly what he wants – he has happened to look in just the right part or section of the library, catalogue, etc; or, secondly, he may find he needs to narrow the class he is examining (because it contains more items than he wants) or, thirdly, to broaden it (because it contains too few). Or fourthly (but this is really a special case of the third situation) he finds nothing at all and the whole search has to be re-directed. In each of the last three situations a further requirement of the organisation of the information is that it helps the searcher to re-define the class of information he needs and to redirect his search accordingly. The two functions have been aptly summed up by saying that indexing (the general name for the operation which seeks to point out, or indicate the whereabouts of information) should locate and relate – i.e. pinpoint the exact place where the information sought is most likely to be, and if further search is called for, indicate to the user where else he might look – what classes there are which are related in a relevant way to the initial exact one.

4.4 To point out where information of a particular kind is in a library means in practice indicating which documents contain that information. The classes indexing deals with are always ultimately classes of documents, albeit defined by the information in them. But particular documents can only be pointed out if we know already what information they contain: hence the basic library operation of indexing (classifying, cataloguing) each document as it is acquired. Each such document is examined, and an index description made of it in some form which records succinctly what are the chief concepts it deals with.

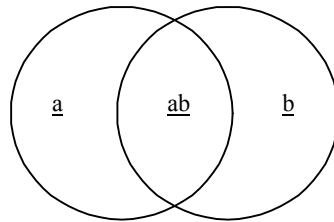
4.41 The problem may be stated thus: each single document is potentially the answer, or part answer, to a very large number of readers' requests for information. How can we best anticipate these requests so that when a given request is received, no matter what form it is couched in, we can retrieve quickly the document or documents which are most likely to have the required information? Both the documents on the one hand – and the requests for information on the other may vary widely in their generality. The document a library wishes to index may vary from encyclopedias and large treatises to journal articles focusing on a highly specific topic. Similarly, the requests may be for broad classes or narrow classes; also, the user may want everything or most of what the library has on the topic, including material which is only marginally relevant (this is called a high recall demand); or he may want only those items which deal precisely with the topic and nothing else will do (this is called a high precision demand).

The size and complexity of the problem may be demonstrated by taking a single document and asking what sort of requests might be received which should, if the indexing were done efficiently, result in the retrieval of that document as being possibly relevant to that request. Suppose a library concerned mainly with economics and management acquire a document on industrial relations in the motor vehicle industry of Great Britain since the war. This might be represented symbolically as giving information on any or all of a number of different concepts a, b, c and d where a represents *Industrial relations*, b represents *Motor vehicle industry*, c represents *Great Britain* and d represents *1945-1975*.

4.42 If we now consider the sorts of reader requests which might reasonably be expected to result in this document being brought to the attention of the requester we can admit at once that the document should be located promptly if the request were for the subject represented by all four elements (a, b, c and d) jointly, i.e., a document dealing at one and the

same time with a, b, c and d. But the document should also be retrieved in response to a request for any combination of these concepts (as part of the relating operation in searching); e.g., abc (Industrial relations in the motor vehicle industry since the war) and any other two of the original four constituent concepts. It should also be retrieved for requests consisting of any two of the original four (e.g. ab Industrial relations in the motor vehicle industry, ac Industrial relations in Great Britain ...) or, if need be, for requests consisting of any one of the constituent concepts a Industrial relations, b Motor vehicles industry, c Economics of British economy, d Economics since the war.

The distinctions indicated above (whether the class sought is a, or ab, or abc, or abcd, or ac, etc.,) reflect a fundamental theoretical point and one with which all indexers must be thoroughly familiar. The class a (representing Industrial relations, say) means 'all documents in the library which in any way deal significantly with the concept a.' The class b (representing Motor vehicles industry, say) means 'all documents in the library which in any way deal significantly with the concept b.' The class ab represents the intersection of these two classes – i.e. all documents in the library which deal significantly at one and the same time with concepts a and b; it is usually represented in elementary symbolic logic by Venn circles:



This shows clearly that ab is a subclass of both a and b : it is the child of two parents.

Logical intersection is usually referred to in modern indexing as coordination. The intersection of differing numbers of 'elementary' concepts (2, or 3, or 4 ...) is called the coordination level. The constituent classes individually (a, b, c ...) are usually referred to as relatively elementary classes and a class reflecting the coordination of two or more elementary classes is called a compound class.

4.44 Recognition of the fact that a document indexed as a compound class (e.g. abcd) should be retrievable in response to any combination of its constituent elementary classes is by no means the only sort of anticipation called for in indexing for retrieval. Any one of the elementary concepts making up an index description belongs to a hierarchy of closely related concepts – those which are more general (which contain it entirely) and those which are more specific (which are entirely contained by it). For example, Industrial relations is a subclass of Labour economics and itself has subclasses such as Conciliation, Strikes, etc. Motor vehicles industry is a subclass of Manufacturing industry and itself has subclasses such as Motor accessories industry, Vehicle repair industry, etc. An effective index must show these relationships clearly.

4.45 Moreover, requests may be received for different combinations of different hierarchical levels of the concepts in an index description, e.g. a request for Labour economics in Britain since the war, or strikes in the motor vehicles industry.

4.46 Another problem the index must anticipate is that of the same concepts occurring in different relationships. An index description consisting simply of the concepts Teachers-Attitudes-Students is ambiguous, since this might refer to the attitudes of teachers to students, or vice versa.

4.47 A problem of a different kind is that of the exhaustivity of indexing – i.e. the number of different concepts recognized in the index description of a document. For example, it might be the case that the document on Industrial relations already referred to contains a significant amount of information (included by way of a case-study, perhaps) on a particular strike at a motor-vehicle manufacturing plant x caused by a labour demarcation dispute between trade union y and trade union z. If a request were received on the specific topic of labour demarcation dispute involving trade union y, what chance would there be of this particular document being retrieved quickly? It would certainly not be retrieved at the initial 'locating' step, because the index-description of the document (as given in Section 4.4 above) does not refer to this specific subject. It could be retrieved in the 'relating' steps so long as the index displayed the relationship between demarcation disputes or trade unions and industrial relations – but it might take a longish search.

4.5 In constructing indexes designed to cope with the formidable problems of locating and relating indicated above, librarians recognize two fundamentally different methods of indexing: pre-coordinate (or 'conventional') and post-coordinate (or 'non-conventional') indexing. The meaning of these two terms will become clear, we hope, after the explanation below, and is given in Section 4.8.

4.6 Pre-coordinate indexing

4.61 Often referred to as 'conventional indexing', or 'traditional indexing' or 'linear indexing' this is the familiar form of indexing seen in printed or card catalogues and bibliographies and in the shelf arrangement of books (which is not usually thought of as a form of indexing but which is in fact a very important form – the only one many readers, in self-service

library situations, ever really use). Every item is assigned to a specific class by a process of summarisation – i.e., the index description of a document is a summarisation of its overall theme – e.g. History of Europe in the 19th century; Organic chemistry; Automatic measurement of reverberation time in sound studios. It does not take note of concepts dealt with as subsidiary themes within that overall theme; an example would be an index-description limited to

Industrial relations – Motor vehicles industry – Great Britain – 1945/1975

when the document concerned dealt with numerous specific sub-themes such as Conciliation, Trade unions, Strikes, Demarcation disputes, Motor accessories industry, Scottish assembly plants, etc.

4.611 The only way in which explicit indexing of such subsidiary themes can be achieved is by additional entries in the catalogue. Such added entries are often made in the case of collections or symposia, where the separate items making up the different chapters or sections of the document may each get their own entry. But to make additional entries on any substantial scale for all documents would greatly increase the size and cost of the catalogue and is therefore rarely attempted.

4.62 Having decided which concepts make up the summarisation, the indexer then has to decide which one is to be treated as the primary one for purposes of arrangement. For example, most indexers would not hesitate in deciding that the first example given above would, for purposes of shelf arrangement at least, be treated as a work in the (primary) class History, with Europe as a subclass and 19th century as a sub-subclass.

This operation (called 'citation order') is a very important one indeed and will be considered in more detail later on. Here it is necessary to say only that pre-coordinate indexes are arranged by the classes formed in the summarisation, to produce a linear order of classes (index descriptions), one after the other, which can then be scanned visually by the users of the index when searching for a given class.

4.621 This linear order may be systematic ('classified'), whereby all classes are grouped first into a series of 'main classes', each main class is then divided into major subclasses, each subclass into further subclasses and so on. So all the documents (or their index-descriptions) on history, say, are kept together and within history all the documents on Europe, and so on. Or, all works on Economics are kept together and within this class all works on particular economic problems like Land, Labour, Capital, are kept together, and so on.

4.622 Or, the linear order may be alphabetical, whereby the position of every class is determined not by the concept(s) it deals with but by its name (on the dubious assumption that every class has a 'known name' – i.e. a particular term which all users of the index will search for). Examples of subject headings (as the index-descriptions in such a system are called) might be 19th century; Labour economics; Industrial relations; Trade unions. For fairly specific classes, such as 'Industrial relations in the British motor vehicle industry since the war' the rules for form of heading are often rather arbitrary, since several different forms might claim with equal justice to be the 'name' of the class.

4.623 Systematic order is widely used both for catalogues and for the physical arrangement of stock (which constitutes an 'index' in this sense, since the whole point of the arrangement is to indicate the class of information any given section deals with). Alphabetical order, however, is rarely, if ever, used for the physical arrangement of stock – only to arrange catalogues and bibliographies.

4.63 Whether the arrangement is systematic or alphabetical, the central feature of linear indexes is that the elementary terms which make up a compound class are coordinated or linked together at the time of indexing and this calls for a deliberate decision by the indexer as to which concept shall be taken (cited) first, which shall be second, and so on. Since only one concept can be treated taken as the primary one, others must be subordinated to it, as the concept 19th century was subordinated to the concept Europe in an earlier example.

4.631 The subordination of some concepts to others is both the main weakness and the main problem of linear indexes. If Industrial relations is subordinated to Motor vehicles industry then information on the former concept is distributed or scattered. Assuming that the index is consistent (and consistency and predictability is absolutely essential to efficient indexing) then every document dealing with Industrial relations in a particular industry will be subordinated to that industry and a searcher for everything on industrial relations or a particular feature of it (e.g. Strikes) may have to search in many places for it.

If the concept of Great Britain is subordinated both to Industrial relations and to Motor vehicle industry, then the searcher for information on the British economy is even worse off. If we again assume consistency in the index, such a decision implies that information on Great Britain might be found under (subordinated to) all kinds of industries, all kinds of industrial relations, as well as under Industrial relations when the latter is already subordinated to a particular industry (as in our original example).

4.632 Although these 'distributed relatives' as the British librarian, Wyndham Hulme, described them many years ago, constitute an undoubted weakness of the linear index, consistent rules and the provision of complementary alphabetical

indexes to systematic arrangements go a long way to minimising their effect and these remedies will be described fully later on.

4.7 Post-coordinate indexing (usually called 'coordinate indexing'). This form of indexing was developed after the war as a response to the two weaknesses of conventional indexing – that of distributed relatives and the limitations on the exhaustivity of indexing described in Section 4.61.

4.71 In coordinate indexing, the index-description of a document consists simply of a number of separate individual terms, not linked in any way. This form of indexing is usually applied to articles in journals, research papers, etc. rather than to books. For example, an article on Membrane biogenesis might include in its index-description not only the terms summarizing its overall theme (Membranes, Biogenesis) but also others referring to particular subsidiary concepts, such as Mitochondria, Chloroplasts, Bacteria, Cytochromes, Eukaryotic cells, and so on.

4.711 The index-description thus differs from that in conventional indexing in two ways. Firstly, the individual terms are treated as independent and equal – no term is subordinated to another; this is because the terms are not used to produce a linear arrangement for visual scanning as are those in conventional indexing. Secondly, the number of terms included usually exceeds that in the summarisation and covers the concepts in subsidiary themes within the document. For this reason, coordinate indexing is sometimes described as 'deep' indexing, or 'analytical' indexing, although both these terms should be used with caution.

4.72 A record is made of what items (documents) have been indexed by each particular term (concept). For example, against the term Membranes is recorded the accession numbers, or other identifying marks, of all those items in the library which include this term in their index-description, and which therefore deal in some way with the concept of Membranes. Similarly against the term Mitochondria will be recorded the identifying numbers of all documents containing that term in their index description. So in essence, the coordinate index consists physically of a list of elementary terms each of which is accompanied by the identifying numbers of all documents which include the term in their index description.

4.73 When a request is received, the records of all the separate concepts which collectively describe the information wanted (the search prescription) are compared and any item numbers which appear in all these records can be assumed to be of items relevant to that request. These numbers are noted and the items retrieved from the store for examination.

4.74 The operation of comparing item numbers is usually done with some mechanical assistance, or in a computer.

4.75 Arrangement of the physical items (documents) is usually numerical, by item-number.

4.8 The terms pre- and post-coordination may now be explained. Virtually all problems of information indexing are problems caused by compound classes. In conventional indexing, the linking (intersection, coordination) of elementary terms to form compound classes is done at the time of indexing. In coordinate indexing, this is done only after receipt of a request. When the question is received then the search is made for the particular combination of elementary terms making up the search prescription. So it may be said that in conventional indexing coordination to form compound classes is done before (pre-) receipt of any particular request whereas in coordinate indexing it is done only after (post-) receipt of a request.

4.81 Two main advantages are claimed for post-coordinate as compared with pre-coordinate indexing:

4.811 Distributed relatives are avoided; since no concepts are subordinated to any others, it is as easy to search for any one combination of concepts as for another, whereas this is not the case in pre-coordinate indexing.

4.812 Indexing can be more exhaustive – i.e. go beyond summarisation – with very little extra cost.

4.82 Despite these advantages, it is generally accepted that coordinate indexing is primarily a means of locating rapidly information on relatively specific topics. As such, it has proved particularly suitable for detailed indexing of scientific and technical non-book materials in special libraries of all kinds. However, it provides no principles for linear arrangement and as such offers no solution to the problem of organising physical stock or catalogues and bibliographies for visual scanning, although these will continue to play a vital part in everyday information retrieval.

4.83 This is not the place to argue the merits of the two different systems or to consider which circumstances would suggest the use of one rather than the other. But it is important for users of classification systems to see the problems of retrieval in perspective. Although it is clear that the main role of a classification scheme is to provide a system for arranging systematically the physical stock of libraries, or the entries in catalogues and bibliographies, its utility is not confined to these tasks. The problems of searching described briefly in Section 4.31 are common to all systems of indexing; the need to relate concepts to others is fundamental and in both the pre-coordinate alphabetical catalogue and in the post-coordinate index considerable effort is usually called for to indicate these relationships in the form of schemes of

subject headings and references or thesauri. Both of these instruments reflect a considerable amount of classification, although the degree to which this is made explicit rather than left implicit varies considerably.

4.84 The use of the BC in producing such tools is referred to later (in Section 7.65). Until then, and for the most part, we shall assume that users of the BC are concerned primarily with the systematic arrangement of the physical stock of libraries and of catalogues and bibliographies

4.9 Usually, an information need is defined by subject – e.g. ‘Have you anything on music?’ But it may also be defined by other characteristics – e.g. ‘Have you a score of the Messiah?’ ‘Where are the one-act plays?’ ‘Where will I find the writings of the Christian mystics?’

4.91 The problems raised by these other approaches to information must also be handled by the classification. The librarian needs to distinguish all those characteristics of his information-carrying materials which are relevant to their easy retrieval. The use made of the materials (for reference only, for loan, for children) may be the first principle by which the library is organised. Within such departments of the library, the physical form of the material – e.g. monograph book, periodical, newspaper, microfilm, sound recording, filmstrip – is often the first basis for arranging, materials physically.

4.92 However, within these departments or physical categories, and in the catalogues and indexes which support them, the approach to library materials by its fundamental characteristic – its information content – is invariably the major concern of the librarian and some system of classification becomes an essential instrument in his organisation of this information.

5. THE STRUCTURE OF A BIBLIOGRAPHIC CLASSIFICATION

5.1 Before describing the BC itself and explaining how it may be applied, it seems sensible to describe briefly the nature and structure of a modern library classification. There is a very close interaction indeed between the basic theory of library classification and its practical application, and any explanation of the latter is bound to refer continually to certain theoretical concepts and principles. We therefore summarize these below and even if the impatient intending user skips this section and proceeds straight to Section 7, he must be prepared to consult this section if he finds he needs further explanation of any concept referred to there.

5.11 Most of the modern theory of library classifications has been developed intensively within the framework of special classifications – i.e., of particular subjects. Moreover, understanding of the basic problems and principles is more easily achieved by considering the nature of a special classification and therefore this is dealt with in most detail here. However, because the BC is a general classification, the additional problems posed by this are briefly indicated in Section 5.5.

5.2 A library classification is a sequence of classes (which becomes embodied concretely as groups of documents on the library shelves or groups of entries in a catalogue or bibliography) in systematic order. By systematic is meant an order in which related classes are kept together as far as possible; e.g., all documents on Economics – such as those on Labour, Utility, Employment, Value, Price, etc. – may be kept together rather than distributed alphabetically by the accident of their specific subject's name.

5.3 Theoretically, there are two different ways of arriving at such a sequence. One way is to work inductively, from the particular to the general; innumerable individual classes are sifted through, and assigned to groups according to their likeness, these groups in turn are clustered in yet larger groups, and so on. The other way is to work deductively, from the general to the particular: a limited number of broad classes is postulated to begin with and each broad class is then divided progressively into smaller and smaller classes.

Whichever way is used, the end product is substantially the same and the human mind in practice uses both procedures interactively. For convenience in clarifying the problems of systematic arrangement, it is probably best to consider the deductive procedure and work from the general to the special. Users in a library frequently demonstrate this approach; a searcher for information on dolphins may begin by asking where the books on zoology or animals are kept; a searcher for information on Warsaw will begin by asking for the section on Poland. So the following explanation will utilize the deductive approach.

5.4 Division of a class

A class is said to be divided by a principle of division (less accurately, a characteristic of division) when its sub-classes are arranged according to one particular kind of characteristic or attribute. A simple example is the classification of physical objects: in a women's wear shop, for example, garments are usually grouped (divided) by the principle of function (overcoats, underwear, stockings ...) and within such functional groups ('classes') further principles of division will be by size, by price-range, by material and so on. The principle of division is essentially mental picture we hold in our mind which governs our physical actions in separating and grouping.

5.41 One fundamental rule is that division must be by one principle only at a time; when grouping clothes, for example, if function is the principle by which grouping is first being effected, all other attributes are dismissed from the mind as irrelevant for the time being; so, whatever the price or size or material or other characteristic of the garment, if its function is to serve as a top coat then it is assigned to that class (Overcoats). Only when grouping by one principle is exhausted (all its possible sub-classes recognized) is another principle applied; so the clothes, having first been grouped by function may then be arranged within each functional group such as Overcoats, Evening dresses, etc.) by a further principle – by size, say.

5.42 There is a very important practical point involved in this rule. Retrieving information from a store or library which contains information on tens of millions of classes (a single treatise might give information on many hundreds of concepts) demands a high degree of predictability as to where to locate any given class of information. The only known way in which this can be achieved is by recognising the order in which we apply principles of division. If, for example, in a collection on Modern history the arrangement is first by Country, then by Social process (giving Political history, Economic history, etc.) and then by Period, a statement to this effect summarises the whole organisation and a request for an Economic history of France is immediately referred to the class France and not (in the first place) Economic history. This problem is considered in more detail under citation order (Section 5.73).

A useful, if somewhat rough and ready distinction may be drawn here between 'simple' subjects and 'compound' classes. Within a given class, a simple class (or subject) is one reflecting only one principle of division, whereas a

compound class (or subject) reflects more than one principle of division; so, within the class 'History', the subject 19th century history is a simple subject, but Scotland in the 19th century is a compound subject.

5.43 It may be noted that in the example above, the very first step of division applied to the physical stock was really based on the characteristic of information content, as distinct from the numerous other attributes by which documents could be classified, such as author or physical form. Moreover, in order to handle the problem of the complexity of information content – the fact that any one document could be characterized as being 'about' a very large number of things – we are assuming the principle of summarization explained in Section 4.61.

5.44 It was suggested in Section 5.11 that it is easier to grasp the process of division and classification within the boundaries of a given subject class than at the level of a general classification. This is because, *inter alia*, the notion of a principle of division can be more sharply exemplified; e.g. there is no difficulty in seeing that, in a class History, a sub-class France (i.e. French history) is arrived at by the operation of 'dividing' history by the principle of division 'Country'; or that the sub-class 19th century is obtained by dividing by the principle of Period. In each case, we recognize the principle of division by asking ourselves what kind, or type of thing (in the context of the initial containing class) is the subclass; so France is defined as a country and 19th century is defined as a period. The situation is not quite so clear when the class we divide is not a reasonably well defined particular class, like History, but the universe of knowledge itself. This situation is now considered separately.

5.5 General classifications and special classifications

5.51 All existing general classifications make their initial division of the field of knowledge into what are loosely called 'disciplines', such as Science, History, Philosophy, Art. These are then divided into sub-disciplines such as Physics, Chemistry, Astronomy ... or, Ancient history, Medieval history ... or, Metaphysics, Epistemology ... and so on.

5.52 Disciplines are often thought of in terms of the specialisation of labour; a discipline is defined as a subject or group of subjects forming a recognised field of study, with its own special methods of enquiry, specialised workers, departments of study and training in universities and schools, specialised professional organisations, specialised information services, and so on.

5.53 A stricter and probably more accurate way of regarding disciplines is to see them as reflecting different 'forms of knowledge', or ways of looking at the phenomena of the world. The concepts and methods of enquiry of the scientist, the philosopher, the historian, the artist and so on are very different, although the phenomena they consider may be to some extent the same.

An important feature of this distinction (i.e., of disciplines reflecting different forms of knowledge) is that their concepts are discrete and quite independent of each other. For example, judgements in the fields of empirical science, moral action and aesthetics are peculiar to their respective disciplines and one cannot argue from one to the other. The implication of this for a general classification is that these at least must be regarded *a priori* as 'given' major classes.

5.54 Main classes and disciplines: the term 'main class' is an ill-defined one and there is some confusion between it and the idea of discipline.

5.541 If main classes are regarded simply as the first 'level' of division of the universe of knowledge, they still fail (in any existing scheme) to equate with true disciplines. For example, the philosophy and the history of a given phenomenon is usually subordinated to the phenomenon (Philosophy of law, history of machines); also, the treatment of one discipline by another (e.g. History of religion) is usually put with the discipline treated, whereas a strict classification by discipline would put them under the one used (i.e. all Philosophy under Philosophy, all History under History and so on).

5.542 A further confusion results from use of the term 'disciplines' in referring to what are essentially sub-disciplines. Within a given discipline, sub-disciplines may be distinguished purely on the basis of the phenomena involved, not on the basis of the way they are looked at. In empirical science, for example, such phenomena as energy and subatomic matter, atomic and molecular matter and organic matter give rise to sub-disciplines such as Physics, Chemistry and Biology; in art, such phenomena as sound, colour and three-dimensional form give rise to sub-disciplines such as Music, Painting and Sculpture.

5.542.1 It is confusing to refer to such sub-disciplines (which entail both a discipline and a phenomena to define them) as disciplines proper and perhaps the most sensible thing to do in order to avoid confusion is to call true disciplines fundamental disciplines.

5.55 Disciplines and phenomena

5.551 It should be clear from the last section (5.542) that although the disciplines reflect discrete systems of knowledge they yet share to some degree the same phenomena studied. The implication of this for a general classification is that the basic organisation of information will subordinate material on a given phenomenon to the discipline or sub-discipline from

whose viewpoint it is being regarded. So documents on the subject of the phenomenon 'Colour' for example, will not be kept together insofar as they will be assigned to the different disciplines (Physics, Art, etc.) their treatment reflects.

5.552 However, it should be recognised that there is, theoretically, a quite different way of organising a general classification. This would be to make the first division of the field of knowledge into phenomena (from subatomic particles to planetary bodies and stars, from single cells to particular organisms and particular societies, and so on) and to subordinate to each phenomenon the disciplinary aspects from which it may be treated; e.g., Colour – in Optics, in Biology, in Art, etc.; or, Food – in Agriculture, in Nutrition, in Cookery, in Economic resources, etc.; or, Water – in Chemistry, in Geology, in Biology, in Engineering, in Transport, etc.

5.553 Such an arrangement would run counter to the way we usually study things and the way most information is marketed, which reflects the division of labour by discipline. There are relatively few persons, if any, specialising in a given phenomenon from all its aspects. Indeed, such a specialised study would require a training which is at present hard to envisage.

5.554 Nevertheless, a growing number of documents do reflect a multi-disciplinary approach, although authorship of such works is usually, and not surprisingly, also multiple, as in the case of symposia. Such material poses a special problem for the older general classifications, which are sometimes called 'aspect' classifications in that their basis of arrangement is by aspect or 'discipline', not by phenomenon. This does not, however, invalidate the general correctness of the decision they all reflect, which is to treat classification by discipline as being on the whole more helpful to users. It may be noted that factual literature for children has always shown a strong tendency to concentrate on phenomena rather than discipline – e.g., The big book of trains, which considers most aspects of the railway system.

5.6 Classification within a special subject class

5.61 Whereas earlier writers on library classification (including Bliss) tended to concentrate on the problems of the overall arrangement of disciplines and sub-disciplines, for the past four decades (since Ranganathan began it in the 1930's) attention has been concentrated much more on the problems of how the phenomena within a given field are analysed and organised in detail. On the whole, the work done on this has been very successful and by the early 1960's a comprehensive and coherent theory concerning the structure of a special classification had been developed. From the late 1960's the particular problems of a general classification began to receive attention and this will be referred to briefly when we consider the main class order of the BC in Section 6.2. At this point, however, it is more fruitful to consider the structure of the classification of a given class and how such a classification is made.

5.62 Although the problems of information classification can become quite complicated, a great merit of the modern theory of library classification developed by Ranganathan and others is the simplicity and economy with which it now allows the basic structure of a classification to be described. It recognises six major features only; moreover, since in the making of a classification only one order of dealing with these features is possible, with each feature depending on the preceding ones, they should always be considered in this one particular order. To emphasise this simplicity and economy the six features are stated summarily below to give a bird's eye view and are then explained in more detail.

A bibliographic classification consists of:

5.621 A vocabulary of terms organised into broad facets;

5.622 Within each facet, terms organised into subfacets, or arrays;

5.623 A citation order for the formation of all compound classes (i.e. classes of more than one term reflecting the intersection of concepts from different facets or from different arrays within the same facet);

5.624 A filing order for the resulting classes (simple and compound);

5.625 A notation to maintain the filing order;

5.626 An alphabetical index of terms to locate them in the classification.

5.63 The introductory notes to each separate class in BC will be found to deal with these same six features in the same order. These features will now be considered in more detail.

5.7 The six main features of a library classification

In making a classification for a particular subject it is necessary to take six major steps, each one producing a major structural feature. So the following description is both a description of the classification as a system and also of the operations required in making it, including the order of their performance.

5.71 Broad facets: the vocabulary of terms, representing the classes which constitute the building blocks of the classification, is compiled by first examining samples of the current literature on the subject, both at book and at journal article level, in order to establish the types of concepts used in it. Distinguishing what these types are is done concretely by considering the relationship of each term to the subject in general. For example, if a class Social Welfare is first defined as dealing with the provision by society of aid to members in particular need, the terms found in the literature may be readily recognised as reflecting particular types of concepts implied by that definition. For example, a title 'Domiciliary aid to old persons' reflects the concept of a person in need (old persons) and a particular environment in which help is given (the home). 'Counselling service for unmarried mothers' reflects another type of person in need (unmarried mothers), and a form of aid (giving information or advice). 'Assessment of claims for unemployment benefit by self-employed persons' reflects a cause of need (unemployment), a form of aid (social insurance payments), another type of person in need (self-employed) and an administrative action arising from the operation of welfare itself – i.e., assessment of need.

5.711 The broad concepts exemplified above – Person in need, Place where aid is given, Form of aid, Cause of need ... – give rise to the facets in the subject. A facet may be defined as the total set of subclasses produced when a class is divided by a single broad principle (see Section 5.4); e.g. the Persons in need facet consists of all the terms reflecting the concept or principle of Person in need – e.g. Children, Old persons, Handicapped persons, Sick persons, the Poor, the Unemployed, and so on. The Place where aid is given facet consists of all the terms reflecting another concept e.g. Domiciliary, Institutional, at School, at Place of work, in Towns, and so on. Examples from other classes would be the geographical Place facet common to many subjects, consisting of terms like U.K., France, Scandinavia, Highlands, Lowlands, Tropics, Coastal areas, Common Market countries, etc.; the Substances facet in Chemistry and related subjects; the Documentary materials facet in Library and Information Science; the Operations facet in Agriculture, in Chemistry and in many other subjects – and this facet will have different terms according to what subject is being divided: Sowing, Harvesting, etc. in Agriculture; Analysis, Distillation, etc. in Chemistry; and so on.

5.72 Arrays (subfacets)

When the terms of the vocabulary have been sorted into their broad facets, each facet is further analysed and its terms sorted into arrays (or subfacets, as they are sometimes called). An array may be defined as the total set of subclasses produced when a class is divided by a single specific principle, so that the resulting subclasses are mutually exclusive. For example, in the class Building technology, a topic like 'High rise flats' reflects two different concepts from the same broad facet, Type of building. 'High rise' reflects the specific principle of Type of building by height and 'Flats' reflects the specific principle of Type of building by function – i.e. flats imply a building for living in. A request for information on the topic would not be answered unambiguously if the enquirer were referred simply to the documents on Types of buildings, since this would still leave in doubt whether it is located under High rise buildings or under Flats. Similarly, a topic like 'Immigrant children in primary schools' reflects two specific principles of division within the broad facet of Person taught – i.e., Person by provenance, to distinguish persons native to a country from those settling in it later, and Person by age, implied by Primary school children.

5.721 In order to meet this problem the terms in a facet are sorted into smaller sets, each reflecting a single specific principle; e.g. the Types of building by function array will consist of terms like Residences, Hospitals, Libraries and so on which reflect the specific principle of function as well as the broad principle of Type of building. Or, in Education, the Persons by age array will consist of all those terms in the broad Persons taught facet which reflect the specific principle of age, such as Children, Adolescents and Adults.

5.722 Within an array the classes are mutually exclusive and there can be no overlapping, or intersecting. Whereas a class 'High rise flats' is possible because its elements, 'High rise' and 'Flats', come from different arrays in the 'Type of building' facet: one cannot have a low rise high rise building or a primary secondary school or a native immigrant. This quality of mutual exclusiveness signals the end of the need to analyse or divide further, since we have now arrived at a point where we can define any compound class unambiguously and therefore predict confidently its location for retrieval.

5.723 The naming of arrays and facets sometimes presents problems: e.g. in a class like Government periodicals the term 'Government' reflects the notion of publisher whereas 'periodical' reflects the notion of a work issued in successive parts and designed to be continued indefinitely, as distinct from a monograph, which is a work written to stand on its own. Whereas it is easy to name the first array implied as being 'Form of document by publisher' it is not so easy to name the second array. This difficulty frequently arises where the array consists essentially of two classes only, the division being dichotomous. The term 'Immigrant' in the previous example also demonstrates this and 'Person by provenance' is not really as precise a name for the array reflected as 'Person by age' is for the term Children.

5.724 The operation of considering the exact relationship each term has to the general class and assigning it accordingly is called facet analysis, and is the fundamental operation in designing a modern library classification. A classification whose total vocabulary is organised consistently into the appropriate facets and arrays is called a faceted classification.

The importance of facet analysis rests in the fact that no clear or consistent rules for handling compound classes are possible until the terms making up such classes have first been organised into facets and arrays. These rules will now be considered.

5.73 Citation order

Most documents reflect compound subjects, such as Lighting in theatres, or Teaching arithmetic in primary schools. As we have seen, these raise the fundamental problem in linear order – i.e., under which concept do they file. The only known way of providing a predictable answer to such a question is to state which type of concept reflects the first principle of division applied and which the second, remembering that 'facet' is simply the shorthand term for 'classes derived from the application of one broad principle of division'. If division of the documents on Education has been, say, first by Person taught and second by Subject taught we can predict accurately that documents on the specific subject requested should be sought under Primary schools and not under Teaching of arithmetic.

5.731 Citation order refers to the order in which the elements of a compound class are cited when we state the class as a string of terms; e.g., if a heading in a systematic subject catalogue devoted to Building and Architecture is

Houses – Old persons – Heating systems

this reflects a citation order:

Buildings by function – Buildings by special user – Part of building

5.732 Put in another way, this reflects the division of the material on Building and Architecture by a number of principles of division – first of all by Type of building according to function, then by Type of building according to special user, then by Part of building.

5.733 Citation order is obviously an important determinant of the way the material is organised, since it determines which subjects will have their material kept together and which will have their material distributed to a greater or lesser degree. For example, the heating engineer will find material on his specialisation distributed by the citation order given above, since documents dealing with the heating of particular types of building will be subordinated to the type of building.

5.733.1 Although no one citation order is likely to please all users of a given library, if the whereabouts of any particular class of information is to be predictable, a definite citation order must be decided on and then adhered to consistently. This could be called the golden rule of library classification.

5.734 Citation order between facets

5.734.1 Ranganathan was the first classification theorist to develop an explicit and comprehensive theory for citation order. It was based on the notion of 'decreasing concreteness' – those concepts most readily received by the mind (most 'concrete') should be cited before concepts less readily received. This resulted in a 'facet formula' as it was then called reflecting five 'fundamental categories', which Ranganathan called Personality, Energy, Matter, Space and Time.

5.734.2 In the 1950's, leading on from Ranganathan's pioneer work, other theorists developed a considerably more explicit theory based on the principle of purpose or ends before means. This is often referred to as the 'standard' citation order. In any given class the objective of study, or end product, gives the primary facet – the first-cited one. The others are then cited in an order of dependence; e.g., an operation has to be performed on something and the agent of an operation must have an action to be agent of. So in a subject stated as the chain of terms:

Hospitals – Wards – Floors – Finishes

the Finishes 'serve' the Floors, which 'serve' the Wards, which 'serve' the Hospital, which serve the purpose of housing the sick. In this context (of Building and Architecture) Hospitals are the 'end product'. But in the context of the class Medicine, Hospitals are an agent of the action of therapy and care.

5.734.3 To take a more abstract example, the basic citation order of facets in Class J Education of the BC is:

Person taught – Thing taught – Teaching method

So a document on the use of visual aids in teaching arithmetic in primary schools would be classified as Primary schools (i.e. children 5-10) – Arithmetic – Visual aids. This reflects the argument that the purpose of education is to educate persons in particular skills or accomplishments. The end-product of education may be defined as a person (child, immigrant, itinerant, handicapped ... educated in a skill (reading, chemistry, leadership ...)). How they are taught and what agents (visual aids, etc.) are used to assist the process are essentially contributions to this end.

5.734.4 The standard citation order recognizes some nine main facets:

(End product)
its Types
its Parts
its Materials
its Properties
its Processes
Operations on it
Agents of action
Place
Time

and they are cited in the above order (but see Section 5.734.5 below).

5.734.41 It should be noted that the term 'process' is usually confined to the notion of an action internal to the thing being considered – e.g., the respiration of a newt – whereas the term 'operation' refers to an action performed externally on it by something – usually man, as in the dissection of a newt.

5.734.5 The application of the principles of division underlying the facets may begin at any point; e.g. in Aircraft engineering the wing is a part of an aircraft; but it too has its particular types, e.g., swept-back, and parts, e.g., tip. Similarly, an agent, like the visual aids in an earlier example, may be of a particular type, e.g., colour film, have a particular part, e.g., frame, a particular property, e.g., durability, a particular process, e.g., deterioration. Even the 'action' terms may be qualified similarly; a stage in an operation is a part of it; its speed, duration, etc. are properties of it. But whatever the point is at which the division begins, the relative order remains the same.

5.734.6 A concept belonging to any of the facets from Part onwards (in the 'formula' given at 5.734.4) may act as a specifier or 'species-maker' of another concept. For example, Timber is a term in the Materials facet of the class Construction technology. But a material may be used to define a type of structure (e.g., Timber houses, Iron bridges) and the relationship of the term has thereby changed. The subject 'Timber houses' is not the same as the subject 'Timbers for houses': in the latter case the relationship of timber is that of a material, a special component of a house; in the former it defines a type or species of house.

5.735 Citation order between arrays

The rules considered above (5.734) were developed for locating compound classes resulting from the intersection of terms from different facets. Rules are also needed to handle the compound classes which result from the intersection of terms from different arrays within the same facet – e.g. whether a work on Government periodicals goes under Government publications or Periodical publications.

5.735.1 No comprehensive principle has yet been developed for this analogous to those for facet citation order. In the latter, an important contribution, closely related to the notion of purpose, has been the notion of dependence; it is not difficult to see that an agent implies a prior action; action implies a prior patient, or recipient of action; the parts of a system imply a prior whole system, and so on. But no such comprehensive principle is available in the case of citing arrays.

5.735.2 However, a number of individual principles are available to help decide. The principle of purpose still operates to a limited degree, as when arrays reflecting function are cited before those reflecting simple properties; e.g., in the Types of buildings facet of Construction technology a compound class like High rise flats will be cited as Flats – High rise, since the first concept reflects a function (of providing a residence) and the second only a construction form.

5.735.3 The principle of significance in the context concerned sometimes gives guidance; e.g. in the Educands (persons taught) facet of Education a compound class like Blind children will be cited as Blind persons – Children, since the first concept reflects a physical disability which is more significant i.e., raises more special problems than almost any other characteristic of the educand, including age, which would otherwise be the first cited array.

5.735.4 It has been suggested that arrays derived from the use of other facets acting as specifiers (see Section 5.734.6) should always be cited after arrays enumerated especially within the facet and in the order of their facet citation order. However, this does not always lead to a helpful order and most indexers prefer to treat the situation pragmatically, citing arrays in the order that appears to give the most helpful collocation; e.g. in the Offenders facet of the Criminology class in the new BC, the types of persons derived from earlier characteristics, such as Deprived persons, Unemployed persons, persons by religion, by race, etc., are in principle cited after those enumerated especially in the Criminology class – i.e., Offenders by numbers and by type of offence, such as Persistent offenders, Petty criminals. But an exception is made for Minors and for Mentally disadvantaged persons and these are cited before the specially enumerated array. The reason for this is that in the context of criminology it is thought to be more helpful to keep together all the literature on these two particular categories of offenders.

5.735.5 Because there is no comprehensive theoretical principle yet developed, it would seem accurate to say that on the whole deciding citation order in array is largely a pragmatic business. For example, in the Persons in need facet of the Social Welfare class (Q) of the new BC a work on welfare service to immigrant women is cited as Immigrants – Women since in the context of social welfare it seems more helpful to collocate works on services to immigrants than works on services to women.

5.736 The object of citation order is purely utilitarian; it is to produce a consistent, and therefore predictable, arrangement. Of the very large numbers of ways in which it is possible to arrange documents or their representations, some are likely to be much more helpful than others. But any given order is unlikely to please all the users of the library equally well; so in choosing a particular citation order we can only hope to please most of the users. A formula like the 'standard' citation order is designed to give a reliable and easily grasped principle for arrangement in most situations. But if the local circumstances of a given library suggest a different citation order then this should be adopted if possible. The most a general classification can do in this matter is to provide alternative arrangements in a limited number of cases, where it is clear that they are likely to be preferred by a fair proportion of the libraries applying the scheme. A synthetic notation may also allow the use of alternative citation orders.

5.74 Filing order

This is the overall sequence of classes, simple and compound, reflected in the order of entries in catalogues or bibliographies or documents on shelves. It is quite distinct from citation order, which refers to the order in which the elements within a single compound class are cited. A simple example which may help one to grasp this distinction is the arrangement of the telephone directory: the citation order is Surname – Forename (i.e. these are the elements of each (personal) entry and are put down in that order), but the filing order is alphabetical. The two types of order are sometimes distinguished as horizontal (citation order) and vertical (filing order).

There are two quite distinct components in a classified filing order, and these will be considered separately.

5.741 Order in array

This refers to the order of the mutually exclusive classes within an array. There are several 'helpful orders in array' available and one of these is usually used if appropriate; for example, Chronological order, or 'Later in time', is used extensively in History, of course, but is also very useful in the Operations and Processes facets, reflecting the time sequence of the actions e.g., Preparation of soil, Sowing, Protection of crop, Harvesting, Storing ... in the Agriculture class. Other orders in array are evolutionary order, as in Biology; Geographical order, Order of complexity and Alphabetical order – of persons, for example. If there is no obviously helpful order of array, alphabetical order may be adapted so far as this is feasible.

5.742 Facet filing sequence

If all the classes to be arranged were 'simple' ones, reflecting only one facet, the most obvious first step in filing would be to file first all the classes in the primary – i.e. first-cited facet, then all the classes in the secondary – i.e. second cited – facet, and so on; e.g., if the containing class were Modern history and the citation order were Modern history – Place – Period, the filing order would be:

5.742.1 Modern history
 Great Britain (Facet 1)
 France
 Germany
 (etc.)

 15th century (Facet 2)
 16th century
 17th century
 (etc.)

5.742.2 However, if some 'compound' classes were now to be inserted into this sequence (as they are, of course, in sequences of documents or bibliographical entries) we find that the general class frequently follows the special class, e.g.

- (1) Modern history
- (2) Great Britain (general)
- (3) 17th century Great Britain
- (4) France
- (5) 16th century France
- (6) Germany
- (7) 17th century Germany

(etc.)

- (8) 15th century
- (9) 16th century
- (10) 17th century (etc.)

Here, class (3) 17th century Great Britain is a subclass (by 'intersection') of (2) Great Britain and of (10) 17th century; similarly, (5) is a subclass of (9) as well as of (4).

5.742.3 The principle of filing general-before-special appears to be expected intuitively by readers searching files; most people scanning a systematically arranged file on British history, for example, would be very surprised to find works on particular parts of Great Britain – London, say, or the Scottish lowlands – appearing before the general treatises on British history.

5.742.4 The sequence in the example not only fails to observe general-before-special, but it is also inconsistent. Class (1) comes first purely on the grounds of being most general; (3) follows (2), (5) follows (4) and so on for the same reason; yet (3) precedes (10), (5) precedes (9) and (7) precedes (10) although in each case the earlier class is a subclass (albeit a 'distributed' one) of the later.

5.742.5 The solution to this problem is to 'invert' the filing order – i.e. to file first the last-cited facet, to file second the next-to-last cited facet, and so on, the first cited facet filing last; e.g.

- (1) Modern history
- (2) 15th century (from Facet 2)
- (3) 16th century
- (4) 17th century (etc.)

- (5) Great Britain (from Facet 1)
- (6) 17th century
- (7) France
- (8) 16th century
- (9) Germany
- (10) 17th century
- (etc.)

Now, general-before-special is observed consistently e.g. (1) which is most general, files first; (6) which is a subclass of both (4) and (5) files after both of them, and so on. Another element of predictability is thereby built into the arrangement.

5.742.6 Within each facet, the filing order of arrays must also be 'inverted'. Otherwise, the inconsistency of special-before-general would reappear every time a compound occurs involving terms from more than one array of the same facet; e.g. in the Educand (person educated) facet of the class Education, we find that the citation order is (broadly-speaking – there are a number of other arrays also):

Educand – Handicap – Age – Sex

the filing order is:

- (Educands)
- (1) Female (by sex)
- (2) Male
- (3) Pre-school children (by age)
- (4) 5-11
- (etc.)

- (5) Socially handicapped (by handicap)
- (6) Mentally handicapped
- (7) Physically handicapped
- (8) Blind
- (9) Children 5-11

As can be seen, (9) which is a subclass both of (8) and (4) is subordinated to (8) because the citation order rules so, but also follows (4), albeit at a distance.

5.743 It should not be thought that inversion is an essential element in faceted classification. Its sole purpose is to maintain an order of general-before-special: there does seem to be an intuitive expectation of this order on the part of the layman and it is perhaps significant that nearly all the older schemes from DC onwards, reflect the principle unwittingly, if not always consistently (the order of the classes in 5.742.5 will be found in the DC, for example). But a number of special

faceted classifications do not invert, on the grounds that inversion is a great nuisance to explain and they suffer an inconsistent filing order as a result.

5.744 Alternative arrangements

A classification may or may not provide alternative ways of dealing with some classes. Although many libraries make some local adjustment, special to themselves, of the scheme they use, it might be argued that because the possible alternatives are so numerous and because no arrangement is likely to please all the users of a given library, it is a fruitless task to try to provide any.

However, there are a fair number of situations where it is perfectly predictable that many libraries will prefer a particular alternative – e.g. collecting all biography together or distributing much of it by subject. In such cases the extra burden imposed on a scheme by the deliberate provision of built-in alternatives would seem to be justified.

Two somewhat different situations are usually distinguished:

5.744.1 Alternative locations: these provide alternative locations for given classes, but without any change in the internal organisation of those classes, which remain exactly the same. Examples might be locating Constitutional law with Law or with Political science; locating Mineralogy with Chemistry or with Earth sciences; locating the 'favoured country' first in an array – e.g., of social security systems.

5.744.2 Alternative treatments: these provide a choice of different arrangements within particular classes; e.g. allowing the separation of literary texts from works about literature, or their collocation; allowing different citation orders between facets or arrays – e.g., in the Education class, allowing Person educated to be cited before Subject taught or *vice-versa*.

5.744.3 The provision of numerous alternatives makes the design of classification schedules and the allocation of notation somewhat more difficult. By reserving some of the notation for alternatives which will not be used the length of notation may be very slightly increased. The schedules also look more complicated until the indexer has taken the decision as to which alternative he will follow and erased the rejected ones. But libraries are more likely to get exactly what they want if they can choose between alternatives.

5.75 Notation

5.751 With the terms assigned to their facets and arrays, the citation order between them decided, and the filing order of the resulting simple and compound classes decided, all problems of the order of classes have been settled. Theoretically, every conceivable class in the system now has its unique and predictable position. But to implement this order in practice (e.g. to arrange thousands of books or catalogue entries, to have continuous removal and replacement of these whilst maintaining that order) it is necessary to add a code or notation whereby the position of each class is conveyed mechanically, without knowledge of or thinking of the conceptual relationships of that class to other classes which are the reason for it being located at that position. This is effected by assigning to each and every class, simple or compound, a class mark consisting of a symbol which possesses ordinal value – i.e. the property of conveying an order or position.

5.752 A notation is a system of ordinal symbols standing for the terms of a classification. It should always be remembered that notation is quite subsidiary to the order and in no way determines it. The class F Botany in the BC does not file before G Zoology because F precedes G in the alphabet, but because the order of organisms in the Biology class is largely a phylogenetic one and therefore plants file before animals. It is the conceptual relations which determine the order – the classmarks simply make it easier for users to locate classes after their order has been decided on grounds of helpfulness in retrieval.

For some strange reason, this fundamental point is frequently forgotten and we find such absurdities as 'decimal classification' referred to quite seriously in writings on library classification.

5.753 Functions of notation

5.753.1 Its basic function is that indicated above – to maintain the order of classes in a mechanical fashion.

5.753.2 A secondary function, often erroneously thought also to be essential is that of expressing the hierarchy of the classes – i.e. of reflecting visibly the fact that one class is a subclass of another (is subordinate to it) or is 'equal' to it (is coordinate with it).

For example:

5.753.21	5 Science	AZ Science
54	Chemistry	C Chemistry
547	Organic	CO Organic
547.4	Acyclic	CPA Acyclic

The above shows the same hierarchy of terms, in the first case with a hierarchically expressive notation and in the second case with a notation which is purely ordinal – i.e., one which performs the basic function of reflecting and maintaining order but which is non-expressive, and does not consistently reflect the hierarchy.

5.753.22 Somewhat analogous to the intuitive expectation users have that the general should precede the special, is the assumption some users have that notation should be hierarchically expressive. It is difficult to estimate what significance to attach to this, not least because there is virtually no such thing as a completely hierarchical notation. Ostensibly hierarchical notations such as those in the DC and UDC are constantly eroded by failures to express the hierarchy, due primarily to two factors. Firstly, the price in length of notation becomes intolerable if every step of the hierarchy is consistently signalled, i.e. in both the DC and UDC we find the sequence

57	Biology
59	Zoology
592	Invertebrates

The notation here is not hierarchical, of course; if it were, the last class would have at least 5 digits. Secondly, it is exceedingly difficult (and often impossible) to incorporate new topics, or expand existing ones for the obvious reason that the capacity of any given set of ordinal characters is limited in array (e.g. a pure decimal notation, as in DC, can accommodate only ten subclasses at one step; if more than ten classes need to be accommodated it can be done only by abandoning the principle.

5.753.23 A second kind of expressiveness is often distinguished; a notation which shows in any given classmark just where the terms from different facets or arrays link up is called structurally expressive; e.g., in UDC the class mark 914.2 (210.5-13) represents South coast of England in the Geography and description class. The parentheses express the fact that the notation within them is from the Place facet; the hyphen expresses the compounding of terms from two different arrays – i.e. 'coast' and 'south'.

The price paid for this sort of expressiveness is the need to reserve additional characters (perhaps of a distinctive kind, as in the example) to mark off the structural elements, with an inevitable increase in the complexity of the classmark.

5.753.24 Expressiveness in notation is undoubtedly helpful – the notation for these notes is perhaps an example, indicating clearly which argument or example is a part of a wider one. But the serious consequences it has for length and complexity of classmark, together with the fact that it is inherently unreliable, since impossible to maintain consistently, has led to the wide acceptance in modern classifications of purely ordinal notations.

5.754 Qualities of notation: two fundamental qualities are sought.

5.754.1 Hospitality is the quality whereby a notation must be able to grow. It must be able to accommodate, in the exactly correct position demanded by the theoretical principles of citation order and filing order observed in the scheme concerned, two kinds of 'new' class:

5.754.11 New concepts in the literal sense of newly developed subjects resulting from research and development, using these terms in their widest possible sense, in any given field.

5.754.111 Hospitality to really new concepts is notationally quite feasible if the notation is purely ordinal.

5.754.112 If hierarchical notation is attempted, such hospitality is often impossible unless the hierarchical principle is abandoned.

5.754.12 All possible compounds of existing classes – most of them are only potential at the time the classification is compiled.

5.754.121 It is not practicable to enumerate all these, although earlier schemes like DC and Library of Congress enumerate selected compounds on a rather arbitrary basis and have been called 'enumerative' schemes because of this.

5.754.122 The only feasible way of providing this hospitality is by synthesis in notation – i.e. classmarks are designed to allow the linking of the symbols representing classes in one facet or array to those of others; e.g., in the BC the classmark J8E represents the class Education (J) – in (8) Great Britain (E) where E comes from the Place facet (a 'common' facet) and the link is effected by the "facet indicator" 8.

5.754.123 A notation which provides comprehensively for the linking of classes from different facets and different arrays is called a faceted notation.

5.754.2 Simplicity is the quality whereby the user judges how easily he can locate the position of the class represented. A number of different factors contribute to this quality, of which three will be mentioned here.

5.754.21 The 'ordinality' of the symbols used; the ordinal value of two types of symbol (numerals, letters) is almost universally recognised. If other symbols are used, as in UDC, for example, there must be assigned an exact ordinal value – i.e. filing position – and the user must learn it;

5.754.22 The brevity of the classmark. This depends on two different factors:

5.754.221 The notational system itself; e.g., the longer the base (the number of characters available for division) the shorter the classmarks; the more expressive the notation the longer the classmarks (in particular, allocation of notation according to the amount of literature on the subject and its rate of growth is inhibited); the more synthetic the notation the longer the classmarks.

5.754.222 The material being classified and the library's policy as to specificity in index description. A collection of books, reflecting relatively broad subjects, will not require lengthy classmarks to represent their subject matter specifically, whereas a catalogue in which entries are of periodical articles would. In any collection, the specificity of notation can be regulated by a policy imposing limits on length, which may vary according to the subject class concerned.

An important consideration here is the fact that precision in retrieval (i.e., the ability to reduce a search to a relatively small subset of the total collection without overlooking too many relevant items in the process) is entirely dependent on specificity in indexing. If a book on Infrared spectra of coordination compounds is indexed only as Analysis of coordination compounds, then a request for items on the specific subject Infrared spectroscopy or Absorption spectroscopy of coordination compounds can only be met by examining a larger body of literature.

5.754.223 If a classification scheme provides for specific indexing, a given library may choose its degree of specificity. If the scheme doesn't provide for specific indexing there is no choice and libraries and indexing services requiring precision in indexing can do nothing about it.

5.754.23 The retention value of the classmark both visually and orally; long unbroken sequences of letters or numbers tend to confuse, as do shorter sequences of excessively mixed symbols.

5.755 The criteria above assume the user of the notation in visual scanning of documents on shelves, of entries in catalogues, etc. The criteria for machine manipulation are different. It is often assumed that hierarchical notation is to be preferred for computer use on the grounds that the machine is relatively indifferent to the length of code numbers and can be programmed more easily for searching broader and narrower classes if these are signalled by the code number – by assuming, for example, that a class 57 is narrowed by examining only those classes whose codes begin with 57. Two points seem relevant here.

5.755.1 Firstly, the maintenance of a fully hierarchical notation is virtually impossible in any case, because of the conceptual problems of complete modulation, in which all steps of division would need to be recognised.

5.755.2 Secondly, in the present state of the art, at least, hierarchical coding demands a masking process to effect the deletion of successive characteristics; this is a more difficult and expensive procedure in a computer than the simple addition demanded by a purely ordinal notation, e.g. 'subclasses from X to YT'.

5.755.3 On the present evidence it would seem wise, apart from taking note of certain obvious limitations on machine character sets, to allocate notation purely with a view to its maximum effectiveness in visual scanning and to assume that any problems that this raises for machine use are best left to the programmers to resolve.

5.756 A major theme in the account of notation given above is the fact that notation is the servant of the theoretical order of the classification – Bliss called it 'correlative and subsidiary'. To serve this order fully, with classmarks of maximum brevity and simplicity is the aim of notation. However, if it fails in the last task, it can have serious effects on the acceptability of the scheme. As Bliss said, the notation cannot make the scheme, but it can mar it.

5.76 The alphabetical index

A systematic arrangement of information requires an alphabetical index whereby the user, whether it be the indexer scanning the schedules, or a reader scanning the shelves or a catalogue, approaches the arrangement via the natural language – the terms used in ordinary speech and writing. The user begins with a named subject and wants to know where to begin looking for it in the classified arrangement.

5.761 Alphabetical order has been described by Metcalfe as 'known names in a known order'. The 'known order' is of course, the order of letters in the alphabet; apart from some minor problems, such as where '1984' files in such a

sequence, it undoubtedly is a known order (at least, for those familiar with any one of the languages which uses the alphabet concerned).

5.762 However, the 'known names' turn out on inspection to be a far less reliable component when it is the names of subjects or information classes we have in mind. The arrangement of the telephone directory rests as much on a universal awareness of the citation order of the elements in each entry (surname – forenames) as on awareness of the order of the alphabet. The same holds for the index to the names of the classes in a classification.

5.763 But whereas the citation order of the element in personal names is usually well known, the same cannot be said for the names of subjects. Only at the broad level of single terms, such as Chemistry, Psychology, England, is the name really known – i.e. the user of an alphabetical index knows exactly where to look for them. In the case of compound classes, there arises immediately the problem of alternative ways of expressing them – e.g. Psychology of children or Child psychology. Their name is no longer 'known' with any confidence. Subjects with several components in the description can be named in many different ways; e.g., a subject like British nineteenth century political history can be named differently not only by varying the citation order of the elements – e.g. changing it to Political history of Britain in the nineteenth century – but by varying the form of individual component words – 'British' or Great Britain or Britain.

It is clearly impossible to handle a problem of such dimensions by providing in the index all the different forms of name possible. As in the case of the classified arrangement, the central problem of the alphabetical index is the citation order of the components in each entry, and the need for some regulation of this is inescapable.

5.764 In the case of the A/Z index to the classification schedules the problem is simplified considerably when the latter are completely faceted. If the schedules list, or enumerate, only simple terms within their facets and arrays (e.g., in the Social welfare class, terms like Immigrants, Wives, Counselling) and do not enumerate compounds of these (e.g. Counselling services for immigrant wives) then at least the alphabetical index is spared the problem of providing for all the variant forms of the latter type of subject.

5.765 Nevertheless, it is still necessary to have some rules for the A/Z index to a classification schedule. The possibilities of multiplying entries are still legion; e.g. is it necessary, for the dozens of types of engineering to have entries both under the direct form, such as Electrical engineering or Mechanical engineering and the indirect form (Engineering, Electrical and Engineering, Mechanical)? The size of the A/Z index will vary greatly according to what rules are followed. What is needed is a way of controlling the production of entries in the A/Z index so that economising in the number of entries does not reduce the number of access points (measured by the number of different key words appearing at the beginning of entries) since the effectiveness of an alphabetical index relies heavily on the thoroughness with which it provides such access. The best known way of doing this is by using the methods of chain procedure, developed by Ranganathan; it could be said to make explicit and more consistent the principle underlying the Relative Index to the DC (which index, incidentally, Dewey himself regarded as a greater contribution to indexing than the classification itself). The method is explained briefly in Section 6.6.

6. THE BLISS BIBLIOGRAPHIC CLASSIFICATION (BC)

6.1 The BC is a general library classification suitable in the first place for general information collections, but possessing features which should enable specialized collections to adjust it to particular requirements.

A brief account of Edition 1 of the BC and of the changes made in Edition 2 is given in Section 3. Here, Edition 2 only is considered. This section describes the BC in terms of the structure and function of a modern classification outlined in Section 5 and it is assumed that readers are familiar with the concepts and terminology dealt with there. Practical advice on how to use the BC is given in Section 7.

6.2 Broad structure: The general problems of broad order in a general classification are considered in Section 5.5 and it is assumed that this is read before this section.

6.21 Disciplines and phenomena

6.211 Citation order

In common with other major general classifications the BC distributes the classes representing phenomena under classes representing disciplines and subdisciplines, reflecting a basic citation order of Discipline – Phenomenon. So a phenomenon like Children, for example, will be found under Medicine, Psychology, Education, Sociology, Social Welfare, Art, Morals and ethics, and so on. Similarly, a phenomenon like Form or Structure will be considered separately under Geology, Biological sciences, Social sciences, Linguistics, and so on.

6.211.1 Citation order between disciplines

Some disciplines and sub-disciplines intersect to form compound classes. But these vary in their relationships; e.g. the history of philosophy and the Philosophy of history are quite different things; there is a Chemistry of biology but the Biology of chemistry is a meaningless phrase; there are numerous applications of Mathematics to other disciplines and sub-disciplines but not vice-versa – there is no Geology of mathematics. An Economics of mathematics would presumably refer to the economics of the production and use of mathematics by humans (an economic activity), not the economics of the concepts of mathematics; that is to say, the particular phenomena with which the sub-discipline Economics is concerned are those relating to the production and consumption of human artefacts of one kind and another.

6.211.11 Theoretically, at least, a possible rule here would be to cite first the discipline applied; e.g. a Philosophy of history would be viewed as an application of philosophical method and would be treated as a sub-class of Philosophy.

6.211.12 However, Bliss, in common with the other general schemes, tended to subordinate such compounds with the discipline examined rather than the discipline being used to do the examining and this is consistent with a widely observed indexing rule that applications of one thing to another are subordinated under the latter – e.g. mathematical economics is put under Economics. Alternatives are provided for each method in the new BC.

6.211.2 Citation order between phenomena

The number of phenomena is vastly greater than the number of disciplines and sub-disciplines and the possibilities of intersection are virtually infinite. But the compounds formed by such intersection reflect a disciplinary or sub-disciplinary class and as such, are subject to the citation rules developed for classification within a special field. For example, such compounds as the Morphology of crystals, Innovations in gold mining, Gold fillings (for human teeth), Gold coins, Social change, Planned obsolescence, etc. reflect disciplinary treatments (from physical sciences, technology, medicine, etc.)

6.211.21 Relatively simple intersections – e.g. Gold mining – could conceivably remain at the level of pure phenomena – i.e. continue to be multi-disciplinary, as Gold mining might be viewed from economic, technological, human behavioural, political etc. aspects. In such cases the citation rules of the standard citation order (e.g. Thing – Action) should be both helpful and adequate.

6.212 Filing order between disciplines and phenomena

Bliss, in common with the designers of the other general classifications considered only the problem of order of disciplines and made no provision for locating the category of phenomena *per se*.

Now that such a category is being provided, and an explicit citation order has been decided between phenomena and disciplines, there is a need to apply the general rule for facet filing order considered in Section 5.742.

6.212.1 In Section 5.74 it was seen that until the level of mutually-exclusive classes in an array is reached (when no intersecting to produce compound classes is possible) filing order is a function of citation order. If a general-before-special order is sought, the order of facets in filing must be the reverse of their order in citation, and this results in an inverted, filing order. So, ideally, the filing order should consistently reflect citation order, thus allowing a simple rule for compounding the constituent classes. Assuming an inverted file, this would be by an operation of retroactive synthesis, – i.e. always citing first the class appearing latest, or lower down, in the schedule. Such a rule holds within each special class of the new BC and, clearly, the filing order between disciplines and phenomena should reflect the same rule.

6.212.2 Observing the principle of the inverted schedule in order to maintain general-before-special, this gives a basic structure:

Phenomena	
Properties:	Structure, symmetry, colour ...
Operations:	Organising, managing, planning...
Processes:	Change, adaptation, innovation...
Entities:	Particles, atoms, molecules, minerals ... communities, states ...
Disciplines	
Mathematics	
Sciences:	Physics, chemistry ... Social sciences ...
Humanities	
History	
Religion	
Arts	
etc.	

Compounding would be retroactive, the phenomena (which appear earlier in the schedule) being 'brought down' to qualify particular disciplines and sub-disciplines e.g. Science – Innovation; Physics – Colour; Arts – Innovation; Painting – Colour. This is the conceptual situation; it does not imply that the compounding will be expressed in the notation; the classmarks for phenomena will not be added synthetically to those for the disciplines to express the resulting compounds.

6.213 Filing order of disciplines and sub-disciplines

6.213.1 It was seen in Section 5.74 that the relations involved in intersecting disciplines and sub-disciplines are such that they do not allow an absolutely consistent citation order. Since filing order is partly a function of citation order, it is hardly possible to achieve a filing order between disciplines and sub-disciplines which will reflect absolutely consistently the principle of general-before-special; e.g. the intersecting of History and Philosophy can produce two quite different subjects. Not surprisingly, therefore, it cannot be claimed that the main-class order of BC possesses this kind of total consistency. However, Bliss was particularly concerned with the problems of main class order and produced what, in the light of the limitations indicated above, is probably as good a one as it is feasible to get. It combines both a clear and coherent principle, gradation-in-speciality, for the first half of the order (the natural sciences) and a careful, pragmatic order for the rest which reflects a number of broad principles which Bliss regarded as essential in a bibliographic classification. A brief resume of these is given here.

6.213.2 Collocation: by this is meant bringing together in propinquity classes which are most closely related. It is the fundamental principle of classification and the principles of citation order, filing order, etc. are designed to serve it. Collocation may refer to classes in subordination (e.g. of Psychology and Medicine to Human biology) or in coordination (e.g. Linguistics, a major social science, may be collocated with the art of Literature; Economics may be collocated with Industry and technology; a technology which is closely connected with a particular science may be collocated with it.

6.213.3 Subordination: one aspect of this (the order of decreasing extension, or general-before-special) has already been considered and is now observed carefully throughout the BC.

6.213.31 Gradation in speciality reflects another aspect of subordination, quite distinct from the class/subclass relation, and one which is a major determinant of main class order in BC. It reflects a notion held by a number of philosophers and particularly by the French philosopher Comte of the dependence of the special sciences on the general sciences. For example, Physics deals with the most fundamental phenomena – the nature of matter and energy itself. Chemistry deals with matter and energy as organized in different substances. For the explanation of chemical phenomena, the concepts of physics will often be drawn on; e.g., the valency or combining power of the elements is explicable in terms of their electronic structure. In this view, Chemistry is more 'special' than Physics. Again, Astronomy, in explaining the nature, properties and origins of astronomical bodies and systems, draws extensively on concepts from Physics and Chemistry,

such as gravity and motion and the constitution of astronomical bodies. Biology, also, uses extensively various physical and chemical concepts in explaining the nature and action of organisms – e.g. all biological responses involve chemical change. But biological concepts are not used, *vice versa*, in Physics or Chemistry.

Principle of gradation in speciality implies that “the generalization and laws of each more general science are true in some measure of all the more special sciences ... But the laws or truths of the more special sciences rarely apply to the more general sciences or solve their problems.” (*Organization of knowledge and the system of the sciences*, p. 212.) to the very process of classification, and the order of major classes by this than by any other principle; “... each science being in one sense individual and coordinate with its fellow sciences, yet in another sense subordinate to that on which it is largely derived by specialization.”

6.213.32 Gradation is a theoretical order of the sub-disciplines of science. It correlates quite strongly with another theoretical order, that of integrative levels, which has proved of considerable value in classification theory in the last decade or so and may be said to give additional point to the theory of gradation (see Classification Research Group. *Classification and information control*. London, Library Association, 1969). Integrative level theory refers to phenomena. It arranges physical entities in a sequence beginning with elementary particles or energy forms (or even, it has been suggested, mathematical structures) and proceeding through successively higher levels (atoms, molecules, molecular aggregates, minerals, mineral aggregates, land masses, celestial bodies ...) whereby at each new level new emergent properties are discernible; e.g. when hydrogen and oxygen atoms combine to form molecules of water the latter has properties not possessed by its original constituents.

6.213.33 The sub-disciplines of Physics, Chemistry, Astronomy, Biology, etc. are distinguished by the phenomena they study and the point of view they bring to bear on these. If the two sets of phenomena, one arranged by integrative levels and the other as they appear successively in the classes arranged by gradation, are set out side by side, the parallelism is striking. It is not, however, absolute – e.g. some of the phenomena with which Physics deals such as Sound, imply macro matter or bulk matter, which in terms of integrative levels is at a higher level than the atoms and molecules of Chemistry. Further differences arise due to the incorporation of the general principle of subordination in the BC; e.g. in the BC individual celestial bodies are regarded as parts of the solar system, galaxy, etc. and follow rather than precede them. These differences are relatively minor, however, compared with the similarities.

6.213.4 Consensus

As a result of a thorough examination of the many philosophical classifications of knowledge, from those of ancient Greece to those of the 19th and 20th century philosophers, Bliss concluded that there was, at a broad level, a discernible consensus regarding how knowledge should be organised, despite the enormous expansion in human knowledge over that period. He claimed that the system of knowledge reflected in this consensus was 'correlative to the persistent order of nature'. Reinforcing this consensus by a consideration of how knowledge is organised and advanced – in universities and schools, in curricula, in learned and professional societies, in career specialisation. etc. – Bliss referred to the 'scientific and educational consensus' and attempted to reflect it in the main class order of the BC.

6.213.5 The relativity of classes and classification

The consensus was not regarded as absolute; rather it was relative and temporary, in the sense that it has at different times given varying emphasis to the different forms of knowledge. This had the practical implications that a general classification should provide for the adaptation of logical order to practical convenience and to different views. This led Bliss to provide a large number of alternative treatments and locations (which in practice implies careful provision for these in the notation) and the second edition maintains this policy and even extends it.

At the level under discussion – that of broad order – such alternatives are those which allow certain technologies to be collocated with the science in which they are most closely based – e.g. Economic biology after Biology; the provision for locating Social welfare with Sociology, or moving class P (Religion, The Occult, Morals and ethics) to Z, alongside the other major imaginative disciplines of Art and literature. They can be seen best by an examination of the General Outline of the classes in Section 11

6.213.6 Science and the humanities

Gradation in speciality is essentially a theory of the order of the sciences, and the consensus was described as 'scientific and educational'. This apparent prominence given to the fundamental discipline Science is not surprising in a 20th century classification designed to meet the problem of information retrieval from stores of recorded information. It has been in science mid technology that the problem has slowed itself most acutely and it is those areas which have given the main thrust in the extraordinary proliferation of recorded information which makes such undertakings as the BC necessary.

Bliss was aware of the, claims of other disciplines and described the central view of the BC as being that of 'humanity in nature': "This combines the so-called 'naturalistic view' with the 'humanistic view'. They are closely related and complementary, the latter depending on the former." (*A Bibliographic classification* Vols. I-II, 1952, p.20.)

In considering the terminological problem of naming the classes subsequent to the natural sciences (A/G) Bliss considered that the Social Sciences and the humanities were not sufficiently well distinguished to justify these terms and preferred the comprehensive term 'Human studies' for the classes H/Z. Within these, he distinguished the 'more comprehensive and scientific' as Human sciences (Classes H/K) and the rest (Classes L/Z) as the special human studies. These contain both humanities, such as History and Religion, and social sciences, such as Political science and Economics.

6.214 Filing order of phenomena

6.214.1 The Phenomena in the BC constitute a new feature, which has not been attempted before in a general classification, although studies undertaken for the Classification Research Group in London looked closely at the problems involved. (*Classification and information control*, op. cit.)

6.214.2 These phenomena classes are designed to take that literature on a given concept (entity, attribute, process) which treats it from the viewpoint of several or all disciplines. An example would be a work on the horse, treating it from the zoological, equestrian, agricultural, military, artistic, etc. viewpoint; or, a work on Colour, treating it from the viewpoints of optics, biology, photography, painting, decoration, etc.

6.214.3 Such a literature has existed for a long time and seems to be growing, although at a relatively slow rate. Particular examples are manuals in numerous technical crafts, such as Photography, where physics, chemistry, reprographic data, aesthetic considerations, etc. are all dealt with, albeit briefly. The librarian's own field of information handling also gives numerous examples; a treatise on the Book, for example, may be very much a phenomenon-focused work, with numerous different viewpoints (authorship and literature, writing and linguistics, printing, paper technology, bibliography, etc.) making it impossible to locate satisfactorily under one particular disciplinary class. A work on housing may present viewpoints from social welfare, politics, law, economics, construction technology, planning, sociology, etc.

6.214.4 The BC takes the view that provision should be made now for the classification of such material from the phenomenon rather than the discipline view. Since the growth of such literature is not to be disputed, the sensible theory appears to make comprehensive provision for all the forms it might take – i.e. for all phenomena, not just a rather arbitrary selection based on the current situation.

6.214.5 Problems raised by the Phenomena class

6.214.51 The decision to provide a separate class of phenomena divorced from context at once raises the question of the relation of its order to the order of phenomena already present in the disciplinary classes. For example, in chemistry, in the earth sciences and in biology there are extensive bodies of entities (the most prominent form of phenomena from the point of view of the literature on them) and these are already arranged in well-developed taxonomies.

Unless a completely different and new order is to be sought for them, some parallelism with the order of phenomena found in the different disciplines would seem to be a reasonable assumption.

6.214.52 If the order of phenomena within disciplinary classes is to be utilised, some principle for extracting classes of phenomena from the latter is called for. But this immediately poses the problem of which disciplinary class is to be used for generating a particular class of phenomena. If the latter are to appear completely context-free in the new class, so as to represent multi-disciplinary treatments of a given phenomenon, it is arguable that the order should not reflect the definitions and collocations of any particular disciplinary view (e.g. the order of animals should not reflect, say, a zoological classification).

If this argument were accepted as final, the phenomena class would not only lose substantial elements of helpful order which their arrangement – in many discipline classes displays (e.g. that of animals in Zoology) but it could not be derived by a process of extraction. But since the process of extraction has obvious advantages of economy and predictability the BC will in fact use it. So the problem becomes one of deciding which of several different disciplinary classes is the most appropriate and useful for generating a particular part of the phenomena class (e.g. the individual types of animal).

6.214.53 Closely connected with the last problem is that of providing alternatives whereby a phenomenon class can be collocated with one of the disciplinary classes, rather than be isolated from any particular aspect. Because the literature on phenomena is as yet far less extensive than that of disciplinary treatments, many librarians will prefer, at least for the time being, to locate multi-disciplinary treatments of a phenomenon with that aspect of the phenomenon which gives it the most helpful collocation. The BC will provide alternatives to allow this and clearly, that aspect class which is considered to be the one most appropriate in generating the concept of the phenomenon for a separate phenomena class will also be the one to be recommended as the alternative class.

6.214.54 There is also the practical and economic problem of scheduling a large phenomena class. Ideally this would be enumerated fully in the schedules with the unique classmark for each concept attached. But this would enlarge the size of the schedules substantially and for this edition of BC at least must be regarded as a luxury not to be afforded. This means that the phenomena classes will be obtained by a synthetic process of extraction from the discipline classes. For example, if Horse in Zoology is GYH J and if the Zoology class is regarded as the disciplinary class most appropriate for generating the phenomenon class for any animal, then the resulting classmark might be 5GY HJ. This is a perfectly simple and feasible procedure so long as the classifier knows which discipline class is to yield the phenomenon concept.

6.214.55 A small problem of filing order is raised by the provision of the alternatives whereby a phenomenon class (a multi-disciplinary treatment of a concept) may be collocated with a selected mono-disciplinary class (which is, of course, necessarily more limited in scope). For example, if a multi-disciplinary study of the horse is collocated with the zoology of the horse, strict observance of the principle of general-before-special would require it to file before the purely zoological treatment:

Horse (multi-disciplinary treatment)
Zoology of horse

But the BC, like all primarily 'aspect' classifications has assigned notation on the basis of disciplinary treatments filing first in a given class; e.g. the classmark for the Horse in Zoology in the BC is GYH J. If this classmark is to take the multi-disciplinary treatments of the horse the strictly zoological treatment would need to have another classmark, to file after it; inevitably such a classmark would usually be longer. But the present position is that the disciplinary treatments far outnumber the multi-disciplinary treatments, and consequently should have the briefer classmark. It is proposed, therefore, to file the multi-disciplinary treatments immediately after the disciplinary ones, using the numeral '1' to notate it exactly (the common subdivisions in Schedule 1 begin with the number '2'):

GYH J Horse (Zoological studies, general)
GYH J1 Horse (multi-disciplinary studies)
GYH J2H Horse (Zoological studies) – Pictorial material

This small inconsistency is the price we pay for attempting the impossible (inserting phenomena into a disciplinary classification whilst maintaining general-before-special). For even if GYH J were assigned to the more general multi-disciplinary studies it would still be subordinated to the disciplinary class G Zoology.

6.214.56 A final problem is whether to provide an alternative whereby a library could develop a classification of all or some phenomena in which the phenomenon was cited before the discipline (e.g., having a special class 'The Horse' in which all aspects of the horse (zoological, equestrian, agricultural ...) were subordinated to the phenomenon Horse. It seems clear that BC would be inconsistent in view of its general policy not to provide such an alternative so it will in fact provide one.

6.214.6 The BC utilizes two principles when extracting phenomena classes from the disciplinary ones.

6.214.61 The place of unique definition is a principle, first advanced explicitly by J. Farradane which rules that for any given concept, the minimum information needed to define it is to be taken as the clue to its location. Such a definition will often approximate the dictionary definition. For example, a horse may feature as the subject of numerous disciplinary classes but as a phenomenon it is defined unambiguously as a quadruped mammal of a certain kind and by virtue of this the phenomenon class would be extracted from Zoology, since these 'essential' characteristics are biological ones. In other contexts (e.g. when the horse appears as a concept in the Sport and recreation class) further characteristics are, of course, regarded, but these are additional to the fundamental ones despite the fact that, for the purpose of the given context these further characteristics (e.g. the horse's jumping abilities) may rank as more important than taxonomic ones.

6.214.611 Unique definition may be seen as a more sharply posed aspect of a fundamental classificatory principle – that of the maximum correlation of properties. An old and well known example of this is the classifying of the whale as a mammal and not as a water-dwelling creature. The last attribute has few correlated properties – i.e. from the fact that an animal lives in the sea one can infer with confidence very few other attributes. From the former, which reflects phylogenetic and structural properties, a great many other (correlated) properties may be inferred. One gets many classifications for the price of one.

Since the principle of unique definition is likely to give us classes demonstrating the maximum correlation of properties, it is very appropriate for the task sought here, which is to establish for each phenomenon a place for documents which cover all or many of its aspects, whether the latter are usually correlated in the literature or not.

6.214.62 Because of its well-established position in scientific classification, the notion of unique definition and maximum correlation of properties is one which is particularly relevant to the natural sciences. When applied to the social sciences and humanities an essential ingredient in unique definition is that of purpose. Human activities reflect human purposes and human artefacts serve these purposes. This is so whether the artefacts are material or immaterial (Barbara

Kyle called these 'mentefacts'). Any attempts to define uniquely these activities and entities must take purpose into account. The action-agent relationship already prominent in the citation orders discussed in Section 5.73 will determine the location of most, if not all, these artefacts. For example, Computers are uniquely definable in terms of data-processing and serve the activity of communication (taking this in its broadest sense). The State, law courts, banks, serve political, legal and economic activities and reflect those fundamental human purposes.

It may be noted here that the greatest concentration of purpose-defined artefacts occurs in the Technology class (U). Technology (which Bliss regarded as a social anthropologist might regard it, as a social science) reflects the process whereby society establishes its material culture and purpose is implicit in all its classes. Roads and aircraft, for example, serve transport services; turbines and generators serve energy control; weapons serve military processes, sewers serve public health services.

6.214.621 A particular problem is raised by a limited number of concepts which could be said to make their first appearance in biology (human biology usually) where, it might be argued, they are uniquely defined. These concepts reflect basic human needs such as food, clothing, shelter, etc. Food is essentially an input to a biological system and might be thought to be uniquely defined as such. Shelter, as a form of controlled environment, might also be defined as a biological need. But clothing can be so defined with less confidence. The Patagonians Darwin encountered dwelt in a harsh climate, yet wore no clothes. The latter are not biologically necessary, it would seem. Further characteristics are necessary even for a minimum definition and these characteristics are cultural. In this light, locating comprehensive works on food at Nutrition seems less obviously the correct solution; the production and consumption of food certainly carries substantial cultural overtones (of ritual, sociability, pleasure, arts of preparation, and so on). To locate comprehensive works at so narrow a class as Nutrition would be almost as unattractive a collocation as that of clothing and costume at the class 'Maintenance of body temperature'. It would seem that in such cases, a more helpful collocation would be secured by regarding such phenomena also as elements of material culture and to locate them with the activities which produce them in Technology. It is worth noting that Bliss's principle of gradation placed Anthropology (in the widest sense as the total study of man) as a derivative of Zoology and consequently of Biology; so theoretically at least, the biological implications of these subjects are not completely ignored.

6.214.7 Most of the examples in the sections above have been of entities – i.e. things as distinct from activities or attributes. The last two large categories of phenomena raise similar problems. In the case of such attributes as symmetry, rhythm, form, etc., the fundamental concept is a highly abstract one; their location in Physics, with such concepts as space, position, etc. would seem to be as inappropriate as that of clothing and costume in Biology. But in this case there is no human artefacts class to take them. It would seem that in these cases, their separate location in the Phenomena class is preferable to any attempt to force them into an unreceptive disciplinary framework.

In the case of operations reflecting human action, purpose again would seem to offer a principle. The development in recent years of a number of fundamental phenomena studies, such as Systems theory and cybernetics facilitates this exercise. Activities like Management, which originally developed with a strong disciplinary bias (towards the management of business enterprises in this case) can now appear as completely general ones.

6.214.8 In Section 6.214.5 above it was stated that BC will not enumerate the phenomena but derive them with the help of notational synthesis. There is one prominent exception to this rule. The large class of phenomena made up by human knowledge and information, and its communication, appears as the first class (at 7/9). Bliss had originally provided a place for library and information science and related subjects at Class 2 and his reasoning in putting them there (an example of collocation for practical needs) has strong arguments in its favour. The degree to which the different disciplines and subdisciplines in the world of communication interact and lean on each other, as well as the fact that this whole classification is essentially an instrument of communication, would seem to justify the establishment of this 'phenomenon' class at the beginning of the scheme. Its scope can be seen from the detailed Outline of the whole BC in Section 11.

6.22 Alternatives at main class level.

6.221 As stated above, the alternatives provided in the treatment of disciplines as compared with phenomena are three:

complete separation of multi-disciplinary treatments of phenomena in Phenomena classes whilst subordinating those treated from a particular disciplinary viewpoint to the discipline;

collocation of phenomena classes with the most appropriate disciplinary class in X/Z;

collocation of all aspects of phenomena at the Phenomenon class in 4/9, leaving under the discipline classes only their general works.

6.222 Within the disciplinary classes there are numerous alternatives whereby a class may be collocated with one or another discipline or sub-discipline. Mention has already been made in Section 6.211.12 of how a given discipline, such as Philosophy or History may have collocated it all subjects treated from that disciplinary view; e.g. Philosophy may take the philosophy of all special subjects – of History, of Science, of Politics, etc.

The full range of these alternatives may be seen by examining the detailed Outline. Examples are: strongly science-based technologies (nuclear and electronic technology, chemical technology and materials science, etc.) may go with the science (in Physics, Chemistry, etc.) or in the Technology class (U). Human geography may go with Geography in general (DT) or with the special aspect (Social geography, Historical geography, etc.). Social psychology may go with Psychology (1) or Sociology (K). Religion may go with the Social sciences (in P) or at Z, after another major humanities discipline (Art and literature). Legal branches of political science (e.g. Constitutional or International law) may go with Law or with Political science.

6.3 Order within main classes

Sections 5.6 and 5.7 give a brief account of the structure of a given class and how schedules for a class are designed. Each and every class in BC demonstrates the full and consistent application of the methodology described in those sections, so in one sense, to describe the structure of one class in BC is to describe them all in principle.

This section is exactly parallel with section 5.7, taking the same six main features of a class in the same necessary order in which each feature develops from the preceding one. The introduction to each separate class also uses the same features in the same order.

6.31 Broad facets

Each class has its vocabulary organised in the first place into broad facets. For example, Class J Education recognizes such facets as Educands (the persons taught), Subjects taught, Method of teaching, etc. Class P Religion recognizes such facets as Religious systems, Religious practices, Systematic theology, etc. Class C Chemistry recognizes such facets as Substances, Components and structures of substances, Reactions, Operations on substances (i.e. practical and analytical chemistry), etc. These facets reflect various relations in the class; e.g. they may reflect the relationship of an End-product in the class (e.g. educands are the 'end-product' in Education); or a Part (e.g. atoms, electrons, surfaces, etc. are parts of a chemical substance; legislatures, executives, parties, etc. are parts of a political system); or an Action (e.g. analysis is an action performed on a substance, teaching is an action performed on an educand); or an Agent of actions or processes (e.g. agricultural implements, buildings, etc. are agents of agricultural operations; civil services, etc. are agents of operations in public administration). Every term in the vocabulary of every class is assigned to an explicitly named facet.

6.32 Arrays

Within every facet of every class, the terms are organised into separate arrays, each of which reflects one specific principle of division, i.e. one which generates mutually exclusive classes. For example, in the Educands facet of Education persons by age (child, adolescent ...), are distinguished from persons by physical disability (deaf ...) or by sex. Or, within the facet of Place (a 'common' facet which may be applied to any subject if need be) are found arrays based on political unit (Denmark, Sweden, USSR ...), altitude (highland, lowland ...), latitude (tropics, temperate zones ...), military groupings (NATO ...) and so on. Because the classes within an array are mutually exclusive, no intersection is possible – e.g. one will never need to recognize a class such as high low land, or teenagers aged 5-11.

6.33 Citation order

Every class has an explicit citation order covering compounds of terms, both from different facets and from different arrays. So far as is possible the citation order between facets observes the 'standard' citation order (see Section 5.73); e.g. in Chemistry (Class C) the primary facet (the first-cited one) is Types of substances, the secondary facet is Parts and structures of substances, the tertiary facet is Processes and reactions, the fourth is Operations, and so on.. In Biology, the primary facet is Types of organism, the secondary facet is Parts, organs and systems within organisms, the tertiary facet is the Processes facet (giving concepts such as Physiology, Pathology, Developmental biology ...) and the last is an Operations and Agents facet of investigative actions and their instruments, etc. In the Social welfare class (Q) the facets in citation order are the Persons in need (recipients of welfare action), Causes of need, Welfare action received, Method and procedures in welfare action (i.e. social work).

All of these reflect a consistent application of principles of division which first divides the initial main class into its products or whole systems studied, then successively into their sub-systems or parts, their processes or internal behaviour, the operations performed in or on them, agents of these actions, and so on.

6.331 It is not claimed that the standard citation order always produces the best arrangement – only that for a general classification it probably comes nearest to the ideal of a principle giving a reasonably helpful and predictable order in virtually all classes. That is why it is called the standard citation order. Inevitably, on a number of occasions it produces an order which offends what Bliss would call the consensus of opinion and is therefore modified. A prominent example is Class H Medicine in which an action term (e.g. Surgery) may be cited before the thing on which it acts (e.g. Brain) or a process term (e.g. Pathology) may be cited before the system displaying the process (e.g. Skin).

6.332 As was explained in Section 5.734.5 the operation of dividing classes in the above way may begin at any point. For example, in Class Q Social welfare, Organisations and agencies (QC) represent part of the Agents facet (which comes well down in the overall citation order). But Organisations themselves are divided into their Types (e.g. Voluntary bodies), their Parts (e.g. Departments), Operations on them (e.g. Administration) and so on.

6.333 Citation order between arrays

It was stated in Section 5.735 that there is as yet no comprehensive theoretical principle governing this. As a result, deciding which citation order between arrays to follow is largely a pragmatic matter.

Each of the separate principles mentioned there (purpose, significance in the context, enumerated arrays to be cited before synthetically derived ones) is observed in the BC, but is modified if the local situation seems to warrant it. All the examples in 5.735.5 were also taken from the new BC. No attempt has been made to list these array citation orders separately because in all cases the filing order indicates clearly the intended citation order – i.e. the class appearing lowest in the schedule is cited first (see Section 5.742).

6.34 Filing order

6.341 In array: classes in the same array are arranged systematically where there is a clearly helpful order available; e.g. in the Persons in need facet of Social welfare (QG/QS) the array based on age is arranged by evolutionary order – i.e. one of increasing age.

6.342 Facet filing sequence: every class in BC reflects an 'inverted' facet filing order – i.e. the primary facet files last, the secondary facet next to last, and so on; e.g. in Education, the Educands facet is the primary facet but files last (QL/QV). Within each facet the different arrays also file in an order which is the opposite of their citation order. The reasons for this are given in Section 5.742.

6.343 Hierarchical relations are shown in the filing order by indentation within each facet. Since there is no subordination of one facet to another (except in the case of compound classes, which are not enumerated in the BC) all facets begin in alignment; e.g.

JB	Educational administration
JF	Educational performance
JFB	Measurement and testing
JFC	Measurement
JFD	Tests, in general
JFE	Construction of tests and scales

Because the notation is purely ordinal and does not necessarily express the hierarchical relations between the classes it represents, the symbolism of indentation to indicate class-inclusion (subordination) is strictly observed. At the top of each new page or column enough of the hierarchy is repeated in 'carry over' lines to indicate clearly the hierarchical status of the first class (and therefore of the rest) of the new page or column.

6.344 Alternatives within main classes

These are far too numerous to list separately and only a few examples will be given here to indicate the range of different situations to be found. In Class J Education the preferred citation order is very broadly: Person taught – Subject taught – Method of teaching. Alternatives are provided whereby the Subject taught, or the Method of teaching, is made the primary facet. In Class W/Y Literature extensive alternatives are offered in the citation order as between Period, Form and Author and on the question whether works about a writer should file with the texts of the works by that writer. Similar alternatives are offered in Class P Religion, where texts of the Bible for example, may be arranged in different ways relative to the treatment of works about them. An example of a very specific alternative in citation order for one array is found in Class Q Social welfare where documents on fostered or adopted children with special needs (e.g. handicapped) may be subordinated to the special need (in QM) or to the welfare action of fostering (QLL) or adoption (QLM).

An example of simple alternative location, without affecting the internal arrangement of the class concerned, is to locate Islam at PV in its correct position in the chronological order of major religions or at PK in collocation with other Eastern religions and with Judaism.

6.4 Notation (see Section 5.75 for a general discussion of this).

The BC notation consists of capital letters A/Z and arable numerals 1/9, the latter having a filing order lower than the former – i.e. numerals file before letters. At the level of broad order, the numerals are used for the Generalia classes (of disciplines and of phenomena) and the letters for the disciplines and subdisciplines themselves (see outline of the BC

in Section 11). Within each class, the numerals usually introduce subsidiary and common facets and the letters both subsidiary and major facets.

If a policy of multiple subject entry is followed in the catalogue a hyphen is also used to link the component classmarks (see Section 7.62). Its filing value lies after numerals and before letters.

6.41 Functions

It is a purely ordinal notation; it makes no claim to express hierarchical relations but concentrates on maintaining the carefully determined sequence of classes with classmarks of maximum brevity and simplicity. It does nevertheless express hierarchy to a limited degree, but relies on the careful indentation and display in the schedules to convey clearly to the indexer the full hierarchical relations involved.

6.42 Qualities of the BC notation

6.421 A major quality is its ability to show compound classes, which is the major technical problem in notation; compounds may arise between elements from different facets, from different arrays in the same facet, or between different (main) classes.

6.422 To meet the problem fully, BC provides a faceted, synthetic notation. The schedules do not usually attempt to enumerate compound classes within a class but rely on the notation to represent accurately all possible compound classes by synthesis. This means that the elements from the different facets and arrays making up the index description which summarizes the information content of a document are brought together in the order prescribed by the rules for citation order. For example, in Education (Class J):

Audio-visual aids is JJN
Biology (in the curriculum) is JKQ
Secondary education is JN

and from these elements compound classes may be built (synthesized):

Biology teaching – Audio-visual aids JKQ JN
Secondary education – Audio-visual aids JNJ N
Secondary education – Biology teaching – Audio-visual aids JNK QJN

It may be noted here that virtually all classifications, general or special, use some degree of synthesis. The BC takes the process to a logical and practical conclusion.

6.422.1 The chief method used in synthesis is that of retroactive notation; e.g. in Education (Class J) the class Secondary education begins at JN; its first enumerated subclasses (i.e., the subclasses peculiar to the class in question, Secondary education, and whose notation is provided ready-made and not built by synthesis) are:

JNM For students with minimum schooling
JNN Lower school, 11-13 years
(etc.)

All the earlier classmarks ('divisions') – JNA/JNL – are reserved so as to be available for the direct addition of all preceding facets or arrays; e.g.

J	Education
JC	School administration
JIB	Teaching aids
JIE	Audio-visual aids
JK	Curriculum
JN	Secondary education
JNC	School administration
JNIB	Teaching aids
JNIE	Audio-visual aids
JNK	Curriculum

All these file before the first enumerated subclass at JNM. As can be seen terms from an earlier facet may be added directly to a lower term, dropping the initial letter 'J'. Because the schedule is an inverted one, all compound classes are arrived at by a process of building backwards – hence the term 'retroactive'.

6.422.11 In the case of compounding terms from different arrays within the same facet (most easily thought of, notationally, as being divisions of the same 2-letter classmark), it is usual to drop the first two letters; e.g.,

J	Education
JC	Administration of schools, etc.

JCC	Building and equipment (together)	
JCC J	Mobile	
JCD	Buildings	
JCD L	Functional spaces, rooms	
JCL	Recreational facilities	
JCL BT	Inspection	(from an earlier facet, <u>JBT</u>)
JCL CJ	Mobile facilities	
JCL DL	Rooms for recreation	

Whereas the compound with another facet drops only the initial 'J' (to give JCL BT), a compound with another array drops the initial 'J' and 'C' (to give JCL CJ etc.).

6.422.12 It is not difficult to see that as progressively higher valued letters are needed for divisions (subclasses) the greater is the number of letters which have to be reserved for retroactive combination and consequently the fewer left for the enumeration of divisions special to the class concerned.

For example, in Class J the letters JV are for special educands (Disadvantaged persons, Handicapped persons, etc.). These classes will require qualification by all the preceding facets (JC School administration, JJ Teaching methods, JK Curriculum, etc.) and many preceding arrays (e.g. PM Primary education, PN Secondary education). If all the letters A/U are reserved so that these earlier facets and arrays (JA ... JU) can be added directly very few letters are left to take the particular types of special person constituting the enumerated subclasses special to class JV.

A common solution to the problem is to use an intercalating symbol (called the intercalator) to act as an explicit facet indicator introducing these earlier facets and arrays and thereby release far more of the alphabet for the special enumerated divisions; e.g.,

JV	Exceptional persons
JVA	* <u>Add</u> to JVA letters A/U following J in JA/JU – e.g. JVA C Administration of schools for special persons (from <u>JC</u>)
JVB	Special socio-economic classes (e.g. elites)
JVC	Special religious groups
JVD	Disadvantaged persons
JVG	Socially handicapped

Here the 'A' is the intercalator which introduces the preceding facets (JA, JB, JC ...) and enumeration of types of exceptional persons begins at JVB.

6.422.13 The BC uses retroactive notation in a flexible manner and the 'pure' retroactive procedure shown above is not always maintained. It is described in detail for the practical indexer in Section 7.4.

6.422.2 Another method of compounding facets is by the addition of terms from the Common Subdivisions (see Auxiliary Schedule 1 in Section 10). These represent facets common to many subjects and applicable wherever called for at the discretion of the indexer. They all begin with numerals and can therefore be added direct to any literal classmark without ambiguity; e.g., J3H Serial publications on education; JJ3 H Serial publications on teaching aids; JN6 C Research into secondary education.

6.422.3 A particular provision in the Schedule 1 Common Subdivisions (see Section 10) allows terms from different main classes to be compounded; e.g., Influence of technology on the development of teaching aids JIB 9JU.

6.422.4 Another method of compounding is by explicit provision in the schedule with an instruction on how to apply it, e.g.,

PX	The Occult
PXF	Astrology
PXF N/T	(Special functions)
	* <u>Add</u> to PXF letters N/T following PX in PXN/PXT – e.g. Fortune telling by astrology PXF PQ

Here, the later class PXP Q Fortune telling is added (as an alternative) to the class Astrology (the fact that it was an alternative had already been stated).

6.423 Allied to the problem of being hospitable to all possible compound classes is that of accommodating new topics as they arise. Assuming that the theoretical principles of the BC can decide accurately where a new topic should go, the notational problem is to represent it by a classmark which locates it at that exact point. To do this the notation must allow intercalation within any sequence of classes or extrapolation at the end or at the beginning of the sequence. The first two demands are met by the radix fraction principle; i.e. letters, like numerals may be used to 'divide' each other indefinitely, so between any two classmarks (AZ and B, say) one can insert an infinite number of further divisions (AZA, AZB ... AZZ,

AZZA ...). However, nothing can be inserted before A (or 1, if the zero is not used – and it has not so far been used in BC). So in allocating notation care is generally taken never to end with 'A' or with '1'. In his original allocation of notation, Bliss was not always scrupulous on this point, but fortunately, at the broad level in which he was mainly operating, little harm was done and a striking example of the general hospitality of the notation has been the insertion at the beginning of the main class order of a number of major 'new' classes, based on the fact that numbers file before letters.

6.423.1 A considerable advantage enjoyed by the purely ordinal notation is that when inserting new topics one does not have to worry about the 'expressiveness' of the classmark used. BC can more easily accommodate new topics as they arise, in the place logically demanded by them, because it is not handicapped by a vain attempt to reflect the hierarchy.

6.424 If hospitality to new classes (whether compounds of existing elements or really new ones) is an essential and absolute quality of notation, simplicity is a quality in which degrees are possible. The BC aims at a notation of maximum simplicity compatible with the performance of its function of providing exact ('specific') representations of index descriptions.

6.424.1 It uses only numerals and letters, of which the ordinal values are already well known – i.e., it avoids arbitrary symbols.

6.424.2 It utilizes a number of features tending to shorten the length of classmarks:

6.424.21 Its base is long, consisting of 1/9, A/Z. This gives 35 sub classes at each step of division.

Using just two characters, this gives a theoretical maximum of 1225 classes (11/ZZ) which may be compared, say, with the hundred classes given by two characters in a purely decimal notation.

6.424.22 It does not seek to be expressive; a brief example of the boost this gives to brevity was given in Section 5.753.21.

6.424.23 It was carefully allocated initially by Bliss with regard to 'literary warrant' in the sense that classes on which there is a large literature or which are dynamic and tend to proliferate subclasses are given more space, notationally speaking.

6.424.24 As a result, in view of the precision with which it can represent very specific subjects, the BC notation is exceptionally brief.

6.424.25 The synthetic quality, implying the repetitive use of the same symbols for certain concepts gives a slight mnemonic quality to many classmarks. This is particularly the case where Common subdivisions are used. The coincidence of the initial or last component letter in a classmark being the initial of the name of the class (e.g. PHM Mithraism; C Chemistry; UA Agriculture) gives a mildly mnemonic quality to a few specific classes.

6.5 The alphabetical index

The brief account (Section 5.76) of the central problem posed by this referred to the need for consistent rules if reasonable economy is to be effected without the loss of access which results from key words not appearing in the first position.

6.51 Each separately published class or set of classes in BC has its own A/Z index and it is planned to produce a consolidated version when all classes have been published. These indexes are all constructed by chain procedure which is best explained by a practical demonstration. The following are extracted from a section of schedule in Class P Religion and show the full hierarchy whereby the class Obedience is arrived at:

PD	Practice of religion, religious activities, devotional religion
PE	(Types of religious activity)
PEW	Personal devotion, non-formal devotional activities
PEW Y	Submissions
PEX L	Holy Orders
PFX M	Vows
PFX O	Obedience

6.52 From this are derived a number of entries for the A/Z index. Each line (representing a class in the hierarchy) is considered as a candidate for a key word, i.e. a name providing access to a user by being filed in the front position of an entry; if a term is not in the front position it hasn't been indexed. If the term indexed may appear (in Class P) in contexts other than the one here, it is qualified by the most appropriate term or terms from above (which terms represent the broader classes of which the term concerned is a subclass).

This procedure gives the following entries (listed here in the order in which the indexer derived them so that the method is made clearer; in the index they file alphabetically, of course):

Practice of religion	PD
Religious activities	PD
Devotional religion	PD
Personal devotions	PEW
Submissions (religion)	PEW Y
Holy Orders	PEX L
Vows (Holy Orders)	PEX M
Obedience (Vows, Holy Orders)	PEX O

6.53 The golden rule is that a term is not qualified by one of its subclasses (by a term below it in the chain, which was Ranganathan's name for a series of terms where each one is subordinate to the one in front of it), so there are no entries for

Devotions, Personal	PEW
or for	
Holy Orders, Vows	PEX M

This is because the division of a class into its subclasses is the function of the classified order and need not be duplicated in the A/Z index. An indexer wanting the classmark for 'Vows' and looking under 'Holy Orders' would be directed to PEX L – not exactly the place he wanted, but on the way to it. To get the exact classmark the specific subject must be looked for.

6.54 A second and important function of the A/Z order is to reveal the degree to which a given class is distributed by the classification (hence the term 'relative index' used by Dewey). For example, the A/Z index to Class P reveals that the class 'Obligation' also occurs under Morals and ethics at PYM R. The consistent bringing to the front of the specific terms assists this function.

7. HOW TO USE THE BC

Note Sections 7.448 - 7.454 below are shown as amended by the Bliss Classification Bulletin, vol.VI, no3, 1978

7.1 Practical classification

To arrange a library in the clear and helpful order provided by the BC each document or item must be assigned to its specific class, and its membership of that class and its position relative to all other classes marked clearly by giving it the appropriate classmark.

The essential steps can be summarized fairly easily:

7.11 Concept analysis stage

The information in the document must be summarized by a set of terms, or key words.

7.12 Translation stage

7.121 The terms of the summarization must be put into an order reflecting BC citation order, each term representing a qualification of the preceding term.

7.122 The class mark for the specific class reached must be assigned, usually with the aid of synthesis (classmark building).

7.123 If the document represents the first item the library has received on its specific class, any new terms involved must be added to the A/Z subject index and if the library maintains an authority file, additional entries for this must be made.

7.13 Before considering these steps in detail a few assumptions should be made explicit.

7.131 It is sometimes said that the first rule of practical classification is to place an item where it will be most useful. This rule suffers the drawback of inviting subjective and therefore unpredictable judgements as to what features of the document are to be regarded when classifying it (for example, the particular type of reader it might be bought for, the author's purpose in writing it).

For a general collection (which these notes will assume unless otherwise stated) a more reliable first rule is to classify a document strictly by its information content. This was the view of W.S. Merrill, whose book *Code for classifiers* (2nd ed. Chicago, American Library Association, 1939) has long been a standard guide on the subject. Merrill states in his first principle:

"Class a book where it will be permanently useful, not where it may serve only a temporary need ... the purpose of classification is not to place the book where it may be looked for but where the matter in it may be looked for. The author catalog, and to some extent the subject catalog, are made for the purpose of finding the book; classification is concerned exclusively with its contents."

Although the contents of some documents – e.g. in imaginary literature or in music – are not classified by subject but by other features such as language or form or author, the basic problem (which facet shall be taken first, second, etc. ...?) is unchanged. So content will henceforth be treated as subject content.

7.132 In some catalogues and bibliographies a document may be classified in several different ways, each one getting a separate entry under a different classmark. The normal practice of pre-coordinate indexes is to make, in the great majority of cases, a single entry only, one reflecting a summarization of its subject content. These notes will assume this last method and alternative procedures will be considered separately, in Section 7.62.

7.14 Classification by specific subject is assumed. Some libraries pursue policies of relatively broad classification, in which a maximum length of classmark (usually somewhat arbitrarily fixed) is observed. This practice is considered separately in Section 7.46.

7.2 Concept analysis: how to decide the subject of a document

This should be done with maximum economy of time and if a document can be dealt with satisfactorily simply by noting its title and checking quickly that it is an accurate summary description of the subject, so much the better.

However, the document may have to be examined at greater length and in such cases a number of possible clues should be considered in deciding what the subject is.

7.21 The author: most technical studies in any field are written by persons professionally concerned with the subject; their qualifications and experience are often a good guide in deciding which discipline or sub-discipline a work belongs to.

7.22 The title (and sub-title, if there is one) is often, in factual literature a concise and reliable statement of a book's subject. But this should never be assumed, always carefully checked. The title of the series to which an item may belong is often a useful clue also.

7.23 If an abstract is included this will often be a useful summary of the chief features of the document's content. This is not, however, the same as a summarization, in which the classifier eschews all information not entering into the description of the main overall theme of the document.

7.24 Other features providing summaries of a kind are the contents table of books, prefaces or introductions, and publishers' blurbs (so long as they are treated with caution).

7.25 Bibliographies and citations of sources used by the author way provide clues.

7.26 Information from published indexes and bibliographies may help, although headings, etc. in these are frequently not precise enough to reveal a full summarization. An exception here is made by the PRECIS strings appearing in the *British National Bibliography*. Although sometimes idiosyncratic in their analyses, these strings are arrived at by procedures closely analogous to those of facet analysis. PRECIS is theoretically a neutral language of summarization; although there are admitted instances where analysis is distorted in order to match a particular situation in the Dewey Decimal Classification used by BNB, it can serve as a reliable analysis for translation into BC.

7.27 All the above sources may perform a timesaving role in that they save the classifier the task of examining the detailed text of the document by revealing salient facts less readily apparent in the full text. But in some cases the text proper has to be consulted in detail.

7.28 The end product of the concept analysis stage is a summarization of the overall theme of the document in the form of a string of terms or key words (for a definition of summarization see Section 4.61). For example, History – Great Britain – 19th century; Economics – Labour – Migrants; Ethyl-alcohol – Distillation – Fractional.

7.281 It is important that no ambiguities in relationship are left in the summarization; e.g. a document on Research in training for social work would be imperfectly summarized by a simple setting down of the bare terms

Research – Training – Social work

These could represent at least three quite different subjects:

Research into training of social workers.

Practise of research as an element in the training of social workers.

Use of current research reports and findings in the training of social workers.

7.282 The summarization should make clear what the relations are and this can be done either by adding prepositions, etc. as in the natural language, or sometimes simply by making the facet relations more explicit; e.g. if the second of the three possible subjects above were in fact the correct one it could be given unambiguously in the form

Social workers – Training – Curriculum – Practical research.

7.283 This to some extent anticipates the next step of procedure (translating the summarization term into an ordered chain, reflecting citation order) and it is the case that the experienced classifier tends to get into the habit of incorporating his awareness of citation order into his statement of the summarization.

7.284 This example should also demonstrate once more the fundamental need in practical classification to be able to recognize relationships. And once again it can be seen how familiarity with the operation of facet analysis is essential to the intelligent application of any classification scheme, including the BC.

7.3 Translation into the BC language

7.31 The summarization resulting from concept analysis is neutral with respect to any given classification. In the translation stage it becomes an index description in a particular index language – that of the BC. This obviously calls for a familiarity with the general structure and rules of the BC. This may be gained by reading Section 6, by consulting the Outlines of the scheme in Section 11, and by practical use of the scheme.

7.32 Deciding between alternatives

7.321 It is important that the user realizes at the outset that the BC language can often provide several alternative index descriptions corresponding to a particular summarization. When applying BC to a particular collection, of course, these variations in description (and hence in location) cannot be tolerated; as Ranganathan put it, there can be no synonyms in the classificatory language. Therefore, the very first step in applying BC is to decide which of the various alternatives are going to be used (in practice this might be done as the indexer comes to each class concerned).

7.322 All the examples which follow assume that the classifier has, for the class in question, examined all the alternatives in it, decided which ones give the order best suited to the library and then deleted from the schedule the rejected ones. This deletion should be done clearly by crossing out all sections, instructions and examples which do not apply. It will be found that this simplifies the appearance of many classes and makes subsequent classification much easier. It may be noted here that in small-scale tests in which classification by BC has been tried, the need to distinguish and choose from alternatives may give a distorted impression of the time taken to classify by BC, since in practice it is a once-for-all operation. Once decided, it is no longer a factor.

7.33 Producing the chain of a class: this is the first of the three steps in the translation stage. The BC citation order is applied to the string of terms in the summarization which, when arranged in a sequence reflecting that order, constitutes a chain – e.g.

History – Great Britain – 19th century

A chain is a string of terms in successive subordination – i.e. each one is subordinate to the term preceding it. It has already been emphasized (Section 4.63) that a central feature of the classified index, and indeed of any pre-coordinate index, is that of subordination (sometimes loosely called 'hierarchy'). The heading or index description, which both summarizes a document's subject and locates its class relative to all the other classes, reflects this. For example, the chain above implies that History is the primary class, British history is a subclass and 19th century British history a further subclass. Read in reverse, 19th century British history is subordinate to the preceding step British history which in turn is subordinate to History, or, a chain

Chemistry – Technology – Ethyl alcohol – Distillation – Fractional

implies that Fractional distillation of ethyl alcohol is subordinate to Distillation of ethyl alcohol ... and so on.

7.331 Basic features of citation order

Although the summary list of facets given in the Introduction to each class may be used in the questioning process described below (Section 7.352), a sound grasp of the basic, recurrent elements of citation order in BC will be of great help to the classifier in developing rapidly the summarization chain. Indeed, after some practice it will be found that the translation step is often minimal, the summarization string already being in correct citation order because of the classifier's familiarity with the latter.

The following summary of salient orders in the BC is designed to help achieve this familiarity.

7.331.1 A type of anything is cited before its parts:

e.g. Primary schools – Classes;
Methodist Church – Assembly.

7.331.2 A thing acted on ('patient') is cited before the action:

e.g. Immigrants – Counselling;
Ethyl alcohol – Distillation.

This is a major rule, featuring in a large number of compound classes. It takes a number of special forms, all of them prominent in indexing; these include the influence or effect relation which, although usually given primarily as a phase relation (see Section 7.344) can also operate between facets or arrays; also, the rule which cites the application of one thing to another as: Recipient of application – Thing applied.

7.331.3 An action or process is cited before an agent of that action or process:

e.g. Information retrieval – Computers in;
Social work – by students;
Pier erosion – by sea water.

'Agent' means any kind of instrument performing or assisting an action; it may consist of a tool or instrument in the popular sense, or a person or organisation ('agency') or method or technique.

7.331.4 Types or parts of things are cited before the material of which made:

- e.g. Houses – Soft woods for;
Houses – Staircases – Soft woods for.

7.331.5 Anything (concrete, abstract, entity, activity) cites before its properties:

- e.g. Tests – Reliability;
Soft woods – Load strength.

7.331.6 Terms from the Common Auxiliary schedules are cited after terms from the schedules proper. The most notable facets here are Place, Period and Form, cited in that order:

- e.g. Engineering Germany – 19th century;
Engineering – 19th century – Essays.

7.331.61 In some subjects, especially the social sciences and humanities, Place and Time often define societies or cultures or styles and in such cases may be cited much earlier than 7.331.6 suggests – sometimes first rather than last:

- e.g. Political science – Great Britain – Electoral system.

The schedule always makes it clear when this is the case.

7.34 Deciding the main class (which is the first term in the chain)

7.341 In a few cases, a document falls into no one particular main class – it covers all knowledge or several different parts of it; examples are general encyclopedias, general newspapers and periodicals, general collections of essays. Such documents go in the Generalia class (2/3) where only non-subject characteristics of division can be distinguished – e.g. the form in which the document is presented.

7.342 Most documents deal with a particular phenomenon treated from a particular viewpoint or 'aspect'; e.g. Child psychology, Child medicine, Child welfare, Children's games; or, Geology of coal, Chemical technology of coal, Labour disputes in the coal industry, Coal mining engineering. This problem is discussed in Sections 5 and 6 under the problem of Phenomena and Disciplines. It is perhaps easier to think in terms of specialised fields of labour and specialised education and training than the more abstract notion of disciplines, since these specialisations are a very familiar feature of everyday life; e.g. the subjects above readily conjure up the specialised viewpoints of the psychologist, the physician, the welfare worker, the geologist, the applied chemist, the economist, the mining engineer. The one subject not readily suggesting the aspect is children's games and this is largely because of its ambiguity when stated without further context. It would most likely refer to Recreation (a main class in BC) but could conceivably be a sociological study or a study in Folk-lore (another main-class in BC); only examination of the document would reveal this.

7.343 The basic citation order in BC, as in virtually all other general classifications, is:

Discipline (including sub-disciplines) – Phenomenon.

This will be clear from the A/Z index to BC in which the more prominent phenomena, bibliographically speaking, will be found qualified by some of the major contexts in which they are found – e.g.

Children	Education	JLG
Children	Medicine	HU
Children	Psychology	IM
Children	Social welfare	QL

7.344 Phase relations is the term usually used to describe a limited number of relations between classes which are not satisfactorily covered by the much commoner facet relations which govern the great majority of compounds within a given class. These relations were originally advanced by Ranganathan to handle the problem of intersection between main classes – e.g. Influence of war on technology; Comparison of religion and philosophy. They are, however, just as prominent between the same class – e.g. comparison of English and Scottish law.

7.344.1 The common Auxiliary Schedule 1 includes all the accepted phase relations and these can be used to link terms from different main classes or terms within the same class. They are:

7.344.11 Comparison phase (9C in Schedule 1): in this case, it is almost immaterial which phase is cited first and an arbitrary rule is observed to cite first the phase appearing later in the schedule. An added entry is made in the catalogue under the reversed citation order:

- e.g. Libraries – France – compared with – Great Britain

would get an added entry under

Libraries – Great Britain – compared with – France

7.344.12 Exposition phase (9E in Schedule 1): where one class is expounded through or illustrated from another class the one expounded is cited first:

e.g. History – Great Britain – expounded through – English fiction

7.344.13 Influence phase (9i in Schedule 1): where one class is influenced by another the one influenced is cited first – e.g. Labour mobility – influence of – Rent control. In those cases where the influence is a two-way action we have something like a 'general relationship' phase; but whereas the latter is too vague a concept to justify inclusion, such a general effect relationship is not and so this is also provided in BC2 (9H in Schedule 1). In such cases an added entry is automatically made, as in the case of comparison phase above.

7.345 Multi-disciplinary treatments of a phenomenon may be classed under the phenomenon in class 4/6 or under the disciplinary class from which the class in 4/6 was extracted:

e.g. The Horse (in all its aspects) 6 GYH J or GYH J 1

Until the publication of classes 2/9 provides detailed instructions, classifiers should observe the general principles given in Section 6.214.

7.35 Citation order within a class

7.351 Two major features of BC2 are that every class has been given a comprehensive and explicit citation order, and that this citation order is clearly demonstrated in every outline of every class and indeed on every page of the schedules where classes might intersect (by reason of the fact that the filing order of classes is the reverse of their citation order – see Section 5.742).

So the basic rule for citation order within a class is very simple: cite first the term appearing later in the schedule (i.e. in the filing order).

7.352 The simplest procedure is to use a Socratic method whereby the classifier asks himself first whether the primary facet is represented, then whether the secondary facet is represented and so on until the summarization is fully accounted for.

7.352.1 The order of questions is most easily taken from the summary statement of facets in the class which appears in the Introduction to each class.

7.352.2 For example, a summarization consisting of the terms

Classification – (of) – Law – Books

having been assigned to the Documentation and library science class would be organised into its chain by the following question and answer procedure:

Is the primary facet (Library systems) present? Answer: No

Is the secondary facet (Library materials) present? Answer: Yes – in Law and in Books

Is the tertiary facet (Library operations) present? Answer: Yes – in Classification

7.352.3 The chain is not yet fully derived because two terms appear from the Materials facet – Law works and Books. The schedule itself has to be examined since no summary table of arrays is given in the introduction to each class – there are too many of them. It is found that the array 'Materials by subject' files after the array 'Materials by physical form'; so the citation order within the Materials facet is Materials on Law – in book form.

7.352.4 The full chain can now be stated as

Library science – Law materials – Books – Classification

But a note at the class 'Books' states that it is 'Usually assumed' and can therefore be disregarded unless being specifically contrasted, say, with non-books. So it would be dropped from this chain and the class mark then sought for Library science – Law materials – Classification.

7.353 In practice, there is some interaction between the concept analysis stage and the translation of the summarization into its chain. The summarization, being drawn from the terms in the title, abstract, etc. of the document with, perhaps, a contribution from the classifier's own knowledge and experience, may yet lack all the steps in the hierarchies involved. Asking what facets are represented, and examination of the schedules will reveal such further details.

7.353.1 For example, a work entitled simply 'On transubstantiation' might generate a summarization:

Transubstantiation – Sacraments – Roman Catholic Church

Assuming the main class Religion, the questions and answers would proceed thus:

Is the primary facet (Religious system) present? Answer: Yes – in Christianity, Roman Catholic Church.

Is the secondary facet (Religious activities) present? Answer: Yes – in Transubstantiation and in Sacraments.

Examination of the schedule now reveals that the full chain is

Religion – Christianity – RC Church – Devotions – Rites – Sacraments – Eucharist – Transubstantiation

Under the class Sacraments (rites of exceptional significance) is found a note referring to particular religions for particular sacraments; under Christian sacraments is found Eucharist, which in this context (a Catholic sacrament) comprehends Transubstantiation.

7.36 Locating terms not as yet in the scheme

The appearance of concepts which are not in the schedules is an event which occurs in the best regulated systems. It is hoped that all users of BC will notify the BCA regularly and promptly of new terms they want added to the scheme's vocabulary and such terms will normally be added promptly, with their own specific class mark, in the next issue of the *Bulletin*. Until then, however, the classifier has to give the item a class mark locating it as near to its ultimate correct class as possible. This will of necessity be the nearest containing head.

7.361 Deciding this will be greatly assisted by familiarity with the citation principles already given. It is very unlikely that any term will require recognition of a new facet. For example, in testing Class J, a document was classified on Art in history teaching, which subject did not appear in the draft schedule being used. The questioning procedure quickly elicited the chain

History (subject taught) – Teaching (activity) by use of Art (agent of teaching)

So the facet in which the new class should go was clear – i.e. JIB Teaching aids. (It should be noted that the specific class is a compound one, of which 'Art' is only the last element; the latter would be obtained synthetically by drawing it from its appropriate facet – in this case JIB – and it is to the latter that the addition would be made.)

7.362 Had it been the completed, published schedule, the classifier would have had two options. Either to assign it to the broad class JIB or to make a temporary place for it at JIZ where it would still have been located in the correct facet (because of its purely ordinal notation there is always room in BC2 for such insertions at the end of a class). The advantage of the latter position would have been that it at least marked it off distinctively from the general works on Teaching aids (which putting it at JIB would not have done) and located it at the end of particular types of aid. Since either class mark (JIB or JIZ) would certainly need some amending when an official class mark was assigned this factor would not be important. On balance, assuming that the classifier can recognize the exact place where the containing facet or array ends, this would appear to be the happier, albeit temporary solution. As a matter of interest, the new array in the Teaching aids facet was located at JIV Using other subjects (as aids)

7.363 To reinforce the marking off of the new class from less specific ones the policy of 'verbal extensions' practised so successfully by BNB until 1970 is recommended. This consists simply of writing the name of the new concept, suitably marked off from the temporary classmark by placing it in brackets, at the end of the latter; assuming JIZ had been chosen, this would have given:

JKT LIZ (Use of other subjects – Art)

(in which JKT is Curriculum – Special subjects and JKT L is History in the curriculum).

In this way, the classified pattern of the catalogue is wholly maintained, as can be seen by examining almost any page of a BNB issue in the 1960s. A filing value for the bracket would need to be 'fixed' if the containing class itself (JIB in this case) were used and a position following the numeral divisions last preceding the letters would be most appropriate.

7.364 An error to be avoided in such cases is the addition of a common auxiliary concept to an imperfectly specific subject class. If, for example, the document in question had been a collection of essays on the subject of art in teaching history it would have been wrong to add the common form classmark 3L for Essays to the non-specific classmark JIB. Although it conveyed additional information relating to the document's form it would have mis-located the item; it would have collocated the work with other works on 'Teaching aids written in the form of essays' rather than with other works on 'Teaching aids using another subject as an aid'; the chain would have been

Education – Curriculum – History – Teaching – Aids – in essay form

when it should have been

Education – Curriculum – History – Teaching – Aids – Use of other subjects – Art – in essay form

The rule implied by this is that a classmark should not hide a 'leap in division' (as this situation is described in works on logical division) and where a link in the chain is missing no further qualification, whether by an auxiliary or other facet, should be added.

7.365 This example also demonstrates the care that the classifier should exercise in applying phase relations. It would have been an error in the above case to use the Exposition phase (9E) to get a specific classmark (JKT L9E V for Curriculum – History – expounded by – Art) since the relationship is clearly one provided for by a regular facet within the class – i.e. Teaching aids. Historically, it would seem that relations treated as phases at an early stage of classifying in a subject often turn out later to be better treated as facet relations.

7.37 Non-subject classes, form classes

Some documents are classified by factors other than their subject matter; e.g. a copy of the Bible is different from a book about the Bible, and a music score by Schubert is different from a work about Schubert. Classes of such documents are often called form classes and prominent examples are to be found in Literature and other arts, Religion and Philosophy.

7.371 Where the literature on a given specific subject class is large, it is usual to classify it further according to its form of presentation; e.g. the general works on Physics may be grouped into Encyclopedias, Essays, Periodicals, etc. to assist rapid retrieval of particular types of material.

7.372 Although the characteristics of the document which form the basis of classification in such cases are quite different from its subject content, the principles of facet analysis and the need for explicit citation orders still apply. Indeed, almost any form class will have its analogous subject class; e.g. a piano score and a work about piano music; a collection of abstracts in chemistry and a work about abstracts in chemistry.

7.373 The common Auxiliary Schedule 1 contains a large documentary form facet, with many different arrays. Although compounding of terms from different arrays, as in Periodical abstracts is not called for to any great extent a citation order must be available for when it does. Examination of Schedule 1 will demonstrate this.

7.374 In the case of literary texts in Literature, sacred works in Religion, statutes, etc. in Law and other such cases the distinction between subject and form is a major feature of the class and the instructions given under the class itself should be read carefully. As always, the central question is: What is most usefully kept together and what distributed? For example, in the case of both sacred works and statutes the preferred arrangement is to keep the two categories ('works of' and 'works about') quite distinct; but the student of Literature may prefer to find the works of a writer and works about that writer together.

7.38 When two or more concepts intersect the compound subject which results is treated as a unified class to be located according to the rules of citation order; e.g. a work on 'The Bible and English Literature' might reflect a phase relationship in which English Literature is influenced by the Bible; a work on Welding aluminium would reflect the facet relations of an action on a 'patient'.

7.381 In some cases a document deals with two or more concepts separately, without considering the particular relationship between them; e.g. Manufacture of soaps and perfumes. Here, the separate parts could conceivably appear as separate monographs, but have been published together for some reason. If only two subjects are so dealt with the document is usually classified under the subject dealt with most fully. This gives a class mark by which the document is shelved, and an added entry is made in the catalogue for the other subject or subjects.

If there are more than three subjects dealt with it is usual to classify the work under the most specific head covering all of them.

7.382 When particular aggregates of separate subjects are very common in a class, BC tries to provide an enumerated class for them:

e.g. JFB Measuring and testing (of academic performance)
QQK Probation and parole (of offenders)

7.383 Since the term 'and' frequently occurs in title, etc. and may represent either a true relationship between different concepts or simply an aggregation of two or more separate subjects in the same document, it is important that the classifier establishes at once exactly which situation it does reflect.

7.39 Examining the schedules

Theoretically, awareness of the citation order in the class concerned and of the general principle of inverted filing order equip the classifier to form an accurate impression of the relative location of any class before he even looks at the schedules. However, the schedules themselves convey important information regarding concepts and relations and the classifier must be prepared to read the various signs and clues, explicit and implicit, which may help him.

7.391 Hierarchy: the importance of subordination (the fundamental feature of any hierarchy) has already been stressed a number of times (e.g. in Section 4.63). In practical classification it is essential for the indexer to recognize that the scope and meaning of a class is determined by its containing head. The same term may occur in quite different parts of the schedules and in each case its meaning depends on what it is subordinated to. 'Assessment' subordinated to Taxation is not at all the same thing as 'Assessment' subordinated to Educational performance; although of course they share a common element of meaning it is the determining context which is the important factor.

7.391.1 In the BC schedules, subordination is indicated primarily by indentation within facets and arrays:

JF	Educational performance achievement, attainment
	* <u>Add</u> to JFA letters A/E following J in JA/JE
JFB	Measurement and testing
JFC	Measurement
JFD	Tests in general
JFE	Construction of tests and scales
JFF	Interpretation and evaluation of tests
JFF G	Standards
J	Reliability and validity
L	Prediction, forecasting, prognosis
JFG	Assessment, rating
JFH	Marks, marking
JFH K	Ranking
M	Scaling
	(Types of test)
JFK G	Course-assessed * Work submitted during course, not by examination.
J	Theses, dissertations
JFL	Examinations (i.e. set examinations)

The observant indexer will quickly learn to recognize a number of points from 'reading' the schedule:

7.391.2 Every indentation implies that the indented class is a subclass in some way of the one immediately above it; e.g. Measurement and testing of educational performance (JFB) is a subclass of Educational performance; Measurement (JFC) is a subclass of Measurement and testing together, and so on.

7.391.3 The relation of a subclass to its containing class doesn't always reflect the conventional relationship of a species to its genus. For example, at JFK G onwards the classes do represent species, i.e. types or kinds of tests. But the whole/part or system/sub-system relationship is also common – e.g. Prediction (JFF L), Assessment (JFG) are parts of the Interpretation and evaluation process (JFF).

7.391.4 These relations are sometimes stated explicitly as in the case of 'Types of test', but in other cases they are so numerous that it would consume too much space to spell them out every time.

7.391.5 Consideration of the relationship reflected by the subclass will show that their citation order and filing order is consistent with the principles described above (Section 6.3). For example:

Construction of tests (JFE) precedes interpretation of tests (JFF) by chronological order.
 Standards and Reliability (JFF G/JFF J) are properties in Interpretation and evaluation.
 Prediction and Assessment (JFF L/JFG) are operations in Interpretation and evaluation.
 Course-assessed work, theses, etc. reflect types of test (as explicitly stated).

7.391.6 From the inverted filing order it can be assumed that all compounds will be built by retroactive combination, qualifying later terms by earlier terms (explanation of the built class marks will be found in Section 7.45):

JFH KFJ Ranking – Reliability
 JFK GG Course-assessed work – Assessment
 JFL H Examinations – Marking

7.391.7 No attempt is made to express the subordination of terms in their class marks. For example, all the classes JFC/JFL are subordinate to the class at JFB; the class mark JFG may 'look' as though it is coordinate with JFF – but the class it represents is subordinate to that of JFF.

7.391.8 Where the hierarchy is continued in another column or on the next page, the relative positions of the terms continues to be marked clearly by carry-over terms at the top of the next column. These always contain the last-appearing term from the previous column and any additional terms thought necessary to remove any doubts as to how the new terms align with the previous column. Examples can be seen in the Auxiliary schedules in Section 10.

7.392 Other points to note include:

7.392.1 A few 'aggregating' classes like Measurement and testing (JFB) are included where the literary warrant – i.e. the existence of a fair number of items describable by the term – suggests it.

7.392.2 Terminology: the translation stage also implies the process of selecting particular terms to describe classes in catalogues and indexes, as well as in the schedules.

7.392.21 Where more than one term appears against a class mark this implies that they are either synonyms or near synonyms. The first one given is usually the preferred one in the sense that it might be the one chosen to constitute a heading in a catalogue or bibliography or in the A/Z index; e.g. if the schedule reads PFE T Converts, proselytes, the A/Z index entries would be:

Converts PFE T
Proselytes see Converts

7.392.22 As an important economy in the physical production of the schedule subordinated terms are as brief as possible and their full meaning is only seen by considering the containing class. In the A/Z index, where they appear divorced from the context of the hierarchy they need qualification by one or more containing heads in order to convey this meaning, e.g.

PYO B Applied ethics
C Moral actions, objects of moral judgement
D Action and omissions
(Objects, recipients)
E Human (usually assumed)
F Children

The term 'Children' at PYO F implies the class 'Children as objects of moral action' (e.g. as in cruelty to children). The A/Z index entry for this is

Children (Objects of moral action) PYO F

7.392.23 It is particularly important to remember this when deciding class marks for compound classes.

For example, when deciding the class mark for Christian converts it would be fatal to forget that PFE T below refers only to converts in general, and does not imply Christian or any other particular religion:

PF Religious systems
PFC Persons
PFE T Converts, proselytes

The meaning of the term converts is defined by its containing heads; here the containing class is Religious system – meaning 'in general' and not a particular system.

7.392.24 The use of relatively elementary terms in the schedules will be found to have certain advantages when considering the use of BC in coordinate indexing systems.

7.392.3 Explanatory notes are sometimes given (as at JFK G in the hierarchy in Section 7.391).

7.392.4 References are made in two situations:

7.392.41 To indicate that a class which the classifier might expect to find in a given place has in fact been placed elsewhere. For example, at the end of JE Educational psychology is found:

(Psychopathology) see Mental health JDL

7.392.42 To remind the classifier of the existence of another concept, located elsewhere, but related to the class he is examining and which he may wish to consider when verifying the correctness of the class being considered; e.g.

JFP Selection for classes, courses, grouping *See also* Admission JDN

In this case, JDN represents a class subordinate to JD School administration in which the concept of Admission is interpreted as being more significant in School administration (including decisions to accept pupils, etc.) than with the purely educational problem of performance and selection.

7.4 Assigning notation

Having decided the chain representing the position of a document's subject in the classification (e.g. Education – Primary education – Curriculum – Reading) the classmark representing this position must be established.

7.41 In simple cases, the whole chain appears in the schedule with the classmark against it (e.g. JM Primary education) and the only problem is to copy the classmark accurately.

7.42 But most documents reflect subjects which are compounds – i.e. reflect terms from two or more different facets or arrays within the containing class; e.g. Curriculum in primary education. Such subjects are not enumerated in the schedule and the indexer has to build the classmark by linking the elements together. The operation of building classmarks is called synthesis and is fundamental to BC.

In the BC, two basic situations will be found. Either there is an explicit instruction on how to build, usually with an example to demonstrate it, or there is no particular instruction and it is assumed that the indexer understands the structure and functioning of the schedule and its notation and can proceed to build the required classmark accordingly.

7.421 Where there is an explicit instruction, follow that; e.g.

JT	Vocational education
JTC	Professional, vocational higher education
JTC M/R	* <u>Add</u> to JTC letters M/R following JR in JMR/JRR – e.g. Polytechnics in vocational education JTC Q

In this example, the classmark for Polytechnics in vocational education is obtained by going to the sequence JRM/JRR, observing which letter or letters follow JR in the classmarks which will be found there, and noting the one for Polytechnics:

JRQ Polytechnics

Here, 'Q' follows JR in the relevant classmark and so 'Q' is added to JTC as in the instruction, to get JTC Q for Polytechnics in vocational education. Having observed the operation by which this is obtained, the classifier should now be able to build accurately the classmark for any concept represented in the range JTC M to JTC R.

7.421.1 A recurrent example of an explicit instruction is that given when a class is divided like the whole classification. But this may raise the problem of further qualification of the classes so derived and is therefore considered later, in Section 7.435.6.

7.422 Where there is no explicit instruction, two standard methods of synthesis may be applied.

7.43 Adding common subdivisions

Auxiliary Schedule 1 provides classmarks for a number of commonly occurring concepts which may be added to any class in the BC, unless there is special provision made for that concept – in which case it will always be clearly noted in the schedule. Auxiliary classmarks cannot be used on their own – only as additions to the regular classes 2/9, A/Z. They are not usually repeated under individual classes except at the main class level – i.e. single letter or single number classes and it is assumed that the indexer knows he can add them at his discretion to any class.

7.431 All the auxiliary classmarks begin with a numeral. Since all BC classmarks consist of capital letters (except for a very few in the numeral classes, for which special provision is made) these auxiliaries can be added straight onto the classmark concerned, whatever hierarchical level it occupies. For example, in Schedule 1, 2H is Pictorial matter, 3L is Essays, 3Q is Numerical data and statistics, 5W is Bibliographies. Any or all of these can be added directly to any part of any hierarchy; they can be added, for example to P Religion, PF Religious systems, PHZ Modern religions, PN Christianity, PO Christian Church ... to give compound classes such as P3L Essays on religion, PF3 Q statistical data on religious systems, PHZ 2H Pictorial matter on modern religions, and so on.

7.432 Some of the common subdivision classmarks introduce further auxiliary schedules. The most prominent of these is probably the Place facet in Auxiliary schedule 2, classmarks from which can be introduced wherever appropriate, following the numeral 8; e.g. Roman Catholicism is PR, and Roman Catholicism in the British Isles is PR8 E in which 'E' is taken from Schedule 2 and added to 8 from Schedule 1 (standing simply for 'Place'). Similarly, historical periods from Schedule 4 can be added to any subject so long as they are introduced by the numeral '7' and the language of a document can be indicated, if this is thought to be necessary, by adding classmarks from Schedule 3 to the Schedule 1 classmark 2X;

e.g. T is Economics, 3A is Encyclopedia in Schedule 1, 2X is Language of the document in Schedule 1, and V is French Language in Schedule 3; so an Encyclopedia of economics in French would be T3A 2XV.

7.432.1 This last example also shows how one common subdivision can be added to another if need be.

7.432.11 Compounding between subclasses of the same initial numeral is retroactive. the initial numeral being dropped; e.g., in Schedule 1 (Common form subdivisions) 2P is Television and 2HL, is coloured material; so 2PH L is Colour television.

7.432.12 Compounding between subclasses from different numerals (each numeral representing a different facet) requires the retention of the initial numeral; e.g., Abstracts is 5VH and Periodicals is 3G; so Abstracting periodicals is 5VH 3G.

7.432.13 As the example demonstrates, this compounding also is usually effected by citing first the concept appearing later in the schedule. However, care is needed, since the relationships between the concepts can vary, especially in the case of the Schedule 1 Common subject subdivisions; e.g. the law relating to research is very different from research relating to the law. The general indexing rules considered in Section 7.3 should help here.

7.433 If there is a special provision made for concepts normally taken from the common subdivisions, the latter are not used. Again, Schedule 2 gives the most frequent examples; e.g. QJS is Immigrants as a class of persons in the Persons in need facet of Class Q Social Welfare. Because Place is obviously an important concept in this context, special provision is made for it; QJU is assigned to the home country as the country of origin and QJV is for other countries as the receiving country, with the instruction to add to these two letters A/Z from Schedule 2. So Welfare problems of immigrants in France is QJV F (F being France in Schedule 2) and not QJS SF, as it would have been had the classmark been built by normal synthesis.

7.434 Schedule 1 also contains numerals to introduce phase relations. These are explained in Section 7.344 and here it is only necessary to indicate the simple synthesis by which their classmarks are built. For example, the comparison relationship, if cited after a Place or Time concept, has the classmark 6T; so a comparison of the British and French educational systems would get the classmark J8E 6TJ 8F – i.e. *J8E British education – 6T comparison – J8F French education. Note that the full classmark of the second phase is given, to allow additions from the whole classification when phase relations are cited.* When phase relations are cited before Place or Time a different set of classmarks is used. For example, 9J is Influence relationship; so the influence of technology on the development of teaching methods and aids would be JI9 JU – i.e. *J I Teaching methods and aids – 9J Influence – U Technology.*

7.435 Further qualification of synthetically derived classes

7.435.1 Usually, common subdivisions are the last thing to be cited and no further division is required

7.435.2 However, in some cases, especially that of the Place facet, they are cited earlier (and therefore appear lower down in the schedule). This raises the problem of how to qualify them by the facets in the class concerned which file before the point at which they are introduced; for example, in Class P Religion is found:

POZ Christianity and the Christian Church in individual countries
* Add to POZ letters A/Z from Schedule 2

This simple instruction will lead to the production of classes such as POZ E Christianity in Great Britain.

7.435.3 The principle of the inverted schedule implies that this class may be qualified by any preceding facet – e.g. by PFM Persecutions. However, if FM were added to POZ E by direct retroactive synthesis the resulting classmark (POZ EFM) would clash with the classmarks for the local subdivisions of Great Britain (in which POZ EFM means Christianity in Norfolk).

7.435.4 This situation does not always arise when the Place, or other common facet is cited earlier than usual. For example, in Class R Political science, Place is a major facet and requires further qualification by preceding facets (e.g. Legislature, Electoral system). But this does not clash with qualification of the same place by its local divisions since the latter appear in a separate class (in Local government); so direct retroactive synthesis is possible.

7.435.5 However, when further local division is required as well as further qualification by preceding subject facets, special arrangements are necessary. Unless otherwise instructed, the procedure is to add to the country classmark as follows:

7.435.51 The numeral ‘2’ followed by numbers and letters from Schedule 1.

7.435.52 The numeral ‘3’ followed by preceding facets in the class in question.

7.435.53 The letters A/Z following the country classmark in Schedule 2; e.g.

POZ E	Christianity and the Christian Church in Great Britain.
POZ E23 L	Essays (from Schedule 1)
POZ E3F M	Persecutions (from PA/PG)
POZ EA	England (from Schedule 2)
POZ EFM	Norfolk (from Schedule 2)

7.435.6A very similar procedure is followed when a class is divided like the whole classification. It may be necessary to qualify the class so derived by earlier facets in the class being divided; e.g.

JK	Curriculum
JKT	Other subjects
	* Add to JKT numbers and letters 2/9, A/Z from the whole classification e.g. Logic JKT AL
	* Each subject may be qualified fully by preceding facets as follows:
	* <u>Add</u> to the classmark the number '2' followed by numbers and letters from Schedule 1.
	* <u>Add</u> to the classmark the number '3' followed by letters A/K following J in JA/JK; e.g.
JKT E	Biology
JKT E23 L	Essays (on Biology in the curriculum)
JKT E25 M	Communication, information (on Biology in the curriculum)
JKT E27	History (of Biology in the curriculum)
JKT E3A B	Aims, objectives (from JAB)
JKT E3J	Teaching methods (from JJ)
JKT E5M	Biological information (in the curriculum)
JKT E7	Biological history (in the curriculum)
JKT EC	Cytology

7.435.61 The above adds a few examples to the instructions appearing in the Schedule at JKT in order to show how the provision of distinct facet indicators for the facets involved incidentally removes possible ambiguities; e.g. the two different meanings attaching to the phrase 'History of biology in the curriculum' are made quite clear.

7.44 Retroactive notation

7.441 This is the second standard method of building classmarks in the BC. Whereas the common subdivisions allow qualification of any concept by a limited set of commonly occurring facets (Form of presentation, Place, Period, etc.) retroactive notation carries the main burden of synthesis in BC by allowing any term to be qualified by any other term from another facet or another array within the same class. Classmark building is effected by a process of 'going back' in the schedule to get earlier classmarks to add on – hence the term 'retroactive synthesis'.

7.442 The problem retroactive notation needs to solve can be stated simply: because every class in the BC has an inverted schedule (see Section 6.342) the basic rule for compounding any two classmarks is to take the one appearing later in the schedule and to add it to the one appearing earlier. Therefore, from the sequence

J	Education
JC	School administration
JK	Curriculum
JM	Primary education

it can be seen that if classmarks are needed for compounds such as the Curriculum in Primary education, or Primary school administration the problem is to add JK to JM in the first case and JC to JM in the second.

7.443 Retroactive notation allows this to be done in the simplest possible manner. If, for example, classmarks were needed for Primary school curriculum and for Primary school administration, the classmark appearing later is taken first (JM Primary education) and to it is added directly the classmark appearing earlier, or above it, dropping the initial 'J' since this is common to both classmarks and has already been given. In the first case, we obtain JMK (Education – Primary – Curriculum) and in the second case we obtain JMC (Education – Primary – School administration).

7.443.1 If all earlier divisions of J can thus be added straight onto JM in this fashion, it is clear that the classmarks JMA to JML will be used up in the process. So if we need to divide JM Primary education into types of primary education (as distinct from qualifying it by preceding facets, which is what adding the letters A/L to it amounts to) these cannot be

assigned classmarks earlier than 'M'. Because if they were, they would clash with the synthetic classmarks obtained by retroactive synthesis.

7.443.2 If the schedule is examined, it will be found that this rule is observed:

JM	Primary education
JMN	Preparatory schools
JMO	Infants, first school (etc.)

Every preceding facet could be drawn on to qualify JM Primary education and all the resulting classmarks would still file neatly in place between JM and its first enumerated subclass (as we call the classes JMN JMD ... to distinguish them from subclasses obtained synthetically). These enumerated subclasses could, in turn, themselves be qualified by all these preceding facets in the same way:

JMN	Preparatory schools
JMN C	Administration
JMN K	Curriculum (etc.)

and if in a later edition of BC it was found necessary to enumerate types of preparatory school they could be assigned classmarks from JMN N onwards.

7.444 We are now in a position to state the basic rule in the allocation of retroactive notation in the schedule (not the choice of classmarks by the indexer, but the design of the notation by the schedule's compiler). This is the rule that the first enumerated subclass should not get a letter (or number) earlier in filing value than the letter (or number) to which it is added. So, in the example above, the first enumerated subclass of JM (i.e. Preparatory schools) was given a letter not earlier than 'M', the letter to which it was added.

7.445 The great advantage of retroactive notation is that it does not require any additional symbols to signal the linking of one element to another in a compound class. If additional symbols are used (as they are in some schemes) every facet must get its own distinctive indicator and each of these must be given its correct filing value, which the user must learn. Using retroactive notation, however, the correct filing value of the 'added' elements is automatically taken care of; e.g. the facets in Class J preceding the class JM file under JM in exactly the same order (JMA, JMB, JMC ... as they do under J (JA, JB, JC ...).

7.446 There is one serious problem raised by retroactive notation. As the later characters (letters or numbers) are reached, the number of preceding characters which needs to be reserved for retroactive synthesis gets correspondingly greater and therefore the number of characters available for enumerated subclasses gets smaller and smaller. At JM, half the alphabet was 'reserved' for synthesising with the preceding facets (JA/JL), leaving M/Z for enumerated subclasses; as it happens, this proved amply sufficient. But at JX, for example, only two letters (X/Y) would be left for enumerated classes. With so few letters to be shared out the classmarks for these enumerated classes would become longer, or would overflow into the next letter (e.g., enumerated subclasses of JX would take the form JYA, JYB ...

7.446.1 One way of meeting this problem – the intercalator – has already been mentioned in Section 6.422.12. Another example of it is to be found in Class P Religion:

PS	Anglicanism
	* <u>Add</u> to PSA letters A/G following P in PA/PG – e.g. PSA FT Movements, schools of thought in Anglicanism (By country)
	* <u>Add</u> to PS letters D/Z from Schedule 2, e.g.
PSE	British Isles, Church of England

Here, instead of building retroactively onto PS to give, say, PSF T Movements, schools of thought (taken from PFT) all preceding facets are added to PSA ('A' being the intercalator), thus allowing the enumerated subclasses of Anglicanism to begin sooner. The reason is clear from the example above – the place facet (which begins with the letter D) can now be added directly to PS, with a consequent gain in brevity.

7.446.2 Another way is to introduce a facet at the division 'B' of a letter instead of at the letter itself; e.g.

PEB	(Religious activities) (By Time characteristics)
PEB C	Morning, sunrise

If Religious activities had been introduced as PE, its first enumerated subclass would have had the classmark PEE or PEF; so introducing the facet at PEB gains a number of letters. In such a case there is no class at PE alone – it is unused.

7.446.3 There are a number of other situations in which the strict rule stated in 7.444 is not observed, e.g. the one described below at 7.455 in which a single facet stretches over several letters. In all cases, these exceptions result in shorter and simpler classmarks and the indexer should not be worried that he can't 'see what's happening' in the schedule by looking at the classmark. It does not matter that the classmark does not express relations, whether these are hierarchical or structural (as in this case). Its primary job is to indicate to the user the relative position of a class in the simplest possible way and this is what these exceptions help to do.

7.447 As a consequence of this, retroactive notation is rarely applied strictly in accordance with the basic rule throughout a class. This means that the situation facing the classifier will vary; usually, simple and direct retroactive synthesis as in the example of JM, is possible, but sometimes a different procedure must be followed. There are only three ways of using retroactive notation in BC: adding directly, dropping one letter; adding directly, dropping two letters; adding to an intercalator. Five situations cover all eventualities and these are described, with examples, in Section 7.45 below. It should be remembered that the basic problem is always one and the same thing; how to be able to add to a given classmark all preceding classmarks in the same class, whatever their relationship – and to do this with maximum brevity. The four situations are soon learnt in practice. It may also be noted that the main criterion by which a notation is judged is its simplicity and brevity for the user and some small sacrifice of the convenience of the indexer should not be grudged when the result is an improvement for the user.

7.448 Notational main classes, facets and arrays

Before describing the three different ways of building classmarks retroactively, four simple terminological conventions should be noted. These assist in describing the notational problems, as distinct from the conceptual problems underlying these. A further simplification is that reference is made only to classmarks involving letters. But the same principles hold for classmarks involving numerals – i.e. those in the numeral classes 2/9 and when using common subdivisions. One needs only to remember that numbers file before letters.

7.448.1 A single letter (A, B, C ... Z) represents a main class notationally.

7.448.2 Within a main class (e.g. J) each two-letter class, generated by the first step of division (JA, JB, JC ...) represents a facet notationally.

7.448.3 Within a facet (e.g. JA) each three-or-more letter class, generated by the second step of division (JAA, JAB, JAC ...) represents an array notationally.

7.448.4 Enumerated subclasses are those subclasses of a facet or array, not derived from another facet or array, and printed in the Schedule with a ready-made classmark, as distinct from subclasses which are built synthetically. Using retroactive notation, the classmark of the first enumerated subclass (FES) determines how many preceding facets or arrays can be added directly to the class being divided.

7.448.5 A FES is the letter introducing the first enumerated subclass under any given class to which an earlier class is to be linked. The FES determines what earlier letters (or numbers) can be added directly to the class; e.g. if QMN P is the first enumerated subclass of QMN, then P determines that letters A/O could be added directly to QMN for synthetic classes without clashing with the enumerated classes.

7.448.6 The facet FES is the letter introducing the first enumerated subclass of a facet; e.g. if JMN is the first enumerated subclass of JM, then 'N' is the facet FES of JM.

7.448.7 The array FES is the first enumerated subclass of an array; e.g. if PBW C is the first enumerated subclass of the PBW array then 'C' is the array FES of PBW; or, if QHN ST is the FES of QHN S, then 'T' is the array FES of QHN S.

7.448.8 The facet letter is the letter standing for a facet; e.g. 'M' is the facet letter in JM.

7.448.9 The array letter is the letter standing for an array – i.e. the last letter of a class being added to when that class has 3 or more letters representing it; e.g. 'W' is the array letter in JSV W.

7.45 Applying retroactive notation in BC

The normal situation, covering the great majority of compound classes, is that described in 7.451 and 7.452 below – the first dealing with compounding between different facets and the second with compounding between different arrays.

7.451 Adding classmarks from preceding facets, dropping initial letter

7.451.1 Here, the two class marks being linked share only the same main-class letter.

7.451.2 How to recognize the situation: the first enumerated subclass of the class being added to is formed by a letter not earlier than the letter indicating the facet to which it belongs .

7.451.3 How to add: use direct addition of any preceding facets, dropping the initial letter of the main class.

7.451.4 Example: assume JM Primary education is to be qualified by preceding facets of Class J Education (JA, JB, JC ...). The schedule is as follows (selected classes only):

J	Education	
JC	School administration	
JK	Curriculum	
JKD	Foreign languages	
JL	Schools by characteristics other than stage, or age of educand	
JM	Primary education	
JMN	Preparatory schools	(* the first enumerated subclass of JM)

7.451.5 This meets the condition in 7.451.2. The first enumerated subclass of JM (Preparatory schools) uses the letter 'N' and this is not earlier than M, the letter indicating the facet being added to.

7.451.6 Addition of preceding facets may therefore be direct, dropping their initial letter; e.g.

JMC	Primary school administration	
JMK	Primary school curriculum	
JMK O	Foreign languages in the primary school	

and these all file in correct order before the first enumerated subclass, JMN.

7.451.7 The last line above (JMK O) demonstrates the fact that adding a facet means adding all its subclasses as well.

7.451.8 *If the condition in 7.451.2 is not met and the FES (whether facet FES or array FES) is earlier than the facet letter, the intercalator must be used (see 7.454.2) except in the case of the situation described in 7.455 (arrays spread over several facets).*

7.452 Adding classmarks from preceding arrays, dropping initial two letters

7.452.1 Here, the two classmarks being linked share the same first two letters.

7.452.2 How to recognize the situation:

7.452.21 *the array FES is not earlier than the array letter, and*

7.452.22 *the facet FES is not earlier than the facet letter.*

7.452.3 How to add: use direct addition of any preceding array, dropping the first two letters of the classmark being added (i.e. the main-class letter and the facet letter)

7.452.4 Example:

Assume QMU is to be qualified by preceding arrays of the same facet QM (i.e. QMN, QMO, QMP ...) in Class Q. The schedule is as follows (selected classes only):

QM	Handicapped persons	
QMM	Mentally disadvantaged	(* Facet FES of QM)
QMP Q	Educationally retarded, backward	
QMU	Severely disabled	
QMU V	Limb deficient	(* Array FES of QMU)

7.452.5 *This meets both conditions : the V in QMU V is not earlier than the array letter 'U'; the last M in QMM is not earlier than the facet letter 'M'. So qualification of QMU by QMP Q (say) from an earlier array is effected by adding directly, dropping the first two letters, to give QMU PQ (which files before the FES of QMU, which is QMU V).*

7.452.6 *Another situation in which the two initial letters may be used is discussed in Section 7.454.9.*

7.452.7 *When the class to be added to has no enumerated subclasses this is treated as the equivalent to the situation in 7.452.1 – i.e. the FES cannot be earlier than the last letter added to because there is no FES.*

7.452.71 Example (selected classes only):

QH	Housing (in Social welfare)	
QHH	Homeless	(* facet FES)
QHK	Finance	
QHK L	Costs	
QHN	Management	

QHN S	Tenure, forms of occupancy
QHN T	Underoccupancy

To qualify Tenure QHN S by an earlier array (QHK L, say) we note that QHN S has no enumerated subclass and therefore has no impediment to the direct addition of *all* preceding classes; also, the facet FES (H) is not earlier than the facet letter (also H). So the conditions of 7.452.21 and 7.452.22 together are met and the earlier classmark is added directly to the later, dropping the first two letters, to give QHN SKL.

7.453 Adding classmarks from preceding arrays, dropping initial letter only

7.453.1 Here, the two classmarks being linked share the same first two letters.

7.453.2 How to recognize the situation: the array FES is earlier than the array letter but not earlier than the facet letter.

7.453.3 How to add: use direct addition of any preceding arrays, but dropping the initial (main class) letter only of the classmark being added.

7.453.4 Example: assume PBW Religious experience is to be qualified by preceding arrays of the same facet PB Systematic theology. The schedule is as follows (selected classes only):

PB	Systematic theology
PBF	Revealed theology
PBT	Future life
PBW	Religious experience
PBW C	Psychology of religion (* the first enumerated subclass of PBW)

7.453.5 This meets the condition of 7.453.2; the first enumerated subclass of PBW, Psychology of religion, uses the letter 'C', which is earlier than W (the last letter of the classmark being added to, but not earlier than the letter signifying the containing facet (PB).

7.453.6 Addition of preceding arrays may therefore be direct, but dropping only the initial (main class) letter; e.g.

PBW	Religious experience
PBW BF	Revealed theology
PBW BT	Future life

7.453.7 It should be noted here that the condition at 7.453.2 implies that the condition of 7.451.2 is also met (the letter added is not earlier than the facet indicator concerned). It follows that facets also can be added directly in this situation.

7.454 Adding classmarks from preceding facets to an intercalator

* Some users prefer the term 'facet indicator' since a major function of the intercalator is to introduce or indicate particular facets. But the intercalator may also introduce arrays, and so the term 'facet indicator' is somewhat too narrow to act as a synonym.

* The use of the intercalator to introduce arrays is now considered separately (at the new Section 7.454.9 below) since some users have asked for a clearer ruling on this point.

7.454.1 Here, the two classmarks being linked share only the same main-class letter

7.454.2 How to recognize the situation: the first enumerated subclass of the classmark being added to is formed by a letter earlier than the letter introducing the facet concerned.

7.454.3 How to add: first add the intercalator 'A' (unless another one is instructed) and then proceed as in 7.451.3 – i.e. add preceding facets directly, dropping the initial letter of the main class.

7.454.4 Example: assume PD Devotional religion is to be qualified by preceding facets of Class P Religion (PA, PB, PC). The Schedule is as follows (selected classes only):

P	Religion
PB	Systematic theology
PBT	Future life
PC	Moral theology
PD	Devotional religion
PDB	Worship (* the first enumerated subclass of PD)

7.454.5 This meets the condition in 7.454.2; the first enumerated subclass of PD, Worship, uses the letter 'B', which is earlier than D, the letter signifying the facet in question.

7.454.6 Addition of preceding facets (PA/PC) must therefore follow only after first adding the intercalator A; e.g.

PD	Devotional religion
PDA BT	Future life and devotional religion
PDA C	Moral theology and devotional religion

7.454.7 There is one exception to the situation above and this is considered separately, in the next Section since it affects 7.451 as well.

7.454.8 Adding classmarks from preceding arrays to an intercalator

7.454.81 Here the two classmarks being linked share the same initial two letters.

7.454.82 How to recognise the situation: the array FES is earlier than both the array letter and the facet letter.

7.454.83 How to add: first add the intercalator 'A' (unless another one is instructed), then add any preceding arrays, dropping the initial letter (the main class letter).

7.454.84 Example: assume that the class QJM V is to be qualified by preceding arrays of the facet QJ (QJB, QJC, QJD ...) in Class Q Social welfare. The schedule is as follows (selected classes only):

QJB	(Victims of social relations)	(* facet FES)
QJC	Lonely, isolated persons	
QJM	By religion, religious minorities	
	* <u>Add to QJM letters G/X following P in PG/PX</u> – e.g.	
QJM V	Muslims	(* from PV Islam)
QJM VH	Sunnites	(* array FES, from PVH)

7.454.85 This meets the condition at 7.454.82: the array FES of QJM V (letter 'H') is earlier than both the array letter ('V') and the facet letter ('J').

7.454.86 Addition of preceding arrays must therefore be preceded by the intercalator (i.e. even dropping one letter only for the arrays would still produce clashes, since the arrays would be introduced by 'J' which is later than the array FES, 'H'). This would give (for example):

QJM V	Muslims	
QJM VAE Q	Counselling	(* adding from earlier facet, QEQ)
QJM VAJ C	Isolated, lonely	(* adding from earlier array, QJC)

7.454.87 Note that the schedule at QJ does not mention the use of the intercalator. It is in fact an example of the situation described in 7.446.2, where the facet letter (here, QJ) does not appear on its own but begins with a specific array class (here, QJB). The decision to use an intercalator must be made by the classifier, after ascertaining the situation (e.g. as described in 7.454.82).

7.454.9 Alternative ways of adding preceding arrays

7.454.91 There is one situation (mentioned in 7.454.422) in which two alternative solutions present themselves and a choice has to be made.

7.454.92 How to recognise the situation: the array FES is not earlier than the array letter, but the facet FES is earlier than the facet letter.

7.454.93 How to add: the alternative ways are:

7.454.931 The intercalator necessitated by the facet FES being earlier than the facet letter (see Section 7.451.8 above) is retained under the subclass being added to; earlier facets are added to this intercalator, but earlier arrays are added directly to their subclass, dropping the initial two letters.

7.454.932 Alternatively, the intercalator is dispensed with under the subclasses and earlier facets and earlier arrays are both added directly, dropping only the initial class letter (as in 7.453).

7.454.94 Example: assume JVS is to be qualified by preceding arrays of the same facet JV (i.e. by JVB, JVC, JVD ...) in Class J Education. The schedule is as follows (selected classes only):

JV	Exceptional educands	
JVA	* <u>Add to JVA letters A/U following J in JA/JU</u>	
JVB	By social class	(* facet FES of JV)
JVO	Backward	
JVS	Physically handicapped	
JVS W	Sick, ill	(* array FES of JVS)

7.454.941 This meets both conditions: the W in JVS W is not earlier than the array letter S; the intercalator A is used at JVA and may be used analogously at JVS A to introduce preceding facets; so the facet FES is B, which is earlier than the facet letter V. The alternative solutions are:

7.454.942 Intercalator used for facets, two letters dropped for arrays

JVS	Physically handicapped	
JVS AK	Curriculum	(* from JK)
JVS AT	Vocational education	(* from JT)
JVS B	By social class	(* direct addition, dropping two letters)
JVS O	Backward	(* direct addition, dropping two letters)

7.454.943 Facets and arrays added directly, dropping one letter

JVS	Physically handicapped
JVS K	Curriculum
JVS T	Vocational education
JVS VB	By social class
JVS VO	Backward

7.454.95 Both these results produce the same order, of course, and the choice rests between

7.454.951 enjoying (by the first method) a shorter classmark for compounds of arrays (e.g. JVS O Backward) at the expense of a longer classmark for compounds of facets (e.g. JVS AT Vocational education); and

7.454.952 treating (by the second method) facets and arrays similarly.

7.454.96 Although it is arguable that in some bodies of literature there is a preponderance of compounding of facets over the compounding of arrays (or vice versa), there appears to be no clear reason why one should be preferred to the other. **But in the interests of a standard practice in applying BC in this situation the second method should be used.**

7.455 Classes in array spread over more than one notational facet.

7.455.1 When adding preceding facets to a classmark the basic situation hinges on whether or not the letter for the first enumerated subclass is earlier than or later than the letter signifying the facet being added to. In 7.451 it was seen that if it were not earlier (e.g. the 'N' in JMN was not earlier than the 'M' in JM) addition could be by direct addition, whereas in 7.454 it was seen that if it were earlier (e.g. the 'B' in PDB was earlier than the 'D' in PD) the intercalator was needed.

7.455.2 There is one situation where this does not hold. For example, in J Education the following situation occurs:

J	Education
JLB	Schools by characteristics other than stage, or educand's age (By age of educand)
JLG	Pre-school
JM	Primary schools
JN	Secondary schools

7.455.3 Although notationally JM and JN are different 'facets' they are in fact two classes from the same array – that of age of educand. As such they cannot intersect – there is no such thing as Secondary primary education. In this case, there is no point in 'reserving' the classmark JNM for an intersection that can never happen and it has in fact, been assigned an enumerated subclass (JNM Comprehensive secondary schools).

This would appear to break the rule implied in 7.451 and make necessary the use of the intercalator, as in 7.454. In fact, the use of the intercalator here is unnecessary and JN can be qualified by preceding facets by direct addition as in 7.451.

7.455.4 The position may be generalised thus: where preceding notational facets are in fact other classes in the same array as the class being added to (and therefore mutually exclusive) direct retroactive addition may be effected so long as this rule is observed: the first enumerated subclass can be earlier than the letter signifying the facet being added to but not earlier than the classmark of the first term in the array in question.

7.455.5 Example: if the class being added to is JN Secondary education, the first enumerated subclass can be earlier than the facet letter ('N') but not earlier than LG since JLG is the first term in the array in question (Educands by age and stage of education).

7.46 Broad and close classification:

7.461 Although this is usually regarded as a matter of individual library policy rather than of the classification scheme, this is the case only if the library has a genuine choice. If the scheme does not provide for close classification, the library has no option but to use broad classification.

7.462 In practice, the issue is one of notation. Close classification, which distinguishes quite precise subclasses within any given class, requires for its maintenance a notation able to provide specific classmarks for specific classes. The more specific the classes the longer are the classmarks needed to represent them and it is this disadvantage which provides the basic objection to close classification.

7.463 The BC notation, unlike that of some general schemes, is designed to provide classmarks of maximum specificity if these are desired, acknowledging the fact that precision in retrieval (i.e. the ability to locate a given type of document with minimal examination of non-relevant ones) is wholly dependent on specific subject description in the index.

7.464 If some degree of shortening is sought the following points should be noted:

7.464.1 The chief disadvantage of curtailing the length of classmarks is that the growth of the collection may mean that at some future time the laborious work of adding to the existing classmark on documents and catalogue records becomes necessary.

7.464.2 The case for limited classmarks is much greater in respect of physical arrangement on shelves than for catalogues and bibliographies. In the latter, facilities for guiding and marking off classes and subclasses are much greater; in searching a file under a particular heading only the subdivisions of that heading effectively engage the attention since the first part of the classmark is common to all entries in the file.

7.464.3 The full classmark should always be established and recorded somewhere in the document to avoid having to re-examine it should the classification be made more specific later on.

7.464.4 It may be noted here that the need for deciding the citation order of elements in a compound class does not depend on a policy of close classification. For example, suppose the items in the Education section of a library were subject to broad classification to the extent of limiting synthesis to two facets: the fact that a specific classmark was not going to be assigned would not alter the need to know whether, say, a work on Visual aids for history teaching in secondary schools was to go under the Method of teaching or the Curriculum (assuming the Educand to be the primary facet).

7.464.5 An arbitrary cut-off point after a fixed number of characters (letters or numbers or both) is unwise. The policy should adapt to the amount of literature in different classes.

7.464.6 A six-character classmark can be assumed to be a tolerable maximum in any context; this is no longer than numerous widely-used codes, such as car registration marks and telephone numbers.

7.464.7 Obvious economies are possible by restricting the use of common subdivisions of form. In any case, these are designed primarily to break up long sequences of items on the same subject and the narrower the class the less need there is for it.

7.464.71 A particular example of synthesis being deliberately restricted is that of phase relations; it is recommended that these should be limited to one at a time.

7.464.8 There should be no changing of letters or numbers: e.g. if a library had few items on Education and decided to classify that part of the stock very broadly, it would be pointless to change JFF (Interpretation and evaluation of tests) to JFB (Measurement and testing) simply because the latter is the broader containing class.

7.47 Alternatives

7.471 The provision of alternative locations and treatments for various classes was considered in general terms in Section 6.344. Section 7.32 stressed the vital importance of deciding at the outset which alternatives will be used in any particular case.

7.472 The use of these facilities raises problems of both order and notation and hence its consideration at this point. Virtually every class in BC provides one or more alternatives and in some classes their provision is very extensive. The pros and cons of the different alternatives are considered in the Introduction to the class concerned.

7.473 In nearly all cases, the alternative preferred by the editors is stated explicitly. Otherwise it is clear from the fact that the class which contains the enumeration of subclasses, etc. and which is referred to for details of classmarks is the preferred one.

7.474 A common provision is that made for the 'favoured' language, place, etc. For example, JNW (in Class J Education) is Individual secondary schools in the United Kingdom or favoured country; JNX is Individual secondary schools in other countries. A library outside the U.K. would use JNW for the individual schools in that country.

7.475 Local adaptations

7.475.1 Sometimes a library wishes to make a particular adaptation not provided for in the schedule: e.g. it may wish to give special prominence to a particular place or subject or for a special collection defined by other criteria.

7.475.2 Such amendments should be made only for a clear and pressing need and great care should be taken when undertaking such a task. The following points should be noted.

7.475.21 The simple removal of an intact class to a different and separate position to be developed in parallel with the rest of the classification can often be done without great difficulty as a result of the ordinal notation in BC (which is more adaptable to such strains than hierarchical notation) and the fairly widespread provision of spare letters (particularly Z). At the main class level Class 1 is left vacant and Class Z is an alternative to class P and therefore potentially vacant if the option is not taken up.

7.475.22 Any insertion within the body of a class needs great care to ensure that the facet structure of that class is fully provided for under the inserted class. An example of the sort of thing this entails can be seen in those classes where there is an instruction to add numbers and letters from the whole classification, and the subclasses produced by this synthesis are then themselves further qualified by the rest of the class (see Section 7.435); e.g.,

- 7.475.23 JK Curriculum (in Class J Education)
- JET Other subjects (i.e. other than Prominent ones, like Reading, which are enumerated)
- * Add to JKT numbers and letters 2/9, A/Z from whole classification e.g. Logic JKT AL
- Each subject may be qualified fully by preceding facets, as follows:
- * Add to the classmark the number '2' followed by numbers and letters from Schedule 1.
 - * Add to the classmark the number '3' followed by letters A/K following J in JA/JK, e.g.
- JKT E Biology in the curriculum (* from E Biology)
- JKT E27 History of Biology in the curriculum
- JKT E3J Teaching methods (* from JJ Teaching methods)
- JKT EC Cytology in the curriculum (* from EC Cytology)
- JKT EC3 J Teaching methods

This uses certain numerals to introduce all the other facets of the Education class and thus releases the main letter divisions (in the example, the full range EA/EZ) for a use special to the inserted class – and they in turn can be fully qualified by all preceding facets of Class J – as seen in the last line of JKT EC3 J.

7.475.24 Naturally, the shortest possible classmark is usually sought for the library's special subject and this can often be achieved only by some sacrifice of brevity on the part of another class. For example, in Class P Religion, PN is Christianity and PO is Christian Church. For the post-Reformation period the latter is divided first by specific church and then by Place:

- POW Post-Reformation Church
- POZ By place (as Schedule 2)
(By church)
- PP Patriarchates and Eastern churches
- PR Roman Catholic church
-
- PU Other

If a library wished to cite place before specific churches (in order to keep together everything on the Christian Church in its own country) it might select PU as a brief classmark in the correct filing order and locate 'Other churches' at PTZ (which is vacant, Z very rarely being used in BC).

7.475.25 It would be sensible to seek the advice of the Editors of BC before deciding such an amendment.

7.5 The Alphabetical index

7.51 A sharp distinction must be drawn between the printed A/Z index to the schedules of the BC and any A/Z index the indexer makes to his library's own collection. These notes refer only to the former, although brief reference is made to the latter in Section 7.6.

7.52 The purpose of the A/Z index is to tell the indexer, by giving him the appropriate classmark, where in the schedule he will find a given class when he looks under the name of that class. Since many of the names he will wish to look up might legitimately appear in a number of different forms e.g. Child psychology or Psychology of children – the rules governing the forms actually used in the index must be understood fully if the indexer is to get maximum benefit from it.

7.53 It should be remembered that, in an A/Z index, a term can be said to be indexed – i.e. have an entry – only when it appears as the lead term, in the front position: e.g. an entry Psychology of children, or Psychology, Child does not index the term Child (or its variant form Children).

7.54 Content of the A/Z index

7.541 The index contains entries for every elementary class enumerated within each facet which is described by a significant term – i.e. one likely to be sought by an indexer.

7.542 Entries are not made for compound classes within a main class, reflecting the intersection of two or more elementary classes. For example, there are entries for Curriculum in education and for Primary education but not for Curriculum in primary education. The indexer is expected to know that the classmark for the last class would be formed synthetically and how this would be done.

7.543 Entries are not usually made for classes derived by synthesis as a result of an 'add' instruction, although these often constitute regular facets or arrays within a given class. It would be quite impossible to index such classes without enormously expanding the index. For example, taking the common subdivisions alone implies potential compounds, in which each term in Schedule 1 intersects with all or many of the classes throughout the entire scheme; nearly every subject may be written about in the form of a glossary or a periodical or essays, be presented in film strips or slides, or be qualified by the notion of continent, or country, or region, or town ... Similarly, an 'add' instruction in the Class Q Social welfare, at

QJL Persons by occupation

* Add to QJL numbers and letters 2/9, A/Z from whole classification

implies numerous potential classes, such as Welfare to seamen, Welfare to members of the armed services, Welfare to itinerant workers, etc. So these will not appear in the A/Z index.

7.543.1 There is no denying that this is not an ideal situation, in that the indexer of a relatively special collection will constantly meet compound classes for which he would like to be able to look up the exact classmark; e.g. in a library with extensive holdings in the Welfare field, terms like Battered wives, Deprived children, Old-persons in care, Aids for the handicapped occur frequently – yet none of these appear in the printed index. Solutions to this problem may be found in an A/Z index to the collection, an authority file, or a 'thesaurus' type compilation which gives such terms. All these are dealt with briefly later on (see Sections 7.612, 7.64 and 7.65).

7.544 Analogous to the omission of potential built classmarks is the omission also of entries for individual persons, places, individual instances of pieces of equipment, etc., although there are exceptions to this in special cases – e.g. Antioch (Patriarchates) PPE; or, Christ, Jesus PNB.

7.55 Rules governing forms of names

7.551 The rule determining which part of the name a class is entered under when it consists of more than one component is by far the most important rule, since such names constitute the greatest handicap to efficient use of an A/Z index.

7.551.1 The BC index handles the problem not by recourse to arbitrary linguistic rules, such as entry under direct rather than inverted forms, but by making the A/Z index complementary to the classified order; e.g.,

Inspection	
educational administration	JBT V
health and safety	
school administration	JDK MR
Art	V
religion	PDP
work (teaching methods)	JJH D

7.551.2 These entries do not merely show whereabouts in the schedule the classes concerned are located, they also show the fact that the concept Art and the concept Inspection (in the context of Education) are distributed to some extent; and by virtue of the fact that entries for all these scattered aspects of a subject automatically come together, the A/Z index may be said to constitute another classification of sorts, complementary to the main one and collecting what the latter disperses.

7.551.3 The form of the above entries is governed by one fundamental rule: in any compound term the elements which reflect a containing (superordinate) class are cited after those which reflect a contained (subordinate class).

It is implicit in the above examples that Inspection appears in Class J as an activity in Educational administration in general and in School health and safety in particular; also, that Art as a main class is at V (since it is unqualified by any wider, containing class) but that its role in religion and teaching is subordinated to Religion and Teaching respectively.

7.551.4 The method of producing the entries (by chain procedure) is described in Section 6.6. Awareness of the basic rule enables the indexer to interpret the sense of any given entry. For example, an entry for Landscape painting implies that Landscape is a subclass of Painting; an entry for Acceleration : Particles implies that Acceleration is a subclass of Particle. It may be noted that Acceleration is not a subclass in the sense of logical division, since its relationship is that of an operation performed on the particle, not a species of particle; but it is a subclass in the library classification sense in that the concept of Acceleration is subordinated to that of Particle.

7.551.5 Awareness of the basic rule also enables the indexer to find more quickly the specific class he wants; he will learn to realize that consulting the subordinate element in any compound will give him the specific class – e.g.

Overhead projectors (teaching aids) JIC R

whereas consulting the superordinate element in a compound will give him only a broader class – e.g.

Teaching aids JIB

The last entry is by no means useless, since it places the searcher on the right road for the specific class, which could then be found by further scanning in the classified section of the catalogue. But if the subject sought is specifically Overhead projectors, consultation of the first entry above is obviously more efficient.

7.551.6 Where the element reflecting the subordinate class in a compound name is not a 'sought' term, an entry may not be made at all; e.g., in the compound Teaching theory, Theory is the subordinate class and Teaching the containing class. No entry will appear under Theory, this being an unsought term, nor under Teaching, since the concept of Theory is very ubiquitous and could occur as a common subdivision (6HP) under almost any class. However, if such a compound represents a distinctive name in its direct form it will be entered as such; e.g.

Teaching force JHD D

Teaching load JHE C

Teaching methods JJ

This type of compound name is the only one for which the basic rule is suspended and the containing-class term precedes the contained-class term.

7.551.7 The ideal index entry is a single term, since the only rule the searcher needs to remember is the filing order of the alphabet. So superordinate (qualifying) terms are added to the entry term only if ambiguity would arise if they were omitted. Within the A/Z index to a given class, the name of that containing class is rarely needed as a qualifier; but in the consolidated index to the whole scheme they will often be needed to distinguish the different disciplinary aspects from which a concept has been treated.

7.551.8 Usually, the qualifying term is placed on a second line; but occasionally, owing to the exigencies of typing, it is given in brackets. Where it seems desirable, prepositions, etc. have been added for greater clarity; e.g.

Animals
cruelty to
ethics PXP WPH

7.552 The noun form is preferred where possible, e.g. Storage rather than Storing, and in the plural – e.g. Solvents, Explosions. The singular form is used for properties, materials, etc. – e.g. Pressure, Nylon.

7.553 The gerund form (ending in '-ing') is preferred for verbs – e.g. Anointing. It is also used to distinguish property from action – e.g. Design from Designing.

7.554 Synonyms are entered under one form only and reference is made from others; e.g. Apparitions *see* Ghosts.

7.556 Occasionally, see also references are made to supplement the dense and comprehensive network of connectives represented by the classification schedules themselves; e.g.

Advice
Morality PYM VS
see also Counselling

Usually, these represent closely related but not synonymous concepts which are not brought into juxtaposition by the A/Z order and whose connection is not obvious from the classification schedule either.

7.57 Filing order is word by word (nothing before something); e.g.

Acid salts
Acid sulphides
Acidification

7.571 Initials file before fully written out words; e.g.

ITA
Ill persons

7.6 Making a subject catalogue using the BC

It is not a function of this Introduction to explain the art of making subject catalogues. But certain aspects of the operation affect the way BC is used and these do call for some explanation. A pre-coordinate classified catalogue is assumed in Sections 7.61/7.64; but it should not be forgotten that a workmanlike and specific alphabetical subject catalogue can be constructed by chain procedure using a classification system as the source of both subject headings and references. The precise and thorough analysis in the BC makes this particularly feasible.

7.61 Single entry system

7.611 This is probably the commonest form of classified catalogue. The class represented by the summarization of a document is made the heading (in the form of its classmark, of course) of a single subject entry and filed in the classified file.

7.612 An alphabetical index must be made to this file; it may take one or two forms – a chain index or a 'rotated term' index.

7.612.1 A chain index in a catalogue differs from the relative index to the schedules in two vital respects:

7.612.11 it indexes only the topics represented in the collection;

7.612.12 it indexes the compound classes represented by the summarization and is not confined to the elementary terms within each facet.

7.612.13 The advantages of such an A/Z index are that it is very economical (sharing with the classified file itself the burden of pointing out class locations) and simple to construct (because it is made systematically from the classification itself).

7.612.2 A 'rotated' index: here, the full summarization heading is retained in each entry, but the citation order of its elements is different in each case, so that every major key word is brought to the front in turn (see example below in Section 7.62).

7.612.21 There are several ways of constructing such an A/Z index (*see*, for example, A.C. Foskett. *Subject approach to information*. 2nd ed. London, 1971).

7.612.22 A prominent example is the PRECIS system used in the British National Bibliography since 1971. Because some BC users may wish to profit to some degree from the centralised provision of summarizations of current literature found in the BNB an example of a PRECIS string is given below and its translation into a BC classmark then demonstrated.

7.612.23 The 1973 volume of BNB contains entries for a work on "Games and activities for the early years of French in primary schools". The A/Z index entries in the form of PRECIS consist of a number of variations on a basic string:

7.612.231 **Primary schools**
Curriculum subjects: French language. Teaching methods: Games

7.612.232 **French language.** Curriculum subjects. Primary schools
Teaching methods: Games

7.612.233 **Teaching methods.** French language. Curriculum subjects. Primary schools
Games

7.612.234 **Games.** Teaching methods. French language. Curriculum subjects. Primary schools

7.612.24 All four entries give the same class-number. If BC were used, the classmark could be derived directly from the PRECIS string to give JMK PS3 JO (which exactly specifies the full summarization).

7.612.25 In addition, a reference appears:

Languages *See also* French language

No entries appear for this document under the terms Curriculum, or Foreign languages.

7.612.26 The great advantage of such a 'rotated' index (as it is often inaccurately called) is that access to the specific subject is direct from each entry. In the chain index only one entry would give such direct access:

Games: Teaching methods: French language: Curriculum: Primary schools JMK PS3 JO

and the others would be of diminishing directness:

Teaching methods: French language: Curriculum: Primary schools	JMK PS3 J
French language: Curriculum: Primary schools	JMK PS
Foreign languages: Curriculum : Primary schools	JMK P
Languages: Curriculum: Primary schools	JMK O
Curriculum: Primary schools	JMK
Primary schools	JM
Education	J

7.612.27 Although in a relatively general collection this disadvantage of the chain index is tolerable, in more specialized collections it can lead to very unhelpful crowding of dozens (or even hundreds) of qualifying terms under particular distributed terms; e.g. the term Teaching methods might be qualified by many different subjects taught, many types of school and many combinations of these (as in the example above). Consequently, most special libraries prefer a rotated index or multiple entry (see 7.62).

7.612.28 One disadvantage of the rotated index is that it takes up more room since more entries are required (it must be remembered that in the chain index the other entries index many other documents as well as the specific one and once made, are not repeated). It may also miss some of the connections, as in the case of 'Curriculum' and 'Foreign languages' above; it is also less simple to make (in the case of PRECIS, decidedly so.)

7.62 Multiple entry system

7.62 This is very common in special libraries. The class represented by the summarization of a document is again made the heading (in the form of its classmark) of entries in the classified file. But now instead of a single entry, as many entries are made as there are elements (or, what is more likely, facets) in the summarization, and each entry has a different citation order in its heading; taking the document already given as an example, entries might be made under the following different chains:

7.621.1 Primary schools – Curriculum – Languages – French – Teaching methods – Games
Curriculum – Languages – French – Teaching methods – Games – Primary schools
Teaching methods – Games – Primary schools – Curriculum – Languages – French

7.621.2 The three entries reflect, respectively, the following different classifications of the main class Education:

7.621.21 Education ÷ Educand ÷ Curriculum ÷ Teaching method
7.621.22 Education ÷ Curriculum ÷ Teaching method ÷ Educand
7.621.23 Education ÷ Teaching method ÷ Educand ÷ Curriculum

7.621.3 Theoretically, these entries could each be assigned to one of three parallel catalogues, each catalogue representing a different classification, for the use of readers with different approaches to the subject. In practice, it is usual to interfile all such entries in one sequence.

7.621.4 The purpose of multiplying entries in this way is to reduce the incidence of distributed relatives; e.g., a reader interested in a particular subject of the curriculum would look under that subject in the second parallel catalogue above (or the single classified file if only one sequence is maintained) and find everything on that subject together. In the single-entry system only the reader interested in a particular educand or type of school would find all his material together.

7.622 Multiple entry requires a synthetic notation in which there is either a clearly recognizable symbol introducing each facet (a different symbol for each facet) or a clearly recognizable symbol for separating any two classmarks, whether from the same main class or from different main classes.

7.622.1 The retroactive notation in BC does not provide clearly recognizable symbols for each facet; this is quite deliberate – such symbols add to the length and complexity of notation. But BC does use a distinctive symbol for separating two classes; this is the hyphen, which Bliss introduced in his full Edition 1 and which BC2 uses only for this one purpose.

7.622.2 Example of using BC in a multiple entry system

7.622.21 Taking the title given in 7.612.23, the classmark in BC for a single-entry system would be JMK PS3 JO. This is derived by the rules for retroactive synthesis operating on the following components;

- (a) JM Primary education
- (b) JKP S Curriculum – Languages – French
- (c) JJO Teaching methods – Games

The '3' in the sixth position is needed to introduce the earlier facets JA/JJ, since the preceding letter S, taken from X \bar{S} French language, may also need to be qualified by divisions of XS e.g. French pronunciation XSB (*see* Section 7.435).

7.622.22 In a multiple entry system, these main components would be built into different summarizations by simple linking using the hyphen instead of being built into one summarization only, using retroactive synthesis.

- JM-JKP S-JJO (Primary schools – Curriculum – French language – Teaching methods – Games)
- JKP S-JJO-JM (Curriculum – French language – Teaching methods – Games – Primary schools)
- JJO-JM-JKP S (Teaching methods – Games – Primary schools – Curriculum – French language)

7.622.23 The different summarizations are usually obtained in a more or less mechanical fashion known as cyclic order. The components (a, b, c ...) are thought of as figures in clockwise order on a clock-face. The preferred citation order would be represented as abc; additional entries are made by taking each succeeding letter in turn to begin a new string and continuing round the clock-face – so in the example additional entries would be made for bca and cab.

- abc = JM-JKP S-JJO (Educand – Curriculum – Method)
- bca = JKP S-JJO-JM (Curriculum – Method – Educand)
- cab = JJO-JM-JKP S (Method – Educand – Curriculum)

7.622.25 The hyphen files after numerals and before letters. Under a given class the classified file would look like this (taking the middle citation order as an example):

JK	Curriculum	(1)
JK3 LR	Conference proceedings	(2)
JKS E	In Great Britain	(3)
JK-JAB	Aims, objectives	(4)
JK-JE	Psychology	(5)
JK-JH	Staff	(6)
JK-JM	Primary schools	(7)
JKD	Development of faculties. senses	(8)
JKO	Foreign languages	(9)
JKP S	French	(10)
JKP S23 LR	Conference Proceedings	(11)
JKP S28 E	in Great Britain	(12)
JKP S-JAB	Aims, objectives	(13)
JKP S-JH	Staff	(14)
JKP S-JI	Teaching methods and aids	(15)
JKP S-JI-J3L R	Conference proceedings	(16)
JKP S-JJO	Games	(17)
JKP S-JJO-JM	Primary schools	(18)
	(* the entry for the example)	
JKP S-JJO-JN	Secondary schools	(19)

7.622.3 The main points of difference between this system and the single entry system are:

7.622.31 The user searching for material on Curriculum finds everything on it together, whereas under the single entry system Curriculum was subordinated to Educand and the last two entries, for example, would be under JM and JN respectively.

7.622.32 Classmarks are longer and slightly more complex.

7.622.33 The catalogue is greatly increased in size.

7.622.34 Common subdivisions, except sometimes the Place facet, are usually not regarded as components worth bringing to the front for separate entry. In this case, if they qualify a single concept from one facet (as French is here) they can be added on in the usual way (as in the entries 2/3 and 11/12 above). If they qualify a compound class they also must be notated by the hyphen method, as in entry 16 above.

In the latter case they do not enter into cyclic order but are always cited last; e.g. entry 16 would also have an entry:

Jl-JKP S-J3L R (Teaching methods – French language – Conferences)

but not one from normal cyclic order at

Jl-J3L R-JKP S (Teaching methods – Conferences – French language)

which is obviously an unhelpful and ambiguous citation order.

7.622.35 The general-before-special order is upset between facets; e.g. entries 7, 18 and 19 above all file before the general works on Primary and Secondary schools at JM and JN.

7.622.36 The A/Z index is usually reduced in size because much of its function in showing distributed relatives (i.e. the different aspects of a class which are scattered by the citation order) is rendered unnecessary by multiple entry.

7.622.361 The normal chain index entries serving the example above under single entry would be:

Games: Teaching methods: French language: Curriculum: Primary schools	JMK PRA JO
Teaching methods: French language: Curriculum: Primary schools	JMK PRA
Foreign languages: Curriculum: Primary schools	JMK P
Languages: Curriculum: Primary schools	JMK O
Curriculum, Primary schools	JMK
Primary schools	JM

7.622.362 A further problem arising with multiple entry concerns the role of the alphabetical index.

7.622.362.1 If the full compound classes, involving more than one facet, are still to appear in the A/Z index, to which classmark do they point? If the different classifications represented by the different citation orders were displayed in separate, parallel catalogues (as suggested in 7.621.3) the above entries would still be valid for the catalogue based on the classification.

Education ÷ Educand ÷ Curriculum ÷ Teaching method

although the classmarks would be different in that they use the hyphen, as explained in 7.622.22.

7.622.362.2 But the other catalogue would need different entries since the pattern of distributed relatives would be different. For example, in the catalogue based on

Education ÷ Curriculum ÷ Teaching methods ÷ Educand

the entry for Primary schools (now a distributed concept, since it is no longer cited first) would be

Primary schools: Games: Teaching methods: French language: Curriculum JKP R-JJO-JM

7.622.362.3 If the different entries, reflecting different citation orders, are interfiled in one single classified file there is no solution but to restrict the A/Z index entries to those classes which do not vary in their classmark – i.e. to the elementary terms within each facet; e.g. the title in question would be served only by the following entries:

Games: Teaching methods	JJO
Teaching methods	JJ
French language: Curriculum	JKP R
Foreign languages: Curriculum	JKO
Languages: Curriculum	JKO
Curriculum	JK
Primary schools	JM

7.622.362.4 These entries, which are best constructed by chain procedure, will only guide the enquirer part of the way to the more specific subjects. It is assumed that the classified file is carefully and clearly guided by featuring (see Section 7.63) to make the rest of the way as easy as possible.

7.622.362.5 It is worth remembering here that the full sense of any entry in the A/Z index could be expressed in such terms as the following:

Games: Teaching methods

means: "There is information on this subject in the collection; documents on it will be found to begin at JJO in the classified sequence and continue beyond that location until the classmark changes. Such a change will signal either the appearance of subclasses of the subject Games as teaching method, or another subject. when the search may be terminated (at least in this part of the classified file.)"

7.622.362.6 But the omission of A/Z entries for the fully specific classes is undoubtedly a weakness of the multiple entry system as usually practised.

7.622.37 Two central problems of multiple entry concern the number of entries to make for any given compound class and the citation order to be assigned to them. This is not the place to consider these problems in detail, but a brief note on them does seem to be called for.

7.622.371 The main object of multiple entry is to reduce the incidence of distributed relatives. If a pre-coordinate index is to do this completely, observance of some such formula as that described by John Sharp (*Some fundamentals of information retrieval*. London, Deutsch, 1965), must be recognized in determining the number of entries. The number necessary for a true 'one-place index' (meaning an index in which everything in the collection on a given subject appears in one place under the entry for that subject, no matter what key word is consulted) is a function of the number of combinations possible between the component elements of a compound class. What is certain is that confining 'rotation' to components from different facets (which is what the example in 7.621 does) does not normally remove all distributed relatives. For example, if a particular aid were incorporated in the games teaching method – audio tapes, say – this would constitute a compound of two arrays within the Teaching methods facet and would call for a further entry. Similarly, the subject may concern a compound of more than one array from the Educand facet. Ideally, the number of entries should reflect the number of different arrays involved rather than the number of different facets.

7.622.372 The citation order implied in the 'cyclic' method of deciding the order of terms in the different entries is somewhat arbitrary, as was seen by the unhelpfulness of treating the common subdivision as a regular component (Section 7.622.264) and the indexer might decide to be more selective. But this would make the business of producing multiple entries slightly more time consuming; cyclic order allows simple clerical procedures to take over once the first classmark or hyphen-linked components is decided, but modification of the principle would require every combination to be indicated explicitly by the indexer.

7.622.38 It was stated in 7.622.23 that multiple entry began with a translation of the summarization into BC notation, using main component classmarks linked by hyphens. The initial entry would be in the 'Preferred' citation order (the one which would be used in a single-entry system) and this would then be 'rotated' in cyclic order to give the additional entries.

7.622.381 It assumed that the citation order (and therefore the classmark) of the initial entry would also be used to shelve the document. Because the hyphen-linked classmarks are longer than those obtained by ordinary retroactive synthesis some libraries prefer to use the latter as the shelf classmark. Very little extra effort is demanded for this since each additional catalogue entry would in any case require a note stating that the shelf location of the document was different from the classmark of that entry.

7.63 Guides in the classified file: Care should be taken to make the order of the classified file as clear and as intelligible as possible. Whatever physical form of catalogue is used, it is important that the classmarks should be accompanied by a sufficient number of interpretative verbal headings as is necessary to do this. For example, in a card catalogue, projecting tab guides carrying classmarks only are of very limited assistance to the searcher. If each one has the name of its last element added to it the searcher can see the structure of the subject he is searching clearly articulated; e.g.

JM	Primary education
JMK	Curriculum
JMK O	Foreign languages

Issues of the BNB from 1950 to 1970 are an excellent demonstration of this practice, usually called 'featuring' (the explanatory verbal element in the heading being the 'feature'.)

7.64 The authority file is a valuable instrument in maintaining consistency and continuity in the application of a classification scheme. A single entry system is assumed in the following brief notes.

7.641 For each BC classmark used a separate card is made out carrying the BC classmark and the A/Z index entries made for it; e.g. if the first document indexed were the title used in 7.612.23, the following cards would be made out and filed in class order:

Card	1	J	Education
			Schools: Education
	2	JM	Primary education

		Elementary education
3	JMK	Curriculum: Primary education
4	JMK O	Languages: Curriculum: Primary education
5	JMK PR	French language: Curriculum: Primary education
6	JMK PRA J	Teaching methods and aids: French language: Curriculum: Primary education
7	JMK PRA JM	Group work: Teaching: French language: Curriculum: Primary education
8	JMK PRA JO	Games: Teaching methods: French language: Curriculum: Primary education

7.642 Assume that the second document to be indexed were about audio materials in teaching French in primary schools. It would be classified as JMK PRA JS and reference to the Authority File would show quickly that all steps of division down to JMK PRA J had already been indexed and only the following two steps in the subject of the second document needed indexing and their cards added to the authority file:

Card	9	JMK PRA IB	Teaching aids: French language: Curriculum: Primary education
	10	JMK PRA IS	Audio materials: Teaching aids: French language: Curriculum: Primary education

7.643 A clear and up-to-date statement of current practice is thus always available. A new classifier can take over with a minimum dislocation and maximum consistency can be maintained.

7.644 Cards 1 and 2 demonstrate the handling of synonyms. These are recorded only at the basic classmark; when compounding only the preferred term is recognized. For example, the Authority file card at JIB, the basic classmark for Teaching aids, would carry all the synonyms for that term:

JIB	Teaching aids
	Educational materials Instructional media Learning aids
	Aids to instruction and learning

But when JIB is compounded with JMK PR only the preferred form, Teaching aids, is used.

7.65 Post-coordinate indexes

7.651 The nature and significance of a post-coordinate index was indicated briefly in Section 4.7. It was noted there that the post-coordinate index was a response to two limitations of the traditional, pre-coordinate index – distributed relatives and limited exhaustivity of indexing.

7.651.1 Some libraries using BC will find that for some part of their stock at least the conditions for which post-coordinate indexing is suited will apply. Examples would be any material for which fairly exhaustive indexing (i.e. beyond summarization) is called for, or for which multiple entry in the permanent catalogue seems to be too expensive a form of indexing (e.g. a collection of research reports).

7.652 Most post-coordinate indexes use some sort of controlled vocabulary into which the terms selected from the document are translated. Such a thesaurus, as it is usually called, indicates for each term its synonyms, variant word forms, and a number of relationships such as broader and narrower terms.

7.652.1 Even when a 'free text' indexing system is used, in which the indexing input consists of terms taken directly from the document and without any translation into a controlled list, there is a need for some controlled list to assist at the search stage and this often takes the form of an ordinary thesaurus.

7.653 The structure of BC can provide considerable assistance in developing some form of controlled vocabulary. The BC itself, of course, is a very large and comprehensive controlled index language, whereas the assumption is that post-coordinate indexing would probably be applied only to a limited field. However, the BC provides for any given subject a basic vocabulary analysed into its facets and arrays and because the latter consist of relatively elementary terms this affords a good basis on which to develop a fuller thesaurus.

In describing the nature of the latter it is necessary to consider the two main features of vocabulary and relationships.

7.654 The vocabulary

7.654.1 The first step in compiling a separate thesaurus would be to list the elementary terms from their facets and arrays. This has already been done for each main class in its A/Z index.

7.654.2 If the library has assembled a more detailed vocabulary in the field in question these should be assigned to their appropriate facets and arrays – and on occasions an array might be indicated which is not in the BC as yet.

7.654.3 The main problem relating to the terms themselves now is that of pre-coordination – e.g. whether, say, the system will represent Battered wives by an intersection of its elementary components, Battered persons and Wives, or by the compound (pre-coordinated) term itself.

7.654.31 Historically, post-coordinate indexing developed in the late 1940s as a system for coordinating single elementary terms (the name of a notable pioneer system was 'Uniterm'). Since then, there has been a strong tendency to accept a considerable degree of pre-coordination. However, experimental tests, as in the Cranfield work, for example, have shown that high recall is more likely with maximum use of elementary terms. One reason for this is that searchers tend to neglect searching under the elementary constituent terms as well as the compound ones when the latter are used.

Pre-coordinated terms have the advantage of adding precision in searching; e.g. the term Children in care is more precise than the intersection of Children and Institutional care, since the latter term covers all aspects of care, whereas the pre-coordinated term conveys the more limited concept of a category of children defined by the circumstance of being in care.

To use Persons in care as the term intersecting with Children would remedy this – but only because it is itself a pre-coordinated term.

7.654.4 If a limited degree of pre-coordination is desired, this may be effected in two different ways:

7.654.41 The Authority file is consulted and all the compounds between the arrays within each facet so far thrown up by the literature can be incorporated to provide a basic set based on literary warrant: Battered wives, reflecting two arrays in the Persons facet, would be an example of such compounds.

7.654.42 A more comprehensive set is established by systematically reviewing all the possibilities. This would be done by taking each array in turn (beginning, say, with the primary array in the primary facet) and considering what compounds might be formed with its members by intersecting with the secondary array, then with the tertiary array, and so on.

For example, in class Q Social welfare, the primary array of the primary facet consists of Deviants (as a particular type of Person in need). These would now be compared with the secondary array Mentally and physically disadvantaged. Few compounds would immediately suggest themselves – e.g. Criminally insane – and checking with the Authority file (or the A/Z index to the collection) might confirm that very few were indeed needed.

Comparison would now be made with the tertiary array Persons by age and rather more compounds would suggest themselves now; e.g. Juvenile delinquents, Young adult offenders.

This procedure would steadily reveal a comprehensive set of sought compounds. For example, comparison of the Age array with the array Persons by cause of need would yield compounds like Battered children, Deserted children.

7.654.43 Compounds should be restricted as far as possible to those between two different arrays in the same facet.

7.654.44 The systematic review could now be extended to compounds between terms from different facets. This is a more daunting task and many indexers would prefer to restrict themselves to listing those compounds actually found in the A/Z index or the Authority list. Two main criteria for acceptance may be recognised:

7.654.441 Frequency of occurrence – e.g. frequently occurring terms like Access to children (Service – Person), Custody of children (Service – Person), Psychiatric social workers (Person – Service – Agent), Dogs for the blind (Person – Service – Agent).

7.654.442 Removal of ambiguity – e.g. Prisoner/Prisoner relationship; Student attitudes. Compounds of this kind make unnecessary the use of role indicators to show what the exact relationship is (e.g. that it is the attitudes of students and not attitudes to students).

7.655 Relationships signalled explicitly in the thesaurus are provided primarily as an aid to the searcher. Most A/Z thesauri provide for each term in the vocabulary up to four different types of related terms:

7.655.1 Synonyms: these are already shewn in BC in the schedules and the index. The indexers may themselves have added to these and recorded them in the Authority file.

7.655.2 Broader terms: simply citing the classmark of a term will send the user to the schedules where the term will be found in its main hierarchy – e.g.

will locate this term in a hierarchy which at a glance shows not only its broader term (Displays, at JIF S) but the broader term of that (Visual materials, at JIF) and so on, ending with Teaching aids at JIB.

7.655.21 The A/Z index will show if a term is a member of more than one hierarchy and if so, the classmark in it would be given, e.g. Computers feature in three hierarchies in Class J Education – as an agent (equipment) in administration, as an agent in teaching and learning, as a subject in curriculum.

7.655.3 Narrower terms: as in the case of broader terms these are revealed at once by citing the classmark, which leads to the schedule display.

7.655.4 Related terms: these are terms in any relationship other than the generic relationship (that of genus/species). Only one such relation is widely recognized and this is the Whole/Part. As in the case of Broader and narrower terms these are clearly seen by reference to the classmark of the concept in question since BC always lists the Part facet of anything immediately before its species (types, kinds). For example, the entry

Patronage (Ecclesiology) PFF P

will reveal at once that this is an element in the Government of a religious organisation (at PFF K). Apart from Whole/Part there is no agreement as to which terms will be selected or how it might be done.

7.655.41 It may be noted that the BC schedules give a comprehensive display of all the different relationships which hold within a class. In addition to showing the genera and species of any given concept and its containing system and subsystem – if it has any the schedule shows the properties, actions, processes, agents, etc. relevant to the field and a searcher may decide for himself which particular ones of these may be worth searching in a particular situation.

8. GLOSSARY

- * This defines and sometimes comments on and exemplifies those terms used in preceding sections which readers may wish to consult quickly. These and other terms will be found in the A/Z index which gives the location of fuller explanations in the text. Terms in the definitions which are underlined are themselves defined in the Glossary and this should be taken as a form of reference to them if further information on the concept is required.

Activities and Processes *see* **Phenomena**.

'**Add**' instruction: an instruction under a class to add letters and/or numbers to a given classmark to produce a synthetic and more specific classmark; e.g.

PFB Religious institutions, ecclesiology

PFH (Types of government, by agent)

Add to PFH letters C/E following PE in PFC/PFE – e.g. Rule by bishops PFH DT.

Here, the added element 'DT' is taken from PDT which is the general class for Bishops as persons in religion. In the new class this takes on the specific meaning of a particular type of church rule.

Alphabetical index:

- (1) index to names (of subjects, persons, etc.) in alphabetical order
- (2) index to the names of elementary classes in facets and arrays in the BC schedules
- (3) index to the names of elementary and compound classes represented in the documents of a particular collection
- (4) in cases (2) and (3) it has two functions: to act as a key to the location of classes; to act as a complementary classification in which those classes which are distributed in the classification have the different contexts under which they are distributed listed under their name; e.g.

Children : Social welfare QL

Children : Education JLG

See also **Index**

Alphabetical subject catalogue: a catalogue or index in which entries are arranged by the names of the subjects stated in the form of subject headings. The latter are given in the direct form (e.g. Delinquent children) so far as one is ascertainable in the natural language. Subject headings may be derived from an enumerated list, such as the Library of Congress subject headings (which is normal American practice) or by chain procedure using a particular classification scheme (e.g. BC) or by generative rules (e.g. British Technology Index, PRECIS, Lynch's articulated index, and Farradane's system. *See also* **Alphabetical index**.

Alternatives: explicit provision of more than one location for a class in BC, allowing the librarian to choose for himself the one best suited to his needs. Sometimes distinguished as (1) alternative locations, implying the same internal arrangement of the class, but in different contexts; or (2) alternative treatments, implying different internal arrangements (citation and filing orders).

Anterior numeral classes: Bliss's name for Classes 1/9 in BC1 (consisting mainly of locations for special collections).

Array: the set of mutually exclusive classes derived from the application of one specific principle of division (e.g. the age of persons; the latitude of geographical areas). *See also* Facets; Notational facets and arrays.

Aspect classification: a term used to describe general classifications which subordinate phenomena (e.g. Children, Carbon, Form, Planning) to the 'aspect' from which these are treated (e.g. Psychology, Medicine, Education, Chemistry, Mineralogy, Economics, Biology). BC is an aspect classification. *See also* **Discipline**.

Attributes *see* **Phenomena**

Authority file: a record, in classified order, of every classmark, simple or compound, used in a given collection together with a note of the term(s) by which it has been indexed in the Alphabetical index.

Auxiliary schedules: tables of classes not to be used on their own but only to qualify classes in the main schedules. Such classes reflect frequently occurring concepts (e.g. Place, Period, Language, Form of presentation) and are given separately as an economy in scheduling. *See also* **Synthesis**.

BC1: Bliss's Bibliographic Classification, first edition.

BC2: Bliss's Bibliographic Classification, second edition.

Bias phase *see* **Phase relations**

Bibliographic classification:

- (1) classification scheme providing classmarks for specific summarisations ('close classification')
- (2) classification of documents as distinct from classification of other objects.

Broad classification: assignment of documents to classes which are broader than their specific summarisation.

Built classmarks *see* **Synthetic classmarks**.

Chain: a string of terms representing classes in successive subordination, each one being subordinate to the preceding one; e.g. the chain

Education – Primary – Curriculum – Reading

implies the subordination of 'Reading in the primary school curriculum' to 'Curriculum in primary education' which is subordinate to 'Primary education', which is subordinate to 'Education'. *See also* **Heading; Hierarchy; Subordination**.

Chain index: an alphabetical index to a classification schedule or to a classified file in which the citation order of the elements in each heading is governed by the position they have in the citation order of the classification; e.g. the chain given in the previous glossary entry would generate (in the BC) the following entries and no others:

Education	J
Primary education	JM
Curriculum: Primary education	JMK
Languages: Curriculum: Primary education	JMK O

The basic rule is: qualification is by superordinate terms only, not subordinate terms; so an entry

Primary education: Curriculum JMK

is disallowed. This is achieved by making the citation order of elements in an entry the reverse of their order in the chain.

Chain procedure: a method for determining the citation order of the elements in the heading of an alphabetical list by the position they have in the citation order of a given classification. Such a list may be a chain index or an alphabetical subject catalogue.

Citation order:

- (1) the order in which the constituent terms of a heading (classified or alphabetical) are taken.
- (2) the order of application of principles of division when a class is divided successively by more than one principle; e.g. if Political science is divided first by Political system and then by Part of system this will be reflected in headings such as

Political science – United Kingdom – Electoral system

Citation order determines what material is kept together and what is distributed or scattered; e.g., using the above citation order the student of Electoral systems finds his material distributed under many different political systems. *See also* Decreasing concreteness; Distributed relatives; Standard citation order).

Class: a set whose members have something in common. In the BC, every class ultimately represents a set of documents having in common the fact that they contain some information reflecting the concept defining that class.

Classification:

- (1) The operation of recognising classes and assigning members to them
- (2) The operation of recognising classes and organising them in a systematic sequence to form a classification scheme

(3) Assigning documents to classes in a classification scheme ('practical classification').

Classification scheme: a set of terms (a vocabulary) representing classes, organised systematically according to the relations between them. The resulting order is maintained in a mechanical fashion by adding a notation in which every class is represented by a unique classmark. An alphabetical index complements this schedule (of terms and notation) by acting as a key to the location of classes and as a display of the distributed relatives.

Classificationist: one who designs a classification scheme.

Classified catalogue:

- (1) A subject catalogue in two parts: a file of subject entries in classified order, and an A/Z subject index to this.
- (2) The classified file in the above pair.

Usually supplemented by an author-title catalogue which may or may not be interfiled with the A/Z subject index entries.

Classifier: one who applies a classification scheme and assigns classmarks to documents.

Classmark: an ordinal symbol representing a class in a classification scheme and applied to documents and records in order to facilitate their arrangement according to that scheme. *See also* Notation.

Close classification: assignment of documents to classes which are co-extensive with their specific summarisation.

Collateral classes *see* **Coordinate classes**.

Collocation: bringing classes together according to the degree of their affiliation or likeness.

Common facets: facets occurring in all or most classes. In BC they are presented as common auxiliary schedules. In some classes, common facets may constitute major facets (e.g. Place in history) and be enumerated especially for that class.

Common subdivisions (CSD): classes which may qualify many different classes and are therefore given their own classmarks which may be applied by synthesis wherever appropriate. In BC they appear in the Auxiliary schedules and take two forms:

- (1) Common form subdivisions, reflecting the form in which the information appears such as non-bookform, serial, essays (*see* Form divisions)
- (2) Common subject subdivisions, reflecting commonly occurring subject qualifications, such as Organisation, Law, Persons and Organisations in the subject, Place, Time, etc.

Comparison phase *see* **Phase relations**

Composite specification: Bliss's term for synthesis

Compound class: a class formed by the intersection of two or more classes from different facets or different arrays of the same main class.

Consensus: the relative agreement amongst producers, users and organisers of information as to the scope of, and relationships between classes. Bliss claimed that a surprising degree of consensus, extending over many centuries, existed at a very broad level as to the major divisions of knowledge.

Concept analysis: that stage in the classification of a document in which the concepts to be recognized in its index description are decided.

Controlled index language: a regulated vocabulary and syntax designed to facilitate the matching of search prescriptions against index descriptions in the retrieval of information. BC is a controlled index language.

Coordinate classes: classes of equal status in a hierarchy so that neither can be said to be subordinate or superordinate to the other. Such classes may be mutually exclusive classes from the same array, or classes from different arrays in the facet (e.g. Persistent offenders and Embezzlers are terms from two different arrays in the Offenders facet of Criminology). In the second case, the term collateral classes is sometimes used.

Coordinate indexing *see* **Post-coordinate indexing**

Coordination *see* **Intersection**

Cross classification:

- (1) Application of more than one principle of division to divide class e.g. animals by structure (to give birds, etc.) and by habitat (to give aquatic, etc.).
- (2) Used pejoratively, the application of more than one principle of division at a time, so that classes are not mutually exclusive, the order is confusing, and the location of compound classes is unpredictable.

CSD *see* **Common subdivisions**

Cyclic order: a formula for deriving different citation orders for entries in a multiple entry system. The initial chain of terms is 'rotated' in clockwise order as though its constituent terms were like figures on a clock face: e.g. an initial chain abcd would be given additional entries under bcda, cdab, dabc.

Decreasing concreteness: a citation order favoured by Ranganathan in the form of five fundamental categories cited in the order: Personality, Matter, Energy, Space, Time.

Dependent facet: those parts of a differential facet which are peculiar (or whose order is peculiar) to a given class, under which it is therefore usually enumerated.

Depth indexing:

- (1) indexing a document beyond the level of summarization so that concepts additional to those defining the overall theme are also recognised;
- (2) indexing to maximum specificity (usually used of 'depth classification').

Difference *see* **Specifier**

Differential facet: a facet of which some terms are applicable only to certain terms from other facets and not to all; e.g. whereas in the class History every term in the Period facet is applicable to every term in the Place facet, in the class Social Welfare some terms in the Welfare services facet are applicable only to certain classes of the Persons in need facet. In BC, those parts of a differential facet which are peculiar to a given class are usually enumerated under that class; e.g. those types of institutional care Peculiar to juvenile delinquents are enumerated under the latter, not in the general facet (Welfare services) containing Institutional care.

Disciplines:

- (1) Distinctive forms of knowledge in which the phenomena of the world (the objects of knowledge) are regarded from different viewpoints, characterised by a specialised body of concepts, a specialised methodology and criteria of validity which are unique to that discipline.

It is convenient to distinguish fundamental disciplines (Philosophy, Mathematics, Empirical sciences, Social sciences, History, Religion, Morals, Aesthetics) from subdisciplines within these (e.g. Physics, Chemistry, Economics, Political science).

- (2) More loosely, generally recognized fields of knowledge (e.g. Mathematics, Physics, Biology, Psychology, Economics) characterised by a distinct object of study, distinctive methods of enquiry, specialised training of practitioners, the existence of professional or learned societies, departments or chairs in colleges and universities, specialised information services, etc.

- (3) A distinction is often drawn between Sciences and Humanities. But whereas Science is a fundamental discipline, Humanities represents a group of such disciplines and there is not complete agreement about the exact scope of these.

Distributed relatives: classes which are related but which the arrangement of the index fails to keep together; e.g. in a History collection, if the citation order observed is Place – Period, information on the Medieval period will be scattered under all the different countries, etc. to which it is subordinated. Usually used of a classified index but true of all pre-coordinate indexes, classified or alphabetical, in a catalogue or bibliography can reduce its incidence.

Division:

- (1) A classification may be viewed as the product of the division of a broader class into narrower classes according to a particular principle of division. It usually implies either the genus-species or the whole-part relationship; e.g. in

the Social welfare class, the class Immigrants – Children would reflect the division of Immigrants by the principle of age; but Immigrants – Counselling services would be regarded as a qualification of Immigrants rather than a division. However, in the looser use of the term division includes intersection – a class is simply made smaller.

- (2) A subclass.

Entities *see* **Phenomena**

Enumeration: the listing of terms, simple or compound, in a classification scheme together with their classmarks, as distinct from synthesis. In a faceted classification enumeration is generally restricted to the elementary terms within their facets and arrays, all compounds being obtained by synthesis. Occasionally, for convenience or clarity, a compound class and its synthetic classmark is enumerated in its correct filing position; its compound nature is usually apparent from its classmark or by being placed in parentheses; e.g. PRF R Roman Catholic ecclesiology, in which the 'FB' is from the general class PFB Ecclesiology; PRF B is then followed by a special expansion of Ecclesiology for Roman Catholicism (an example of a dependent facet).

Enumerative classification: a classification scheme which enumerates a substantial number of compound classes as well as elementary ones. Historically, enumerative classifications do not provide full hospitality (because their notation lacks comprehensive provision for synthesis) and suffer cross classification (pejorative sense) and inconsistent citation orders as a result.

Exhaustivity of indexing: the number of different concepts recognized in the index description of a document.

Summarisation restricts exhaustivity to those concepts necessary to summarize its overall theme; 'depth' indexing adds further terms (which may be implicit in the summarisation as when a document on Safety on ships is assigned an additional index term for Tankers).

Exposition phase *see* **Phase relations**

Expressive notation: notation which, in addition to performing the primary function of showing the relative position of the classes represented, also shows to some degree the relationships between these classes. This may take two forms:

- (1) Hierarchical notation reflects the subordination in a genus-species or whole-part relationship – e.g.

Q	Social welfare
QE	Social services
QEQ	Counselling services

- (2) Structurally expressive notation reflects the qualification of one class by other facets or arrays in the use of distinctive facet indicators which show where the linkage of constituent terms is made. BC notation is structurally expressive insofar as retroactive relation signals the addition of a qualifier by the introduction of a character with an earlier filing value; e.g. in JMK the fact that M is followed by K (which has an earlier filing value than M) signals the fact that JM has been qualified by a preceding facet. It is very doubtful whether any further significance attaches to this, however, or that it contributes in any way to improved retrieval.

By adding a notational symbol for every step of division, classmarks in hierarchical notation tend to become very lengthy. Because of the limited length of character sets (numerals and letters) the principle constantly breaks down and has to be supplemented by quasi-hierarchical devices such as centesimal notation, octave device or zone notation. Insertion of new classes at the correct position is made more difficult. BC notation does not seek to reflect hierarchy although it often does to a limited degree, as in the example above.

Facet: within a given class the total set of subclasses produced by the application of one broad principle of division; e.g. in Agriculture, division by the principle of Place gives subclasses such as England, Scotland, U.S.S.R., Ukraine, tropics, highlands, coastal regions, deserts. The total set of such classes constitutes the place facet of the class Agriculture. *See also* Arrays; Notational facets and arrays.

Facet analysis: the act of assigning terms to their particular facets, either in the compilation of a classification scheme or in the translation stage of practical classification.

Facet filing order: the filing order between different facets, regarded as integral blocks of classes, as distinct from the filing order within a facet. Usually taken to include also the filing sequence between different arrays. *See also* Inversion; Order in array.

Facet formula *see* **Citation order**

Facet indicator: a symbol in a classmark signalling the appearance of a term or concept from a particular facet. In BC the common subdivisions are symbolised by numerals and particular facets (e.g., place) by particular numerals. In BC1,

the comma was used, as was lower-case letter (to indicate the Place facet). *See also* Expressive notation (structurally expressive notation).

Faceted notation: a notation, invariably synthetic, designed to implement fully the requirements for order in a faceted classification – i.e. providing hospitality to all compound classes in the correct order demanded by the scheme.

Featuring: a form of guide to the user of a classified catalogue in which every classmark is followed by the verbal form of the last step of division (last link in the chain); e.g.

Q	Social welfare
QE	Social services
QEQ	Counselling services

The feature may appear on the guide card (or guide headings in a printed catalogue) rather than on each single index entry.

FES *see* **First enumerated subclass**

Filing order:

- (1) the sequence of entries in a catalogue or bibliography
- (2) the sequence of documents on a shelf or in a filing cabinet
- (3) the sequence of classes and subclasses in a classification scheme. In this case, filing order has two separate components: the facet filing order, and orders in array.

First enumerated subclass (FES): in an inverted faceted schedule, the filing order under any given class consists firstly of compound classes formed by all preceding facets and arrays and then of the sub-classes particular to that class (reflecting usually its species, or types, or its parts).

If classmarks for the compound classes are formed by retroactive synthesis the classmark of the first enumerated subclass should be later in filing order than the last preceding array or facet to be added in compounding; e.g.

JL	Educands & educational institutions
JLB P	Private education, fee-paying schools
JM	Primary schools
JMN	Preparatory schools (first enumerated subclass)

Here, under JM Primary schools, the classmark 'N' of the first enumerated subclass (JMN) is later in filing value than 'L', the last preceding array in the 'Schools' facet; this allows the direct addition of 'L' and earlier classes to JM (to give, say, JML BP Private primary schools) without clashing with the enumerated subclasses. Therefore, the filing value of the first enumerated subclass determines whether pure retroactive synthesis can be applied or whether some modification of it (e.g. the use of the intercalator) is necessary.

Flexibility:

- (1) The ability of a classification scheme to provide alternatives. In practice, the problem is notational (Ranganathan said that notation brought rigidity into classification) and such provision has to be built carefully into the notation.
- (2) An older and less precise term for hospitality.

Form classes: classes in which a major principle of division is by literary form or form of presentation or physical form. *See also* **Common subdivisions**.

General-before-special (decreasing extension): a filing order in which a class which completely contains another class files before it; e.g. Great Britain files before England; Child psychology, and Psychology of attention both file before Attention in children. *See also* **Inversion**.

General classification: a classification embracing all classes of knowledge.

Generalia class: the class of documents too general in their subject content to be classified more specifically than 'Knowledge in general'. Usually classified by form of presentation (into encyclopaedias, periodicals, etc.).

Generic relation *see* **Genus-species relationship**.

Genus-species relationship: the relationship between a thing and its kinds or types. In traditional logic, the terms class and subclass implied this relationship, but in information classification many other relationships enter into the definition of classes; e.g. the class Child psychology might include not only generically related subclasses like Psychology of the preschool child but a subclass in a Thing-Action relationship, such as Psychology of memory development in childhood. *See also* **Hierarchy**; **Subordination**.

Gradation in speciality: a filing order in which later classes are 'more special' than earlier classes, not because they are completely contained within these earlier classes (*see* General-before-special) but because they depend on them for certain of their fundamental laws, principles, generalisations or concepts – but not *vice versa*. For example, Biology is considered to be more special than Chemistry in that it needs chemical laws and concepts to explain some of its data – but Chemistry does not need biological concepts to explain its data. The order of the sciences in BC (classes A/I) reflects this principle. *See also* **Integrative levels**.

Heading: the term or terms by which the filing position of an entry in a catalogue or bibliography is determined. The heading reflects the file structure of the index; in a classified catalogue it is essentially a subject description in the form of a chain, but this is represented for convenience by an ordinal symbol or classmark. *See also* Featuring.

Hierarchical notation *see* **Expressive notation**.

Hierarchy:

- (1) An ordered set of classes showing generic relations. This is the original and commonest use of the term; e.g.
Mammals – Ungulates – Equidae – Horses
- (2) An ordered set of classes showing subordinate and coordinate relations, whether these are generic or not, e.g.
Horses – Physiology – Circulatory system – Blood – Leucocytes
This example reflects syntactical relations between the terms in the heading.
- (3) In the second use of the term, hierarchy is that property of a classification schedule or a classified file or a heading in a pre-coordinate indexing system in which one or more terms is subsumed under another. In a pre-coordinate index the heading is merely a reflection of the hierarchical structure of the file and constitutes a chain. So both the headings above reflect hierarchies; the process Physiology in the second example is regarded as subordinate to the entity Horse, just as Horse is subordinate to Equidae in the first example.
See also **Chain**; **Heading**; **Subordination**.

Hospitality: that quality of notation whereby it accommodates new classes and all possible compounds of existing classes.

Index: a guide to the location of information. Usually thought of as an ordered set of entries in a catalogue or bibliography, but in the broad sense it includes an ordered arrangement of documents on a shelf or in a filing drawer. *See also* **Alphabetical index**.

Index description: the set of terms by which a document is represented in an index. In a visually scanned index (e.g. a classified or alphabetical subject catalogue) it takes the form of a heading. *See also* **Exhaustivity of indexing**.

Index language: the set of terms (the vocabulary and the devices for handling the relationships between them in a system for providing index descriptions). It is assumed that requests for information are translated into the same language so that the locating of those particular index descriptions which match a given search prescription is facilitated. In this case, the better name for an index language is retrieval language (where information retrieval denotes the whole problem, covering both indexing and searching). BC is a comprehensive retrieval language.

Indexer: one who assigns index descriptions to a document – e.g. a classifier.

Influence phase *see* **Phase relations**

Integrative levels: a principle for showing relationships between entities which may be used as a principle underlying the filing order of entities in a classification scheme. Entities reflecting a more complex level of organisation file after those reflecting a less complex level; e.g. Elementary particles – Atoms – Molecules – Molecular aggregates... A given level reflects the preceding level plus one emergent property. *See also* **Gradation in speciality**.

Intercalator: a notational symbol which allows the insertion at a required point of one or more qualifying facets. In BC the letter 'A' is often used to replace retroactive synthesis, when the reservation of a large number of letters to accommodate preceding facets and arrays proves inconvenient; e.g.

QF Social security

QFA	* Add to QFA letters A/E following Q in QA/QE
QFC	Social security in UK or favoured country

Intersection: the logical operation of conjunction in which a class is defined by the joint possession of more than one attribute; e.g. those documents which include in their index description both Conversion and Houses belong to the class Conversion x houses, the logical product of the intersection. This class is a subclass of both the intersecting wider classes Conversion (of buildings) and Houses. *See also Compound class.*

Inversion: a principle governing facet filing order whereby the facets file in an order which is the reverse of their citation order – i.e. the first cited facet files last, the second-cited facet files next to last, and so on. The principle extends also to the filing order between arrays in the same facet – the first cited array files last, and so on. The only purpose of inversion is to maintain a consistent general-before-special order; e.g.,

Q	Social welfare
QE	Social services
QEQ	Counselling
QL	Old persons
QLE Q	Counselling

Here, the subordination of Counselling services for old persons to Old persons rather than to Counselling services reflects the citation order, in which Persons are cited before Services:

Social welfare – Person assisted – Service given

But the facet of Persons assisted files after the facet of Services given; as a result, the compound class Counselling services for old persons files after both its containing classes (Counselling services in general, at QE, and Old persons in general, at QL).

Inverted file *see* **Post-coordinate indexing**

Inverted schedule: one which observes the principle of inversion. All BC classes have inverted schedules.

Linear order: a filing sequence, without branching, for visual scanning (e.g. entries in a catalogue, documents on a shelf). Relationships are displayed primarily by juxtaposition and it is impossible to show all the relationships of one class by such an order, hence the central problem of a linear file is that of distributed relatives. *See also Pre-coordinate indexes.*

Literary warrant: the justification a classification scheme has for some of its features because of the nature of the literature being handled. Originally it referred to modifications to logical order caused by such considerations; e.g. at the level of the country or state it is convenient to separate History from Description but at the local level it is not, because a great deal of the literature combines these two subjects at that level. Provision of distinct classes for relatively arbitrary aggregates of subjects – e.g. Heat, light, and sound – is another example. Also used to refer to allocation of notation – classes on which there is much literature are given shorter classmarks.

Logical division: a term from classical logic for the operation of distinguishing the species of a genus. The first rule of logical division is also the first rule of faceted classification that only one principle of division is applied at a time. Bibliographic classification, in the form of faceted classification, extends the notion to include relations other than the genus-species relation; e.g. a thing may be 'divided' by the operations performed on it and a class Harvesting of root-crops is regarded as a 'subclass' of Root-crops.

Logical product *see* **Intersection**

Main class: in a general classification, the broad classes into which knowledge is divided before facet analysis begins and for which there is no broader containing class (or at the most, one or two only). A loose but useful term which is often thought of in notational terms – i.e. a main class is one represented by a single letter or numeral. The latter use is inappropriate in BC where a 'main class' may be spread over several letters (e.g. History L/O) or have a two-letter classmark (e.g. Occult PX or Recreation UY). *See also Notational main class.*

Matching: the basic operation in searching an index; when an index description is found which exactly matches the search prescription it is assumed that the documents carrying that index description are likely to be relevant and are therefore retrieved. *See also Index language*

Mnemonics: devices in the index (particularly in classmarks) which assist the memory. Synthetic notation automatically generates a slightly mnemonic quality – e.g. in BC the symbol 8E in a classmark which invariably means 'Great Britain'. BC also has a number of literal mnemonics – e.g. C for Chemistry.

Multi-disciplinary work: a document which deals with a phenomenon from many different aspects; e.g. a work on the horse which considers it from the viewpoint of zoology, evolution, sport, animal husbandry, warfare, etc. In BC, such a work may be placed in the phenomena classes (4/9) or with that single discipline reflecting its unique definition or its main purpose.

Multiple entry system:

- (1) In the classified file of a classified catalogue, a document may be given as many entries as there are different elements in the index description. Each entry has a different citation order so that each element acts as the lead term in one entry. This means that all aspects of that element will come together in the catalogue and the incidence of distributed relatives therefore is very much reduced. For example, if abc represents the three elements of a compound class description, entries are made for it under abc, bca and cab. The notation must be able to represent a compound class in these different ways. In BC, this is done by using the hyphen to link the separate elements; e.g.

QL-QEQ Old persons – Counselling services
QEQ-QL Counselling services – Old persons

- (2) A similar policy may replace the full chain index in the alphabetical file of a classified catalogue, whilst in the classified file each document still has only a single entry. *See also* **Single-entry system**.

Mutually exclusive classes: classes from the same array which cannot, therefore, intersect to form a compound; e.g. one cannot have a class Plastic wooden furniture, since Plastic and Wooden are both from the same array (Furniture by material used) and therefore exclude each other.

Narrow classification *see* **Close classification**

Non-expressive notation *see* **Ordinal notation**

Notation: a system of ordinal symbols standing for the classes of a classification scheme. The relative position of each class is thereby made immediately apparent and the order (of documents on a shelf, entries in a catalogue, etc.) maintained in a mechanical fashion. *See also* **Expressive notation; Ordinal notation**.

Notational facets and arrays: in BC, using retroactive notation, the notational problem of qualifying any given class depends on whether one is adding a class sharing the same initial letter (or number) only or sharing the first two letters (or numbers); for example, to qualify QL Social welfare of children by QEL Institutional care in the first case or to qualify JLD M Boarding schools by JLB P Private schools in the second. A convention useful in stating the rule is to call the first instance compounding of facets and the second compounding of arrays; hence, notationally a facet in any main class consists of all terms sharing the first letter or number division (e.g. all terms in QL) and an array consists of all terms starting the first two letters or number divisions (e.g. . all terms in QLN).

Notational main class: in BC, using retroactive notation, a useful terminological convention is to call any class consisting of a single letter or number a main class.

One-place system:

- (1) A pre-coordinate index in which all the entries relating to a given concept will be found in one place – i.e., there are no distributed relatives. It implies a multiple entry system covering all possible combinations of the different elements; e.g., an index description containing five elements would need sixteen entries.
- (2) Used by James Duff Brown to describe his *Subject Classification* (1908) which collected in one place many aspects of a given phenomenon (Brown called it a 'concrete').

Order in array: the filing order of the mutually exclusive terms in an array. Where it is helpful a systematic order is followed; e.g. a chronological order of periods in history, or of technical operations in a production sequence.

Ordinal notation: a notation which makes no particular attempt to be expressive, but concentrates on the primary function of notation – to convey location or relative position; e.g., AZ may be a class of which B is a subclass. Strictly speaking it should be called 'purely ordinal' since all notation by definition is ordinal. BC notation is purely ordinal and as a result is able to achieve complete hospitality and to be considerably briefer than equivalent hierarchical notations.

Ordinal symbols: symbols conveying the relative position of classes in a classification scheme. Classmarks in a notation must consist of ordinal symbols; if symbols are used which do not normally possess ordinal value, such a value must be assigned to them; e.g. the hyphen in BC (used in multiple entry systems) files after numerals and before letters.

Phase relations: a limited number of relations, conventionally regarded as not falling into the usual facet or array relations; e.g., influence of one subject on another (influence phase); comparison of one subject with another (comparison phase); exposition of one subject in terms of another (exposition phase); presentation of one subject in a manner suited to the needs of a different subject field (bias phase). Originally conceived by Ranganathan as a relation between different main classes, as distinct from intersection between terms within the same main class, but seen later to operate at all levels (between main classes, facets and arrays). The particular compound formed by two classes linked in a phase relation was called by Ranganathan a complex class. In BC2, phase relations are provided for in the common subdivisions at 9C/9J and examples can be seen there.

Phenomena: objects of knowledge and experience, concrete or abstract, as distinct from forms of knowledge (represented by disciplines and sub-disciplines). BC2 recognizes three major categories of phenomena:

Entities (things, substantives, existents) – e.g. child, diamond, economic system, Russia.

Activities and processes (of the entities) – e.g. change, planning, design, pollution, evolution

Attributes or properties (of entities, activities and processes, and of attributes themselves) – e.g. form, symmetry, rhythm.

Phenomena classes: classes in which multi-disciplinary works are located – e.g. a work dealing with all aspects of the Shell (in Zoology, Palaeontology, Symbolism, Economics, Decoration. etc.). In BC2, classes 4/9 are phenomena classes, as distinct from the 'discipline' classes at A/Z; but an alternative allows them to be collocated with the most suitable discipline class.

Post-coordinate indexing: a system of indexing in which a document is represented initially in the index by a set of separate, relatively elementary terms (e.g. Sugarbeets, Tops, Fertilizers). Coordinating of elementary terms (to give, say, Sugarbeets – Tops – use as Fertilizer) is effected only after a request for such a compound class has been received (hence post-coordination). The file may be organised in two different ways: (1) as a file of the terms, each one accompanied by a complete list of codes (usually accession numbers) denoting the documents which contain that term in their index description. This is called an inverted file, or item-on-term; (2) as a file of document entries (usually in accession number order) each entry carrying its full index description. This is called an uninverted, or term-on-item file.

Matching is usually achieved with mechanical or electronic assistance and consists of identifying which items contain in their index description all the terms making up the search prescription.

Practical classification: assigning a classmark from a given classification system to a document.

Precision: the accuracy with which an index can isolate those documents relevant to a request from those not relevant. Stated as a ratio (the number of relevant documents retrieved divided by the total number of documents retrieved) it constitutes a major performance measure in retrieval testing. Precision tends to vary inversely with recall.

PRECIS: acronym for PREserved Context Indexing System, used to produce a specific summarisation of a document in the form of a string of terms, each of which is labelled with a role operator. This string constitutes a subject heading in an alphabetical subject catalogue. This initial string can then be manipulated by computer to produce as many additional entries (each with a different citation order) as there are key words in the string. PRECIS was developed by Derek Austin for the (classified) *British National Bibliography* which uses it for its A/Z index. It is a relatively simple matter to translate PRECIS strings into BC2, thus saving the indexer the concept analysis stage of practical classification.

Precoordinate indexing: conventional indexing, in which a document is represented in the index by a heading (or headings) consisting of a chain of terms. The leading term determines the position of the entry, i.e. the qualifying terms are subordinate to it. The latter are usually sought by references to the heading, but a system of multiple entry may greatly diminish the extent to which this is necessary. The structure of the heading is determined on receipt of the document and attempts to anticipate how users are likely to consult the index (e.g. by entering a document on Victorian London under London, not Victorian era). Because this coordination of terms in the index description is decided before any particular request is made, the index is called a pre-coordinate one.

Preferred order: the citation order chosen to determine a particular arrangement of classes.

Qualification *see* **Qualifier**.

Qualifier: any non-lead term in a heading which is not in a genus-species relation to the leading term; in a subject heading such as Root crops – Storage the qualifier represents a subclass, as it does also in the chain which underlies the heading in a classified file. In an alphabetical subject index heading the qualifier represents a wider context from which the leading term's concept is viewed – e.g. Storage: Root crops. *See also* **Specification**.

Recall: the retrieving of relevant documents in a search. Stated as a ratio (the number of relevant items retrieved divided by the total number of relevant items in the collection) it constitutes a major performance measure. It tends to vary inversely with precision.

Retroactive notation: a system of notation for an inverted schedule in which synthesis is effected by adding any preceding classmarks directly to a later one. For example:

J	Education
JA	Principles of education
JB	Educational administration
JK	Curriculum
JL	Schools by characteristics other than stage of education
JM	Primary schools
JMN	Preparatory schools

The first enumerated subclass of JM Primary schools JMN Preparatory schools is assigned a letter (N) later in filing value than those introducing preceding classes (A for Principles of education, B for Administration L for Curriculum) so compounds can be formed by direct addition of these to JM (e.g., JMK Primary school curriculum) without clashing with the enumerated subclasses.

Rotated index:

- (1) multiple-entry system in which the same heading appears, although with different citation orders, in as many entries as there are significant elements in it. Each significant element becomes the leading term in one of the entries.
- (2) narrowly, a multiple-entry system in which the different citation orders are determined by cyclic order.

Schedule: the physical (usually bookform) display of the terms, classmarks and connectives of a classification scheme. More narrowly, the classified section of the scheme, as distinct from the A/Z index.

Search prescription: the set of terms by which a request is represented when searching an index.

Single-entry system: a pre-coordinate indexing system in which a document is usually assigned one entry only in the subject file, with its heading reflecting a selected citation order. Often used in the classified file, in which case the distributed relatives are shown by a complementary A/Z subject index.

Species *see* **Genus/Species relationship**.

Specific entry: an entry whose index description is coextensive with the specific subject of a document's summarisation; e.g., if a document is accurately summarized as being about the 'Descriptive cataloguing of slides in school libraries' then index descriptions such as 'Cataloguing of slides in school libraries', or 'Descriptive cataloguing of non-book materials in school libraries' would not be specific, since they represent classes which are broader than the summarization.

Specific subject of a document: its precise subject as distinct from one which is broader in extension.

Specification: distinguishing a species of a thing as distinct from qualifying it by a non-generic relationship; e.g. Houses, Timber reflects specification whereas Houses – Timbers (for) reflects qualification. *See also* Qualifier.

Specificity: the degree to which a given index description matches the exact generic level of the document information content it seeks to define. Or, the degree to which a search prescription matches the exact generic level of the class of information sought.

Specifier: a term in an index description or classification scheme which defines a species of something by a characteristic occurring elsewhere in a different relationship; e.g. to define a species of house by its material, as in Houses, Timber, when the defining term appears also as a member of the Materials facet. BC frequently synthesizes species in a class by adding classmarks derived from preceding facets – e.g. in Class Q Social welfare an array of Persons defined by welfare action received, such as Children in care – which draws on the preceding Welfare action facet for its term .

Standard citation order: a citation order of general application based on the action of dependence (as when, for example, a part implies a whole, an agent implies an action, a property implies something having that property). Usually summarised as: Thing (end-product, ultimate object of study) – its Kinds – Parts – Materials – Properties – Processes – Operations on it – Agents (of processes or operations). BC uses standard citation order as far as possible in all its classes.

Subfacets *see* **Arrays**.

Subject headings: the headings in an alphabetical subject catalogue.

Subject index: strictly speaking, any index of which the index descriptions refer to subjects (as distinct from other characteristics of documents, such as author). But often used loosely to mean the alphabetical subject index to a classified file.

Subordinate classes: classes which are entirely contained by another (superordinate) class. In bibliographic classification, such classes need not be in a genus/species relation; e.g., in Class Q Social welfare, Counselling services to old persons is regarded as subordinate to Counselling services (in general) and to Old persons (in general). In a precoordinate index, most subordinate classes are distributed relatives the exception being species of a genus when the latter belongs to the primary facet. *See also* **Chain; Gradation in speciality; Hierarchy**.

Subordination:

- (1) Logical subordination of species to a genus.
- (2) Subordination of syntactically related terms in a composite heading.

See also **Chain; Hierarchy; Subordinate classes**.

Summarisation: the use of index descriptions which summarize the overall theme of a document as distinct from its subsidiary themes and terms. *See also* **Depth indexing; Exhaustivity of indexing**.

Superordinate class: a class which entirely contains another (subordinate) class.

Syntactic relations: non-generic relations between the terms of a heading or index-description. Relations between facets are syntactic. *See also* **Chain; Genus-species relation; Hierarchy; Subordination**.

Synthesis: a method of achieving hospitality in notation by providing for the building of classmarks for compound classes. This is done by adding all or some of the classmark of one constituent element to that of another according to strict rules; e.g. in BC the classmark JMK O3J is a synthetic one, built up from JM Primary schools, JKO Curriculum – Foreign languages, and JJ Teaching methods. The use of auxiliary schedules also implies synthesis.

Synthetic classmark: one derived by synthesis as distinct from simple enumeration.

Systematic order: classified order, as distinct from alphabetical order.

Thesaurus:

- (1) An indexing language, for use primarily in post-coordinate indexing. It consists of a vocabulary of terms in A/Z order with an indication under all or most terms of other terms related to them in some way. Indication of generic relations may be provided in the form of classified hierarchies which complement the A/Z list.
- (2) Thesaurus is, in its original meaning, an indexing language, primarily for use in post-coordinate indexing, which contains both an alphabetical and a classified display of its terms.

Unique definition, Place of: that class which provides a given concept with its most fundamental defining characteristics; e.g. Zoology provides the place of unique definition for the concept Horse.

Verbal extension: term(s) in the natural language added to a classmark when the latter is not specific. It acts as a temporary device for maintaining specificity in the index until a specific classmark is assigned. Signalled by 'square-bracket one' [1] in the *British National Bibliography* until 1970.