

Broad System of Ordering (BSO) by Keiichi Kawamura. Tokyo, Jusionbo, 2023, 91p.

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1. Introduction

The *Broad System of Ordering* (BSO) was constructed at FID in association with UNESCO in the framework of the UNISIST programme (a World Science Information System) and was intended as a switching mechanism for various indexing languages. The project was instituted by the FID/SRC (Subject-field Reference Code) Working Group in January 1973 and succeeded by the FID/BSO Panel in September 1974. The first hard copy publication containing 4,000 terms was published as the BSO 3rd revision in 1978. *The BSO Manual* published in 1979 gave a more extended treatment of the topics briefly touched upon in the Introduction to BSO and included a specimen file of 750 directory entries of real-life specialized organizations and secondary information services.

The FID/BSO Panel carried out the BSO Switching Test of 1981 and the BSO Referral Test of 1982/83. Revision of BSO was proposed based largely upon the findings and experience of the two field tests. However, in 1990, BSO lost the support of UNESCO and FID (the latter of which dissolved in 2002), because of their financial crises. In 1991, the BSO Panel, which had taken over the copyright of BSO, released the BSO 4th revision containing 6,800 terms in machine-readable form.

While BSO was developed in the framework of the UNISIST programme, the classification scheme of BSO in many respects reflected the work of the Classification Research Group (CRG) in London. This owed much to the efforts of Eric Coates who was one of the original members of the CRG and played a major part in constructing and testing BSO. In 2000 BSO came under the management of the University College London, School of Library, Archive and Information Studies (UCL/SLAIS, now the Department of Information Studies) which was the base of the CRG. They set up a website for BSO, and the 1994 updated version of the BSO 4th revision has been made available online free of charge.

2. Concept of a broad ordering system

The whole idea of switching between indexing languages is based upon the assumption that, however local indexing languages may differ, there is agreement as to the nature and relations of the concepts there represented. In other words, diversity belongs to the plane of language and terminology, but agreement belongs to the plane of thought and idea. Switching is accordingly feasible on the plane of thought and idea on which agreement exists. Switching is achieved through the construction of two-way equivalence or conversion tables between the switching language and each of local indexing languages. It is much easier to form these equivalence tables if the switching language is presented in a systematic form. Thus, the proposed switching language for UNISIST should be a 'broad classification'.

However, the FID/SRC Working Group had considerable difficulties in arriving at an operationally satisfactory and practicable definition of what was to be understood by 'broad'. Arithmetical approach, hierarchical approach, linguistic approach, etc. were discussed, but all these approaches proved fruitless. The criterion adopted for what was

to be included in the scheme rested upon the extent to which organizational activity and institutionalization were manifested in relation to the subject field or area of study. The particular manifestation for which the Working Group looked was the existence of an 'organized information source' devoted exclusively to the subject, and if it is found the subject should have its own BSO code. Organized information source was then further particularized as: (a) an organization supporting or sponsoring the regular issue of specialist information; (b) an abstracting and/or indexing service; (c) an information collection (such as a library or a data bank); (d) a chair of university teaching; and (e) a special subject field periodical. The criterion for cut-off of detail in BSO was a form of 'institutional warrant', but the categories (d) and (e) were dropped by the FID/BSO Panel after much consideration. This resulted in a compilation of 4,000 terms.

Table 1: First outline of BSO

088	Phenomena & entities from a multi- or non-disciplinary point of view	460	Education
		470	Human needs
		475	Household science
		477	Work & leisure occupations
		480	Sports & games
	SUBJECT FIELDS		
100	Knowledge generally		
112	Philosophy		
116	Science of science	500	Humanities & social studies
118	Logic	510	History & related sciences
120	Mathematics	520	Area studies
125	Statistics & probability	527	Society
128	Computer science	528	Social groups & communities
140	Information sciences	530	Social Sciences
150	Communication sciences	533	Cultural anthropology
160	Systemology & cybernetics	535	Sociology
165	Management	537	Demography
182	Research	540	Political science & politics
186	Testing & trials	550	Public administration
188	Metrology	560	Law
		570	Social welfare
200	Science & technology (together)	580	Economics
		588	Management of enterprises
203	Natural sciences		
205	Physical sciences	600	Technology
210	Physics		
230	Chemistry	910	Language & literature
250	Space & earth sciences		
300	Life sciences	940	Arts
359	Applications of life sciences	943	Plastic arts
360	Agriculture	945	Graphic fine arts
368	Veterinary science	947	Photography as art
370	Forestry	949	Decorative arts & handicrafts
380	Wildlife exploitation	950	Music & performing arts
390	Environment		
410	Biomedical sciences	970	Religion & atheism
445	Behavioural sciences		
450	Psychology	992	Esoteric practices & movements

3. Structural features

The first outline of BSO is presented as Table 1. The notation uses Arabic numerals as the main symbol set. All BSO codes begin with a member of the millesimal array 000 to 999, and subject subdivisions are shown by one or more two-digit groups from the centesimal array 00 to 99. The notation thus has a regular pattern of 3,2,2 ... digits.

BSO is a discipline-oriented general classification, so that provision is made for coding multi- or non-disciplinary subjects at 088: Phenomena and entities. Also, on the basis of identified institutional warrant, there are three insertions of non-disciplinary material in the main sequence of subject fields as: 470 Human Needs, covering Food, Clothing, Housing and Leisure; 520 Area Studies, which are multidisciplinary in character; and 528 Social Groups and Communities, such as Women, Racial Minorities, the Aged and the Disabled.

Apart from 088, the outline of BSO can best be understood as comprising three sections: (1) Area 112 to 188, a series of methodological sciences and techniques applicable to many fields, and necessary tools for activity in the subject fields 200 to 890. (2) Area 203 to 588 shows influence of the 'theory of integrative levels', i.e. a sequence of sciences ranging in ascending order of complexity of the phenomena and entities concerned, beginning with the physical sciences (205), and passing through the life sciences (300) to the social sciences (530). (3) Area 600 to 992 is a sequence of subject fields each of which is centred on humanly generated products of a technological, linguistic, artistic, or spiritual kind. On the issue of the collocation or separation of science and technology, BSO has favoured separation as the lesser of evils. But agriculture (360) is collocated with the pure biological sciences (310) and medicine (420) is collocated with human biology (411). The difference is in the level of control, i.e. agriculture and medicine are fostering activities in which vital processes are selectively aided or steered by man, whereas processes in the technologies (600) associated with physics (210) and chemistry (230) are much more completely controlled by man.

4. Syntactic relations and combination facilities

Within each subject field, the schedule details are arranged in a facet pattern, which is 'repetitive' or possessing 'structural isomorphism' from subject field to subject field with only slight variations. The basic facet pattern of BSO is as follows:

- (1) Tools or equipment for carrying out operations
- (2) Operations (i.e. purposive activities by people)
- (3) Processes, interactions
- (4) Parts, subsystems of objects of action or study, or of products
- (5) Objects of action or study, or products, or total systems

BSO has comprehensive facilities for combining notational elements to represent composite subjects. Within a 'subject field' or 'combination area', elements of composite subjects are cited in 'reverse schedule sequence'. Below is a partial extract from the schedule:

- 570 Social welfare
- 573 Social welfare & relief against particular social ills
- 573,50 Disaster relief & aid
- 575 Social welfare & relief for particular social groups
- 575,32 Child welfare

The procedure for internal combination is a simple clerical one that links notations in 'reverse schedule sequence' in accordance with the usual 'principle of inversion' in faceted classification. For example, the so-called compound subject "Child welfare in disaster relief" is given by citing first the element given later in the schedule (i.e. 575,32 Child welfare) followed by that given earlier (i.e. 573,50 Disaster relief) and deleting the first digit (5) of the second notation element (573,50) and inserting a regular linking symbol (,) in the space created, giving 575,32,0,73,50. From the viewpoint of facet pattern already mentioned, the cited first element in the above example, namely the concept Child belongs to facet (5), and the cited second element, the process which requires a welfare operation to be undertaken, namely the concept Disaster, belongs to facet (3). Facet (4) is inapplicable to this subject field. Facet (2) is applicable but has no role in this combination because the operation, Welfare already defines the whole 'combination area'. Facet (1) would be applicable if a particular kind of welfare agency were to be specified.

For combinations containing elements drawn from different disciplines, citation order is governed by the following relational formula:

Cite first: the notation for the element denoting 'application area', 'mission', 'purpose', 'end-product' or 'whole system' (in short 'recipient').

Cite second: the notation for the element denoting 'aspect', 'approach', 'action applied', 'agent', or 'part of a stated whole' (in short 'aspect contributor').

For example, so-called complex subjects constituted of 450 Psychology and 460 Education are expressed as follows (a hyphen or dash is the external combination device):

450-460 Education in Psychology (or Psychological education)

460-450 Psychology of Education (or Educational psychology)

In the first subject (450-460), Psychology is the 'application area', while Education is the 'action or process applied' to Psychology. In the second (460-450), Education is the 'application area', while Psychology is the 'aspect or approach'. Thus, it is necessary to consider, on the plane of meaning, the relationships between the two elements forming the composite concept.

The schedules of BSO are constructed by considering both facets and relations. There are two kinds of relational formula behind two kinds of combination. An external relational formula is described as above. An internal relational formula is concealed behind the facet pattern, but it exists in the schedules themselves. Each relational formula is quite general in the sense that it represents a grouping of several different kinds of relations. For example, analysis of relationship between two concept elements in the above-mentioned compound subject brings an internal relational formula to light as below:

Child welfare (Application area) 575,32

Disaster relief (Action) 573,50

Child welfare in disaster relief 575,32,0,73,50 (internal)

In addition to the facet structures embodied in each subject field, there are three generally applicable facets: Time, Place and Optional facets. Time (subdivision of -01) and Place (subdivision of -02) common facets are dealt with as in document classification. These are unexceptional, apart from the detail that the ISO 3166 alpha-2 code (e.g. GB, JP, US, etc.) is used for notation of individual country names. The Optional facet in BSO is analogous to Form Divisions in document classifications. The facility will also have

general practical value in helping classifiers to discriminate elements of subject field information from those of type of information source. The facet indicator for the Optional facet is shown in notation as two spaces. For example, an information source title as the *British Technology Index* (BTI) is coded as:

600 33-026,GB An index (33), originating in Great Britain (-026,GB), on technology (600)

5. Individualization of subjects in two empty classes (088 & 890)

To individualize every multidisciplinary subject at 088, BSO uses the principle of ‘unique definition’ or ‘uniquely definable class’, which was first suggested at the CRG in the 1950s. Most phenomena and entities are uniquely defined in terms comprehended by a particular discipline. For example, the class of entities “Insects” is uniquely defined in zoological terms, not in terms of systems of invertebrate exploitation, nor in terms of the properties by which insects may be pests, nor in terms of their role in mythology. Individualization is achieved by adding to 088 the BSO number for the entity or phenomenon as found in the class within which it is uniquely defined. Thus Insects receive different treatments as follows:

088,345,46 INSECTS, All or many aspects
345,46 INSECTS, Zoological aspects only

Besides 088, there is another empty class provided in BSO. It is class 890: Manufacture and technology of particular products not scheduled in the foregoing fields 600 to 878. The purpose of some products, such as Switchgear, is simply to contribute to more complex technology. Similarly, for example, 877,60 Cloth and fabric technology does not schedule manufacture of clothing as a product. In BSO products defined by purpose or designed for a particular purpose are classified at the end of the Technology schedule at 890, and individualized by reference to the BSO code for the particular purpose, elsewhere in the scheme. In the above case the technology of the purpose-defined product Clothing is classified at 890,472. The 472 is taken from the root Human Needs code for Clothing. Other examples are:

890,150,42 Stationery manufacture
890,420,22 Medical instruments manufacture
890,953 Musical instruments manufacture

6. Possible applications of BSO

BSO was expected to serve other purposes besides the original switching role. In the middle of the 1980s FID released a publicity leaflet in which nine distinct categories of possible BSO applications were shown. These categories were recognized by the FID/BSO Panel as known regular usage of BSO, and late in the 1990s the tenth category began to draw attention as follows:

1. Overview of knowledge
2. Subject indication quasi-standard, directory codes, codes for disseminated reports, trade literature
3. Aid to compiling information languages (i.e. indexing languages)
4. Medium for switching between information languages
5. Referral tool for online terminals

6. Adjunct subject code for files using computer title-word search for in-depth subject retrieval
7. Sole subject code for information file
8. Knowledge base for expert systems research
9. Teaching model for classification studies in schools of library and information science
10. Information language for use in retrieval as a search aid and/or teaching aid in general education

The last category is the ultimate usage of an indexing language. This means that the acquisition of an information language and an understanding of classification will improve each user's effectiveness in retrieval in the age of an information-skilled society, where ability to come to terms with, and to navigate through, the diversity of knowledge fields would be an essential part of the required skills. It should be emphasized that BSO is designed for users as well as classifiers.

7. How to cope with lack of specificity

BSO is a non-explicitly faceted classification. The non-explicitly or implicitly faceted classification of BSO is partly due to (1) the criterion of 'institutional warrant', i.e. facets may be empty or contain only one or two terms, and is partly due to (2) the BSO's unusual stance on facets. In relation to the latter Coates argued, "It is, in fact, a faceted system, though it has not been thought advantageous to set out the facet structure explicitly and in a formal manner in the schedules". Moreover, Coates explained, "To the classifier matching concepts and forming combinations according to rule, facet statements have a rather limited use. ... it is not requisite to have this knowledge in order to be able to classify by BSO".

To cope with BSO's lack of specificity, a tentative remedy called 'verbal features' was suggested by the FID/BSO Panel. For example, under the caption of Ethology (318,50), there is:

318,59 Protection *Includes mimicry and coloration

This means that each of mimicry and protective coloration shares the notation of 318,59 with Protection as a general topic and with other possible subdivisions of Protection. The tentative remedy is to add a further "digit or symbol" to the notation, together with 'verbal features' such as Mimicry and Protective coloration as follows:

318,59,Mimicry

318,59,Protective coloration

The effect of above measure would result in the following block structure in which subjects are logically ordered:

318,50 Ethology

318,59 Protection

318,59- Protection (External combinations)

318,59, Mimicry

318,59, Protective coloration

318,59,0, Protection (Internal combinations)

318,59,10 to ,99 (Possible future expansion under Protection)

This kind of remedy had been practised as 'verbal extensions' during the early twenty-years (1951-70) of the *British National Bibliography* (BNB) commenced in 1950 under

the editorship of A.J. Wells, and Coates was Chief Subject Cataloguer. BNB employed the *Dewey Decimal Classification* (DDC), but the scheme matched up neither to the specificity required even at book level, nor to the need for a consistently ordered display of classified material. To mitigate this problem BNB adopted Ranganathan's method of facet analysis using the PMEST formula. The superimposition of the facet formula on a non-faceted scheme of DDC was carried out without notation. For the insertion of 'verbal extensions', BNB devised the symbol [1], the 'ordinal value' of which was between 0 and 1, and additional faceted terms followed the symbol. In the case of BSO semantically empty punctuation symbols, i.e. comma and hyphen/dash, each of which has an assigned 'ordinal value' and is positioned in the prescribed 'filing order' as represented above, play an important role in adopting 'verbal features'.

It must be added that an accumulation of faceted extensions was published as the *Supplementary Classification Schedules* by BNB in 1963, and that the publication became a useful guide to an official revision of DDC. In connection with BSO, Coates envisaged a new method of updating, where an updating decision would be a matter of application of agreed rules by a central bureau, with the participation of users, rather than a search by an expert committee for a consensus (which may not exist) or for a collective intuition. This plan was based on his belief, "If the initial scheme is sufficiently structured according to underlying principles which can be communicated, then updating decisions can be swift and the task of the bureau itself". In short the answer is in the BSO schedules themselves. Coates expressed himself paradoxically as below:

"I am in favour of a revolution, not of classifications, but of the management of classifications".

8. Conclusion

BSO incorporates many features drawn from post-1945 classification theory, including the work of the CRG, which have not previously found expression together in completed general classification schemes. The first outline of BSO shows a world view reflecting the division of labour and institutionalization (see Table 1). The schedules are constructed by considering both facets and relations (see Section 4). As a result BSO possesses the property of structural 'transparency' and operational 'simplicity', which makes it both 'non-ambiguous' in use and 'predictable' in updating. The FID/BSO Panel asserted that there was no practical nor technical reason which would bar expansion of BSO in order to be usable for classification for documents. One would probably recognize the potential capacity of BSO. However, the potential capacity will be buried in the history of library classification unless the present status of BSO is improved. What is needed is stronger institutional support or organizational backing than now, which will make it possible to set up a permanent office and full- or part-time personnel.

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