THE CLASSIFICATION RESEARCH GROUP AND THE THEORY OF INTEGRATIVE LEVELS

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ABSTRACT

The Classification Research Group (CRG), formed in the UK in 1952, has been one of the most significant contributors to classification research and theory in the latter half of the 20th century. The theoretical work of the Group has involved the study of facet analysis, relational operators, and the theory of integrative levels. The CRG opposed the traditional top-down approach to classification, whereby areas of knowledge are predetermined and then broken down into their constituent elements. The CRG was interested in first piecing together individual elements and then determining the areas of knowledge they form. The CRG looked towards the theory of integrative levels to provide them with the basis for this bottom-up approach to classification. This paper explores and evaluates the CRG's efforts to apply the theory of integrative levels to the construction of bibliographic classification systems.

INTRODUCTION

The Classification Research Group (CRG), formed in the UK in 1952, has been one of the most significant contributors to classification research and theory in the latter half of the 20th century. A perusal of the reports ("Bulletins") produced by the CRG indicates that the Group has been actively involved in the creation of several classification schemes for such organizations as, Occupational Safety and Health (Geneva), Research and Control Division of Allen and Hanbury Limited, and the Bibliography of industrial diamond applications (CRG 1962). The theoretical work of the Group has involved the study of facet analysis, relational operators and the theory of Integrative Levels.

Phyllis Richmond (1988) considers the contributions of the Group to be of a unique and essential nature to the library and information science profession:

> The Classification Research Group is unique. It has also filled the gap between theory and practice, in such areas as the production of viable formats for use with computers. It has contributed to a number of new areas. For example, a major contribution related to general system theory has to do with pattern recognition. Patterns occur in nature and can be identified...members of the Group produced original, well-organized logical systems, applicable to new or revised needs of the various communities which they served...[and] have managed to close the gap between universal classification systems and highly specialized ones. (246-48)

Due to the diversity of the CRG's efforts, an examination of the Group's contributions to classification theory would require a work of great length and detail. The scope of this paper is therefore limited to an exploration and evaluation of the CRG's efforts to apply the Theory of Integrative Levels to the construction of a universal bibliographic classification system.

The Katharine Sharp Review, Summer 1995 [http://edfu.lis.uiuc.edu/review/summer1995/spiteri.pdf]

ORIGINS OF THE CRG

During the Royal Society Scientific Information Conference held in London in 1948, a scientific committee, led by Professor J. D. Bernal, was established to study the nature of classification and of existing bibliographical classification systems. Within two years, B. C. Vickery was asked to convene a group of interested librarians to continue the discussions, and in 1952 the Classification Research Group was formed (Foskett 1971).

CRG OBJECTIONS TO TRADITIONAL SYSTEMS OF CLASSIFICATION

The common viewpoint held by the members of the CRG was their rejection of "all the existing classification schemes as unsatisfactory, in one way or another, for the demands of modern documentation" (Foskett 1971, 141). The CRG suggested that in traditional classification systems, such as the *Dewey Decimal Classification* (DDC) and the *Library of Congress Classification* (LCC), the universe of knowledge is first broken down into various self-contained disciplines, which are further broken down until, in theory, every conceivable concept can be located in the classification schedules (Austin 1969a).

The CRG objected to the assumption that a finite universe of knowledge could be defined, let alone subdivided into all its individual concepts (Wilson 1972). The Group maintained that the discipline-oriented approach used by most traditional classification systems could lead to several problems:

(a) the difficulty of keeping the systems up-to-date;

(b) the difficulty of fitting in new subjects into a established system of notation (i.e. the question of hospitality);

(c) authors often combine ideas which may not fit into any one known discipline, which may lead to cross-classification;

(d) the systems present a rigidly specified network of pathways leading to rigidly grouped collections of items. (Austin 1969a)

The CRG wondered if, instead of breaking down the universe of knowledge into classes and analyzing these classes to arrive at individual concepts, would it be possible to start by organizing the concepts themselves? The concepts could then be built up to make subjects, while the universe of knowledge would appear as the final product of an operation which began with a universe of separate ideas (Austin 1969a). In other words, rather than taking a top-down approach to classification, i.e. predetermining areas of knowledge and then breaking them down, the CRG advocated a bottom-up approach, i.e. forming areas of knowledge after first having pieced together concepts and determining the areas of knowledge they form. The CRG looked towards the theory of integrative levels to provide them with the basis for this bottom-up approach.

THE THEORY OF INTEGRATIVE LEVELS

The precise origins of the theory of integrative levels are not clear, but may be traced at least as far back as the positivism of Auguste Comte. The theory is clearly set out in the 'First Principles' of Herbert Spencer, who was concerned not only with propounding the essential unity of all forms of matter, but also with relations between these 'entities' and the forces that produce or distinguish them (Austin 1969b). In the 1930s, the biochemist Joseph Needham frequently introduced the theory into his lectures. Although there were various interpretations of the theory of integrative levels, such as those of A. B. Novikoff (Austin 1969b), and Herbert Spencer (Jolley 1973), the CRG decided to adopt the theory as proposed by James Feibleman and Joseph Needham (Feibleman 1965; Feibleman 1985).

The CRG interpreted the theory of integrative levels as follows:

> The world of things develops from the simple towards the complex by accumulation of new and divergent properties and that at certain points changes occur which transform the 'entity' from a member of one group or class into a member of a new group. The new entity has properties of its own, characteristic of the new level of organization within it, and it behaves in a similarly new and characteristic manner. (Foskett 1962, 136)

Foskett (1978) uses the example of a bicycle, which he maintains is more than a mere heap of pieces of steel, rubber, etc. The bicycle has a series of parts which are made out of these materials, but it is only when the parts are put together in a certain set of relationships that a new entity emerges which, unlike the heap of parts, is able to transform the rotary motion a cyclist applies to the pedals and propels her/him along the road. The notion of 'integration' would therefore seem to be inseparable from the notion of 'whole,' because wholes are composed of a series of integrated elements.

What underlies the notion of integrative levels is the idea that "entities develop from simple to complex by the accretion of properties which at a certain point will transform the old entity into a new object with properties of its own" (Huckaby 1972, 99).

The theory of integrative levels stresses the importance of the developmental progression of entities based upon the structure of their internal components. In many ways, therefore, this theory advocates an evolutionary development of entities. The idea of an evolutionary sequence is not new to classification: Herbert Spencer had suggested this approach in the 19th century, and the idea was strongly promoted by the classificationist E. C. Richardson (Huckaby 1972; Richardson 1930). The primary difference between the order proposed by integrative levels and that suggested in the 19th century is that the former is built upon an upwardly-directed evolution, whereas the latter is built upon a downwardly-directed evolution of entities. In the theory of integrative levels, one does not first determine what an entity is and then break it down into its parts; rather, it is only by building up the parts that one can form the entity at all.

INTEGRATIVE LEVELS AND CLASSIFICATION

The CRG believed that the theory of integrative levels could be used in a classification system to divide a list of things into a succession of groups, each containing members of the same level of organization (Foskett 1961). The analysis of subjects into their constituent parts is the basis of all modern methods of information retrieval: the question is, what extent of detail should this analysis entail? According to the theory of integrative levels, subject analysis should not be carried out below the level at which the unit acts as a whole and in a particular way for a particular purpose (Foskett 1961). Thus, for example, if the subject is 'rabbit stew,' one would probably not consider 'rabbit' as the main subject, because the rabbit loses its identity as a living organism once it forms part of the stew.

Based upon Feibleman (1965), the CRG proposed that the basic laws of the theory should allow entities to be organized into the following classes:

Physical Entities
Chemical Entities
Heterogeneous, Non-Living Entities
Artefacts
Biological Entities
Man
Mentefacts (Huckaby 1972; Wilson 1972)

This list of classes, however, does not seem to follow an order which is consistent with the theory of integrative levels. If, for example, 'Artefacts' are dependent upon people for their existence, why do they precede 'Man'? One also questions whether 'Physical entities' can precede 'Chemical entities', since most

physical entities are composed of chemicals, without which they could not exist. The CRG never explains clearly whether this proposed list of classes has been put into any systematic order.

The application of the theory of integrative levels to classification raises a series of interesting problems. Austin claims that "it was intended that every term representing an attribute of an entity should be assigned to its place of 'unique definition'" (Austin, quoted in Huckaby 1972, 103). Foskett defines this place of 'unique definition' as the one where the relations of the entity with neighboring entities are constant, that is to say, "where all characteristics essential to the definition, and no more, are available" (Foskett 1970, 25). It is therefore necessary to examine each entity in isolation, and to establish its characteristic features, before its relations with other phenomena can be analyzed.

Huckaby (1972) suggests that the determination of this place of unique definition could vary with the person classifying it. Another problem which must be considered is that this type of division can eliminate entirely certain aspects of a subject. Austin seems to approve of a one-place system, which means that there can be no, or at least limited, provision for distributed relatives, multiplex terms, viewpoints, and so forth. These criticisms very much echo those made of James Duff Brown's *Subject Classification*, namely, that his one-place classification system did not allow for interpretation, viewpoint, and so forth (Sayers 1967).

The CRG later discovered a major flaw with the theory of integrative levels: it formed a branching structure rather than a single sequence. Integrative levels do not involve only a linear progression upward, branching occurs as a means of further dividing and sub-dividing. Certain levels may build up to two or more fields, which may either sub-divide further, or come to an end of level-building (Feibleman 1985). A molecule, for example, is divided into two branches: inorganic vs. organic structure. The implication is that this theory cannot be used as a basis for a single sequence of classes.

It is not clear how the theory of integrative levels can accommodate conventional subjects, which may often cut across different integrative levels. Will different sets of integrative levels be required for virtually every traditional subject area? The subject area History, for example, is composed of such elements as philosophy, sociology, and so forth, which are, in turn, composed of their own integrative levels. How is History to exist as a separate level when it is composed of different integrative levels itself? (Hopkins 1973)

Not all whole entities relate to their parts in the same way. A committee, for example, is a whole, but its members are also part of the same type (e.g. people); these members are interchangeable, so to speak. On the other hand, the whole bicycle is not made up of a number of similar sub-units which can be interchangeable. Austin wonders whether the change of level produced by an accumulation of interchangeable 'members' is of the same order as that produced by the assembly of different parts (Austin 1969c).

The problem of subjectivity in a classification system cannot be totally avoided by using the theory of integrative levels. Foskett wonders how it is possible for this theory to deal with entities which are described by objective vs. subjective properties (Foskett 1970). Paintings and objets d'art, for example, are usually described in relation to such attributes as beauty, tone, and so forth, but are these attributes intrinsic properties of an entity? Properties must be objectively of a certain shape, weight, etc., which means that attributes are less concrete. Are entities which are described by attributes therefore less concrete than those described by properties?

Foskett also suggests that too much integration could lead to 'disintegration.' A flock of sheep can be divided so that the sheep cease to be a flock and become several separate sheep, or even divided to the point where they become mutton (Foskett 1970). On the other hand, however, levels of distinction must be made in a classification system, but how much of this disintegration should take place before reaching the level of the ridiculous?

The thread connecting the levels in the CRG's outline of classes is that they are composed primarily of physical aggregates. How, therefore, does one organize 'mental' aggregates such as 'Mentefacts'? Richmond (1965) suggests that these aggregates could be organized as follows:

LEVELS

1. Observation: Person turns red in the face
2. Group of observations: Person is red in the face, gesticulates, etc.
3. 1st level generalization: Person is angry
4. 2nd level generalization: Person is frustrated
5. A law: Anger stems from frustration

Richmond believes that her example could work, which means that the theory of integrative levels can be used for non-physical entities. Richmond cautions, however, that "if one has sets of integrative levels covering all areas of human knowledge, are they something entirely new or are they rearrangements of the levels of old hierarchical classification systems by new sets of criteria?" (Richmond 1965, 44). In short, will the theory of integrative levels result in the mere re-hashing of traditional classification systems?

CONCLUSION

In view of the several potential problems which the application of the theory of integrative levels can incur, what are its benefits to classification theory? Richmond is not convinced that integrative levels represent a radical change in classification theory; rather, the theory of integrative levels is similar to the derivation of class entities from the collection of foci in a faceted classification system. Both systems involve a form of inductive reasoning, wherein classes are inferred from aggregates to particulars. This reasoning from parts to a whole involves an inductive 'leap.' This leap forces classificationists to define a subject based upon its constituent elements. The benefit of integrative levels is that the process of classification requires an exact analysis and description of every step in the process, which means that the inductive leap will have to be defined in terms of its composition, factor by factor (Richmond 1965). The theory, therefore, gives validation and method to the inductive, bottom-up approach to classification.

The CRG was never able to resolve specifically how the theory of integrative levels could be used in a classification system; in fact, it seems that the theory raised more questions than it answered. Richmond is perhaps correct in pointing out that the theory is not new to classification. The theory's principles of separation into levels based upon their composite parts are to be found even in traditional systems such as the DDC, where disciplines are broken down into their component parts. The significance of the theory is, perhaps, that it provided the CRG with further reinforcement of its belief that areas of knowledge can be determined only after an analysis of their composition (*a posteriori*), rather than by pre-determining areas of knowledge and then deciding how to break them down into their component parts (*a priori*).

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