

CLASSIFICATION AS THE BASIS OF BIBLIOGRAPHIC ORGANIZATION

JESSE H. SHERA

CLASSIFICATION . . . is the highest function of the librarian's work, calling into play every faculty and every attainment of knowledge."¹ Thus did Ernest Cushing Richardson, a half-century ago, address the students of the New York State Library School. But this was no hortatory injunction admonishing the youth of "Albany" to "mind" their *Cutters* and their *Deweys*. On the contrary, Richardson was merely voicing the esteem with which the act of book classification has long been regarded by practicing librarians in general and catalogers in particular. Today this touching faith in the efficacy of subject classification as it has been traditionally applied to *books* is beginning to weaken, for there can no longer be any doubt that library classification has failed, and failed lamentably, to accomplish what it was designed to do. If present methods of library classification are obsolete, and I submit that they are, what has been the reason for their failure? Is classification *out* as a bibliographic technique? Has classification anything to contribute to the new and improved methods of bibliographic organization, and if so, *what kind* of classification will it be? What lines of investigation must be pursued before classification can be made to meet the needs of bibliography? In short, has the profession merely been guilty of misusing a very effective instrument for the improvement of its bibliographic services? These are the major questions to which we shall here address ourselves—let us begin by examining the record.

THE HISTORICAL DEVELOPMENT OF CLASSIFICATION

The theory of the organization of knowledge, from Plato to Henry E. Bliss, has been founded upon four basic assumptions: First, that there exists a *universal* "order of nature" that, when discovered, will reveal a *permanent* conceptual framework of the entirety of human

1. Ernest Cushing Richardson, *Classification, Theoretical and Practical* (3d. ed.; New York: H. W. Wilson Co., 1930), p. 42.

knowledge; second, that the schematization of that order is a hierarchy of genus and species, class and sub-class, that progresses downward from general to specific, from terms of maximum extension to those of maximum intension; third, that the principle of *differentiation* that operates throughout the hierarchy is derived from the *likeness* or *unlikeness* of the properties or attributes of the component units of the classification; and fourth, that these properties or attributes partake of the *substantive nature* or physical properties of the units being classified: an intrinsic part of the unit itself, permanent and unchanging, an essence that resists alteration by the external environment, and denies all consideration of the fortuitous or accidental. Such are the four pillars upon which, for centuries, classification systems have been erected. The superstructure might vary in form and intricacy of detail as man's knowledge of his environment broadened, deepened, and became more mature, but the fundamental assumptions, whether specifically expressed or merely implied, have remained essentially the same. Whatever its form or its function the completed edifice always lay within the shadow of the Aristotelian predicables of *genus*, *species*, *differentia*, *property*, and *accident*.

The concept of classification as a *hierarchy* was probably the first to develop historically; at least that is the opinion expressed by Durkheim and Mauss in a monograph on primitive forms of classification published at the beginning of the present century.² Observation of the classification of primitive peoples discloses that they closely reflect the social organization of the tribe. The first "classes," then, were classes of men, and the classification of physical objects was mainly an extension of previously established social classification. The hierarchy of type and subtype in logical classification, "for which neither the sensory world nor our own minds offer us a model,"³ parallels the hierarchical pattern of earlier forms of social organization; hence all objects, both animate and inanimate, in the environment were classified as belonging to this or that clan, phratry, or other kinship group.⁴

As early as the fifth century B.C. these basic assumptions that are

2. Émile Durkheim and M. Mauss, "De quelques formes primitives de classification," *Année sociologique*, VI (1901-2), 1-72.

3. *Ibid.*, p. 6.

4. See also Emile Benoit-Smullyan, "The Sociologism of Émile Durkheim and His School," in Harry Elmer Barnes (ed.), *An Introduction to the History of Sociology* (Chicago: University of Chicago Press, 1948), p. 516.

today the accepted foundations of logical classification, had begun to crystallize, and in the work of Plato is found their earliest mature expression. Plato was the first writer known to us who began his treatment of classification with the philosophical assumption of the unity of all knowledge, and then went on to postulate its parallelism with a universal and permanent "order of nature." To Plato philosophy represented the unity of knowledge, for philosophy was *One*, and all ideas ultimately merged into a single concept of the *Good*. The basis of the Platonic classification was perceptual, for he divided the universe into two worlds—the visible and the intelligible, the former being composed of things or their images, the latter of conceptions and ideas. Basically, then, the Platonic concept was dichotomous, but it was the Neo-Platonist, Porphyry, who, in his famous *Tree*, has given us the most picturesque example of binary classification. Further, the *Tree of Porphyry* added to the dichotomy the principle of *gradation by specialty*, the progression downward from terms of greater to less extension and successively increasing intension.

To the philosophical bases of classification the Middle Ages added little that is relevant to our present purposes except by an insistence upon a theological orientation, to reaffirm the doctrine of the essential unity of knowledge and to demonstrate how the focus of thought about the organization of knowledge can be altered in response to current changes in the philosophical climate of a period or an age. With the Scholastics came a further reconsideration of classification, this time in terms of a pedagogic order as typified by the *Trivium* and *Quadrivium* of the curriculum of Medieval universities. Here again one finds a manifestation of the influence that shifting patterns of philosophic thought exert upon the organization of knowledge. More important, it furnished the philosophic foundation for the classification devised by Konrad Gesner for the organization of his *Pandectarium sive partitionum universalium*, considered by Edwards to be the first bibliographic system, and certainly the greatest early attempt to relate the subject arrangement of books to the educational and scientific consensus of the day.

Of all the precursors of science by far the most significant figure, from the standpoint of the magnitude of his contribution to bibliographic organization, was, of course, Sir Francis Bacon. Admittedly his scheme, derived ultimately from the Trivium and the Quadrivium, and based upon the human faculties of Memory, Imagination, and Reason, rests upon a subjective foundation, and his selection of

the "faculties of the rational soul" is entirely arbitrary. But he argued successfully for the unity of knowledge, "the divisions of [which] are like branches of a tree that meet in one stem,"⁵ and it is not excessive to say, as does Berwick Sayers, that "almost every scheme of classification from the seventeenth century to the present has been affected in a greater or less degree by . . . Bacon."⁶ From Memory Bacon derived History and its subordinate disciplines, from Imagination came Literature and the Creative Arts, and from Reason, Philosophy and the Rational Sciences. Here, at least, is at work a principle of division that can be recognized and appreciated. In effect, Bacon is saying that the senses are the portals of the intellect. The impressions received by these sense perceptions pass into, and are fixed in, the memory just as they occur. These perceptions are then processed by the intellect in one of three possible ways. It may merely enumerate or rehearse them; it may create fanciful representations of them; or it may analyze and classify them. "Therefore, from these three fountains—Memory, Imagination, and Reason—flow these three emanations—History, Poesy, and Philosophy; and there can be no others."⁷

Today a scheme that implies that the human intellect exercises its several faculties as isolated operations, and that rather arbitrarily distributes the fields of knowledge among its three major branches, does violence to our concept of the organic unity of knowledge. But at the time it was devised it represented a real advance over the earlier theories of classification, differed fundamentally and in detail from all preceding schemes, and in the prominence which it accorded History was especially radical. When Diderot and d'Alembert were, in the eighteenth century, preparing their great encyclopedia they could devise no better arrangement for its organization. Bacon's scheme influenced the early classification system of the Bodleian Library. Thomas Jefferson founded upon it the classification for his own books and from this it was absorbed into the plan of book arrangement at the Library of Congress, where it was employed, with modifications, for almost a century. In inverted form it was used by William T. Harris, from whom Melvil Dewey took it for his own

5. Quoted by Henry E. Bliss, *The Organization of Knowledge and the System of the Sciences* (New York: Henry Holt & Co., 1929), p. 316.

6. W. C. Berwyck Sayers, *A Manual of Classification* (2d ed.; London: Grafton, 1944), p. 107.

7. Quoted by Robert Flint, *Philosophy as scientia scientiarum* (Edinburgh: William Blackwood, 1914), p. 106.

Decimal system. Its broader outlines can be vaguely discerned in the system devised at the turn of the century by Martel and Hanson for the Library of Congress. So influential has been Bacon's thinking in the development of library classification that, if present library practices continue, it will have to be understood by students of librarianship for generations to come.

Hobbes followed Bacon in distinguishing historical and descriptive knowledge from the theoretical and philosophic, though he did not make this the basic division of his system. For present considerations he is important first because he carried the principle of binary division throughout, and second because he was the first really to approach the order of modern science. Kant, like Plato, distinguished between rational and empirical knowledge, and followed Hobbes in his dogged insistence upon dichotomy.

However, as we recognize today, any valid classification of knowledge should represent a synthesis of the component parts with respect to the significant central concepts, the content, the scope of each, their relationships to each other, and their interdependencies. This kind of structure was approached by Hegel, in whose schematism the whole of reality was conceived as being in the Absolute Idea, of which all phenomena, all concepts, and all sciences were component parts. But Hegel achieved this synthesis and unity from a metaphysical rather than from a natural and empirical orientation.

Our modern concept of the hierarchy of the sciences, and the principle of filiation, in which each science in the series is dependent upon those that precede it but not upon those that follow, derives from the work of Auguste Comte. He declared the fundamental order of knowledge to be one of decreasing generality and increasing complexity, and that this order was coincident with historical development and pedagogic sequence. His series began with mathematics, progressed "downward" through astronomy, physics, and chemistry, to its termination in "Social Physics," or sociology, of which he is said to be the founder. Certainly he at least raised the social sciences to a new level of importance by his recognition that there is no generic difference in the desirable methodology of the social sciences that might distinguish them from the other disciplines, even though the problems of the sociologist are made more difficult because of the great complexity of the phenomena with which he deals and the lack of means for the adequate measurement of these phenomena. Comte further held that there are three stages of intellectual advance—the

theological, metaphysical, and scientific—through which must pass the proper development and education of the individual, the various realms of human knowledge, and the general process of social evolution. None of these stages can be eliminated, though intelligent direction, or lack of it, may respectively accelerate or retard it. Each is a necessary antecedent to the one that follows. Spencer largely demolished the theory that the sciences have developed historically in the order assigned to them by Comte, but though he argued for the unity of knowledge, he failed in his attempt to deny Comte's principle of filiation, a doctrine that was even more positively justified by Lester F. Ward. Thus, in the sequence of its component disciplines and in the hierarchical pattern of its organization, modern schematisms of the organization of knowledge are still dominantly Comtean.

THE DEVELOPMENT OF LIBRARY CLASSIFICATION

At the close of the nineteenth century, when librarians began to think seriously about the problem of the arrangement of their book stocks, these were the major threads that had been conspicuous in the fabric of classification theory—dichotomy, the unity of knowledge, the hierarchical order, the principle of filiation, and gradation by specialty. If one may learn anything from such a cursory examination of the history of classification it is that every scheme is conditioned by the intellectual environment of its age or time; that there is not, and can never be, a universal and permanent classification that will be all things to all men; and that each generation may build upon the work of its predecessors, but must create its own classification from the materials that it has at hand and in accordance with its own peculiar needs. History does not deny the doctrine of the essential unity of knowledge, but it does affirm that man's perception of the nature of that unity is conditioned by the maturity of thought at any given period.

The early systems of library classification may here be dismissed briefly since, in most instances, they were purely utilitarian and without philosophic foundation. In the main they were either one of two types or a combination thereof: (*a*) arrangement by fixed location and (*b*) grouping by broad subject divisions of literature. Like the scheme of Brunet and the Paris Booksellers (which consisted of five main classes: Theology, Jurisprudence, Arts and Sciences, Literature, and History) they were a convenient and often arbitrary sequence designed without reference to the interrelationships of the

subject disciplines. Despite the impact of Bacon's thinking upon the philosophers of the Enlightenment, practicing librarians of the period conservatively adhered to an arrangement of books as physical objects rather than attempt to organize knowledge itself. As long as stocks of books remained of a manageable size, and they were relatively well known to those who would use them most frequently, such an arrangement was practicable enough. As early as 1627 Gabriel Naudé had rejected the order of nature as an appropriate basis for bibliographic classification—" . . . since the order of Nature which is always uniform & like her self, not being to be exactly imitated, by reason of the extravagancy & diversity of Books, there onely remains that of Art, which every man will for the most part establish according to his own fancy, and as he finds best to suite his purpose."⁸

The rapid growth of libraries and the multiplication of printed materials during the nineteenth century brought to practicing librarians a new awareness of the need for better methods of book arrangement. They began to think in terms of a system that would not only serve as a location guide to the titles in their collections, but by its logical arrangement would bring together related materials in such a way as to be a positive aid to the user in his pursuit of subject knowledge, and reveal to him in an orderly fashion the resources of the library in the several disciplines represented in its collections. In such terms did the practitioners of library economy affirm their faith in law and order and proclaim their essential kinship with the new spirit of scientific inquiry.

Quite naturally, then, the history of modern library classification is a story of adaptation of existing philosophical systems to library materials and needs. Early in the nineteenth century Thomas Jefferson had turned to Francis Bacon for the philosophical basis for a book classification that was adopted by the Library of Congress. Melvil Dewey, in the Amherst chapel on that bright Sunday morning, as he listened to President Stearns and pondered the beauties of the decimal system, bethought himself of Harris' "inverted Baconian" and adopted it as the framework of his own scheme. The Expansive Classification of Charles Ami Cutter, especially in the evolutionary or developmental pattern of its subordinate classes, shows the influence of Comte and Spencer. The work of Martel and

8. Gabriel Naudé, *Instructions Concerning Erecting of a Library*, trans. John Evelyn (Cambridge: Houghton Mifflin Co., 1903), pp. 134-35.

Hansson, in spite of their intention to give primacy to the book as a practical base rather than to any theory of knowledge, closely follows, in general outline, the Cutter Expansive. Hence it is heavily indebted to the nineteenth century philosophers, is indirectly derived from Brunet, and even the Baconian influence is not entirely absent. The Universal Decimal was, of course, derived from Dewey, but its makers strove to achieve added dimensions, depth, and flexibility by the use of certain signs of association to indicate relationships and points of view. The result was not improvement but greater complexity and a serious magnification of the weaknesses inherent in the parent scheme. Similarly, other bibliographic systems had their own philosophical antecedents (Bliss, for example, is heavily indebted to Comte), and though their authors might insist that they had been busying themselves with a classification of printed materials rather than an organization of knowledge, the fact remains that in reality they were merely adapting the former to the latter, with such tinkering with notation, provision of form categories, and other relatively minor adjustments as would make their efforts more nearly adequate to library conditions and needs.

Today, under the impact of a rapidly growing volume of graphic records, and the appearance of new forms of publication, traditional library classifications are becoming hopelessly inadequate. No amount of basic revision or tampering with their organic structure can save them from this failure. As guides to the subject content of the library they are essentially meaningless. Even librarians, who are best qualified to interpret them and to exploit their virtues, use the notation only as a guide to location, and largely ignore the interdisciplinary relationships that they were designed to reveal. Yet, as their efficiency has declined, the cost of their maintenance has increased until at least one major research library has abandoned subject classification of its book stocks and has turned to other and more promising forms of bibliographic organization.

But it must be emphasized, and it can scarcely be said too strongly, that the failure of contemporary library classification to achieve its purposes is not because the classification of knowledge has no place in bibliographic organization, nor is it because the men who made these schemes were fools. Dewey, Cutter, Martel, and the others were groping for the application of a principle that we now know to be an established fact—*that classification is basic to bibliographic organization*, and that in large measure the success of our attempts

to organize the graphic records of our civilization will depend upon our ability to devise systems for the ordering of those records in such a way as to maximize their social utility. This can be done only when we have adequately studied the different ways in which all such records are used by recognized groups within the society, and when we have analyzed the internal conceptual arrangement of such records in order to adapt any possible classification scheme to the existing structure of thought rather than to some abstract universal "order of nature" encompassing all knowledge.

CLASSIFICATION AS AN INSTRUMENT OF BIBLIOGRAPHIC ORGANIZATION

The failure of our present systems of book classification in no way condemns the act of classification as a fundamental bibliographic technique. Book classification, as we have used it in the past has failed for two reasons: one, because it has been based upon the book as a physical entity without taking into consideration the inherent character of the book as a composite intellectual product; two, because of limitations arising from the properties of our hierarchical systems of classification. Jevons was right, for library classification as he knew it, was indeed "a logical absurdity."⁹ By this he meant, of course, that the content of books is poly-dimensional, which is logically incompatible with the traditional hierarchical schematization of knowledge which is a linear progression from general to specific. The book, then, as a physical unit, and irrespective of the dimensions of its content, must be forced into a mono-dimensional system in which it has only linear position. This limitation alone destroys most of the utility of traditional book classifications as instruments for the effective subject organization of library materials. Almost two decades have passed since the investigations of Grace Osgood Kelley demonstrated with a reasonable degree of certainty that the library classification reveals only a relatively small proportion of the total resources of the collection in any given subject.¹⁰

9. "Classification by subjects would be an exceedingly useful method if it were practicable, but experience shows it to be a logical absurdity. It is a very difficult matter to classify the sciences, so complicated are the relations between them. But with books the complication is vastly greater, since the same book may treat of different sciences, or it may discuss a problem involving many branches of knowledge" (W. Stanley Jevons, *The Principles of Science* [London: Macmillan, 1887], p. 715).

10. Grace O. Kelley, *The Classification of Books: An Inquiry into Its Usefulness to the Reader* (New York: H. W. Wilson Co., 1937). Pp. 200.

Her results did not so much as hold out the hope that the classification made available even the most important portions of the library's holdings. Yet, we still pursue the same practices in bibliographic classification, not for any doubt as to the validity of her findings, but largely because we have not known exactly how to remedy this situation.

Classification, then, can achieve its fullest purpose as an instrument of bibliographic organization only after the *idea* content of the book has been dissociated from its physical embodiment—its codex form. Once this has been achieved, and the thought unit, rather than the fortuitous manner of its publication, is the subject of classification, the old limitations of library classification will be abolished, the organization of knowledge itself will become the paramount consideration, as it always should have been, and the results of bibliographic systematization will become more accurate and usable.

As this conference progresses it will grow increasingly apparent that, if bibliographic organization is to attain its highest degree of efficiency, traditional library methods and techniques may largely be discarded in favor of an entirely new array of tools—indices, subject bibliographies, annotations, abstracts, micro-photographic processes, mechanical sorters, electronic devices, and combinations of the foregoing. For all of these the physical form of the graphic record, in its original state, is inconsequential. Book stocks, and other library materials, can hereafter be arranged in any way that is convenient and efficient, without jeopardizing the availability of their intellectual content.

But if these new tools promise emancipation from many of the ills that beset traditional library classification, they do not foretell the demise of classification itself as an important bibliographic mechanism. No device can be better than the classification system through which it operates. An index, by virtue of the nature of its terminology, is in effect itself a concealed classification. Systematic arrangement is essential to the utility of the index, the bibliography, and the abstracting service. Microphotographic processes relate mainly to the improvement of physical accessibility. In and of themselves they do not contribute to the solution of content accessibility, but only intensify the problem by expanding the bibliographic resources available to the individual scholar. Mechanical sorters and electronic "brains" stand or fall on the relative effectiveness of the coded classes through which they must operate. Of all the new instruments now at

our command, classification is for them the most fundamental. We say that they are machines that "think," but in reality they only respond in a limited way to the impulses or stimuli that activate them. They cannot think for themselves; the responsibility for the cerebral operations is still human.

From these new implements for the bibliographic organization of graphic materials will arise a completely new concept of classification that is entirely alien to those of us who have been accustomed to thinking in traditional library terms. We stand at the threshold of a reorientation of the idea of classification. Even a cursory examination of the history of the classification of the sciences emphasized the extent to which any attempt to organize knowledge is conditioned by the social epistemology of the age in which it was produced. This dependence of classification theory upon the state of the sociology of knowledge will doubtless be even more strongly confirmed in the future. Here, then, is an implicit denial of Bliss' faith in the existence of a "fundamental order of nature," a rejection of the belief that there is a single, universal, logically divided classification of knowledge. Ability to develop a universal scheme for the ordering of all human experience implies the ability to prognosticate all possible future knowledge, to foretell what man may learn before he has learned it, to diagram all possible relations of all possible knowledge, and so to stabilize the intellectual processes of society to the point of stagnation. For it is by the grouping and regrouping of his data that the scholar discovers new relationships, new approaches to old problems, and new areas for exploration.

Further, if classification is relative to the task to be performed and to the inherent nature of the tools by means of which it is to be achieved, one need no longer adhere to a blind devotion to the Aristotelian predicables and the necessity for a hierarchical structure of knowledge. To assert that classification is founded in philosophical consideration is not to deny that it is also highly utilitarian. If we would make of it something more than a speculative indoor-sport, played according to established and inviolable rules, we must not hesitate to alter the principles upon which it has for so many centuries been established. To free classification from the straight-jacket of the hierarchical order is to endow it with new meaning, deeper significance, and far greater potential utility.

A NEW ORIENTATION FOR CLASSIFICATION

Alfred North Whitehead, arguing for a referential classification, as derived from projective geometry, has condemned Aristotelian logic in terms that are suggestive of a completely new orientation of the organization of thought.

"It is well-known that Geometry can be developed without any reference to measurement—and thus without any reference to distance, and without any reference to numerical coordinates for the indication of points. Geometry, developed in this fashion, has been termed 'Non-metrical Projective Geometry.' Elsewhere I have termed it, 'the science of cross-classification.' Aristotle's science of classification into genera, and species, and sub-species, is the science of mutually exclusive classification. It develops Plato's suggestion of a science of 'Division' . . . Aristotelian Logic, apart from the guardianship of mathematics, is the fertile matrix of fallacies. It deals with propositional forms only adapted for the expression of high abstractions, the sort of abstractions usual in current conversation where the presupposed background is ignored."¹¹

Whitehead goes on to assert that there are two Orders, the Observational and the Conceptual (Plato again!), and that the former is invariably interpreted in terms of the concepts supplied by the latter. Since Observational discrimination is not dictated by the impartial facts, no scientific schematism is valid that is based upon the independent individuality of each bit of matter. Classification, then, need not be a process of atomization; its component units may be a single fact, idea, or concept, or any constellation thereof which is consistently used as a unit. Classification can be synthesis as well as analysis, and its cohesive force any meaningful relationship that serves the immediate purpose irrespective of whether that relationship be expressed in terms of generic properties, function, or any other unifying principle that expediency might dictate.

This pragmatic approach to classification through meaningful units of knowledge must be based on a recognition of the obvious truth that any single unit may be meaningful in any number of different relationships depending upon the immediate purpose. *Thus it is the external relations, the environment, of the concept that are all-*

11. Alfred North Whitehead, *Adventures of Ideas* (New York: Macmillan Co., 1933), pp. 176, 196.

important to the act of classifying. A tree is an organism to the botanist, an esthetic entity to the landscape architect, a manifestation of Divine benevolence to the theologian, a source of potential income to the lumberman. Pragmatic classification, then, denies the existence of the "essence" of tree, for each of these relationships owes its existence to different properties of the tree. Relationship is not a universal, but a specific fact unique to the things related, and just as these relations reveal the nature of the relata, so the relata determine the character of the relationship.

This new approach to classification must begin, then, with the isolation and identification of these units which will comprise the new schematism for any field, after which they must be precisely defined. For to maintain the relativity of the classification process is not to suggest that its nomenclature can afford to be muddled and confused or its component categories indiscrete. Therefore semantics lies at the base of all classification, and the standardization of terminology is a prerequisite to its success. The need for such standardization is emphasized by the results of two tabulations recently made at the Graduate Library School. In the first the subject headings used in the card catalogs of nine industrial relations libraries were analyzed to determine the uniformity of subject entry among the several cooperating institutions involved. Of a total of 938 headings, of which 218 (or 23 per cent) showed significant alternative forms, 57 per cent were unique to one library; 17 per cent were used by only two libraries; 9 per cent by but three institutions; 7 per cent by four; only 10 per cent were common to five or more libraries.¹² A similar dispersion was evident from an analysis of the concepts appearing in the indices of three general textbooks in bacteriology, in which, from a total of 2,256 concepts, 66 per cent were unique to one text, 23 per cent were found in only two, and only 11 per cent were common to all

12. The libraries of the industrial relations centers were situated in the following universities: Chicago, Cornell, Michigan, Princeton, Queens, Stanford, Illinois, Washington, and California at Los Angeles.

No. of Libraries	No. of Headings	Per Cent
1.....	532	57
2.....	158	17
3.....	82	9
4.....	66	7
5 or more.....	100	10
Total.....	938	100

three.¹³ In other words, there was substantial agreement about only one-tenth of the terms used in each case. Yet in the terminology of two areas as compact and closely integrated as these one might expect to find a relatively high percentage of agreement. But one must emphasize that this same standardization of terminology is not a responsibility of the librarian-classifier alone; it is also an obligation of the subject expert in the discipline itself. The maturity of an area of knowledge is reflected in the degree of standardization of its nomenclature. In physics, chemistry, and the other precise sciences such agreement is relatively high; this is, in fact, the very source of their precision. In sociology and economics such consensus is lamentably lacking with disastrous consequences for communication within the disciplines. Speech is in itself a form of classification and the problems of communication and classification are essentially one. Nomenclature, then, is a responsibility that the subject specialist cannot afford to delegate to other hands, or abrogate as being unworthy of his labor. Indeed it is one of the most profitable tasks for groups of subject specialists to undertake. The resulting classification of concepts and the freedom to manipulate such concepts in newly-devised schematisms would contribute most notably to both the advance and the synthesis of knowledge.

If utility is the primary objective of classification, it logically follows that the most useful classification will be one so specific to a given situation that the groupings will be meaningful in the relevant context or relationship. To emphasize and clarify this essential proposition it may be well to return to the example of the tree. To the landscape architect the red-twigged, or red-osier dogwood (*Cornus stolonifera*) is a very useful and important plant. In a classification appropriate to his needs, then, it would appear in terms of its relation to the cluster of properties evinced by the other plant materials at his disposal, its habit of growth, the character of its fruit and

13. The three texts used were: Arthur T. Henrici, *The Biology of Bacteria* (Boston: D. C. Heath & Co., 1948); Fred W. Tanner, *Bacteriology* (New York: John Wiley & Sons, 1937); Martin Frobisher, *Fundamentals of Bacteriology* (Philadelphia: W. B. Saunders Co., 1949).

No. of Texts	No. of Concepts	Per Cent
1 text only	1,488	66
2 texts	520	23
All 3 texts	248	11
Total	2,256	100

leaves, its appearance during the several seasons of the year, the type of soil it requires, the geographic localities to which it is native, etc., etc. By contrast, however, the forester will have no traffic with this beautiful plant, but considers it quite disrespectfully as being only a weed-tree. In his classification, then, it appears only with reference to its undesirable properties, to those characteristics which deny it economic value to the lumberman, and to the means for its effective eradication. Obviously these two points of view are so divergent as to deny the possibility of effective reconciliation in any sort of universal schematism that would serve the needs of both the landscape architect and the forester.

As early as 1890 William James attained this same point of view by applying to the problems of classification and nomenclature his own philosophy of pragmatism. He held that concepts are created by human beings in the pursuit of some particular enterprise or end. They are segments of human experience, which itself is never static, endowed with names and fashioned to suit human purposes. But these concepts become fixed and immutable in the thought processes of the human intellect, because only by reference to their stability are we able to deal with experience intelligibly. When we conceive of paper as an appropriate writing surface we fix that one fact about paper. But such a concept is of our own making, an instrumentality fashioned to a particular need; it does not mean that paper is *essentially* something to write upon. James insists that there is no property absolutely essential to any one thing. During the act of writing the writer conceives of paper as a surface upon which he can write. But if the paper is being used to ignite a fire, it is held to be a combustible substance. Thus, the same paper may be regarded in an indefinite number of ways. To quote James directly:

“[The paper] is really *all* that it is: a combustible, a writing surface, a thin thing, a hydrocarbonaceous thing, a thing eight inches one way and ten another, a thing just one furlong east of a certain stone in my neighbor’s field, an American thing, etc., etc., *ad infinitum*. Whichever one of these aspects of its being I temporarily class it under, makes me unjust to the other aspects. But as I always am classing it under one aspect or another, I am always unjust, always partial, always exclusive. My excuse is necessity—the necessity which my finite and practical nature lays upon me. My thinking is first and last and always for the sake of my doing, and I can only do one

thing at a time. . . . All ways of conceiving a concrete fact, if they are true ways at all, are equally true ways. *There is no property ABSOLUTELY essential to any one thing.* The same property which figures as the essence of a thing on one occasion becomes a very inessential feature upon another."¹⁴

James admits that this denial of the existence of an 'absolute essence is repugnant to logic, which maintains that there must be for every thing a core that constitutes its essence and of which its other characteristics are merely properties. The essence of the thing, then, would be that which gives it its name. The thing *is* paper, and its rectangularity and combustibility, etc., are but accidents or properties. But this attitude itself derives from our practical need to name things in order to expedite communication. So habitual has become this practice of naming that the name comes to stand in our minds for what the thing really is. We traditionally think of water as *really* being a union of hydrogen and oxygen atoms in the ratio of two to one, but water is no more H₂O than it is something to drink, or something to bathe in, or something to keep flowers fresh. To conceive of it in terms of its chemical formula is useful in certain circumstances, but in other frames of reference it is more useful to regard it from a totally different standpoint. No one conception invariably represents its reality independent of a particular purpose. "*This whole function of conceiving, of fixing, and holding fast to meanings has no significance apart from the fact that the conceiver is a creature with partial purposes or private ends.*"¹⁵

If we accept this application of James' pragmatism to classification, and agree that every separate frame of reference accentuates only a part of the totality of attributes of the object with which it deals because only that part is relevant to the specific purpose, it therefore follows that every special classification system devised for the use of a special group should be erected upon a framework of such properties, rather than upon the *actual* or *essential* objects that substantively fall within its orbit of interest. These properties are permanently a part of the frame of reference to a much greater extent than the alleged *essence* or substantive matter of the objects

14. William James, *The Principles of Psychology* (New York: Henry Holt & Co., 1890), II, 333 (italics his). The sequence of the quotations has been reversed.

15. *Ibid.*, I, 482 (italics his). See also Edna Heidbreder, *Seven Psychologies* (New York: Appleton-Century Co., 1935), pp. 182-83.

themselves. Such properties rather than the essential objects themselves should, therefore, become the axes of their respective special classification schemes. Furthermore, those properties relevant to more than one field would serve as axes common to a cluster of related schematisms, and from these would emerge the bases for cross-referential classifications that would contribute to inter-disciplinary integration. (2)

HABITS OF USE AS THE BASIS OF CLASSIFICATION

All this not only denies the validity of universal classification and the necessity for a hierarchical gradation, but it also reemphasizes the basic preeminence of function, the importance of the external factor of habits of use in like situations and as applied to identical materials in unlike situations, and the great need for the pragmatic study of the units used in any given subject field at any given time. Hence flexibility in classification will be achieved by providing *multiple approaches* to the relata rather than, as is the practice in contemporary classification, the provision of multiple or alternative *locations* for the individual units. The growing need for special schemes of classification is emphasized by the proliferation of such classifications among special librarians who have been forced by circumstances to devise their own schemes, largely independently and without any guiding principles for the formulation and ordering of their endeavors. All this might seem to suggest the necessity for constant and continuing reclassification—anathema to all library classifiers and administrators. But since it now seems established with relative certainty that the vitality of most of our research literature is almost wholly ephemeral, and as the new tools for bibliographic organization are inherently flexible, new systems of classification can be introduced without recourse to reclassification of the older, and hence less used, materials.

If one grants that this new concept of classification is grounded in pragmatism, it becomes axiomatic that the study of habits of use is requisite to the act of classifying. At the present time our knowledge of the uses to which literature is put, and the demands made upon bibliographic resources by those who consult them, are lamentably fragmentary. One cannot talk intelligently about the problems of classification or devise effective schemes for the several branches of knowledge until he can answer with some degree of certainty the question: how does any consultant search for and use the literature

that theoretically is at his command? To this the users themselves can give no valid answer. Conjecture and generalization based upon subjective opinions are not enough. Yet the responsibility for the development of a body of specific factual knowledge of these habits of use belongs to the librarian. Already some progress has been made through the studies of citation analysis in the fields of the physical sciences and the humanities, but much more remains to be done. At the moment the case study approach would seem to be the most promising, but it is the obligation of graduate study in librarianship to devise more adequate techniques and effective procedures than have been heretofore available for scholarly investigation in this all-important area. But whatever techniques of research may be brought to bear upon these problems, it becomes mandatory that we know what classification is supposed to achieve and how, why, and by whom it is going to be used.

TECHNOLOGICAL DEVELOPMENTS AND CLASSIFICATION

But even were it possible at this moment, with a snap of the fingers, to solve all these problems of theoretical classification, and to devise as many varying schemes of classification as needs and purposes demanded, there would still remain the enormous task of their application to a body of recorded materials that is increasing at a truly alarming rate. No one knows with any degree of certainty the number of bibliographic units that are extant today. Estimates of book production from the invention of printing in Europe vary from fifteen to twenty million titles. Similarly the volume of periodical articles for the same period would surely be counted in the hundreds of millions, and the volume of ephemera would be truly astronomical. Even though much of this increasing mass is unworthy of subject analysis, to organize even a usable portion of it is a task that far exceeds the capacities of our traditional methods. Gesner's dream of a universal world bibliography grows more faint with each passing decade. In the United States Patent Office alone some three million patents must be arranged so that their patentable properties may be approached by structure, function or effect, and the "art" involved. The present provision of some 43,000 categories is already proving inadequate to patent-searching needs. Classification problems of a similar magnitude are beginning to confront American industry, and other agencies engaging extensively in research.

To meet this problem we have begun to consider seriously the possibilities for the development of new tools which will perform more rapidly, more effectively, and at lesser cost the bibliographic operations traditionally the function of the card catalog, the index, and the "published" bibliography. These mechanical electrical and electronic machines, with the exception of the Shaw Rapid Selector, were mainly designed for purposes other than bibliography, and hence require modification and adaptation to meet peculiar bibliographic needs. But all of them, including the Rapid Selector, necessitate the use of a code, either mathematically or phonetically expressed, for their operation and hence their success or failure largely rests upon the virtues of the classification system through which they operate.

What, then, are the improvements in our classification methods that these machines make possible? The advantages to be derived from the separation of the intellectual content of the book from the book as a physical entity have already been suggested. This does not imply, of course, that the book cannot be considered as a whole—indeed, for some purposes, the book is still most effectively used as a whole—but separation into its component concepts will be practicable when appropriate to specific requirements. The inherent flexibility of these machines, in conjunction with this reversion to the organization of knowledge as distinct from the organization of physical units, i.e., books, periodicals, whether bound or unbound, pamphlets, and the like, will make frequent reclassification and the use of multiple classifications economically practicable. The unitary approach provided by such devices automatically permits of change, expansion, new orientation, and unique approaches to classification. The classifier of the future, then, need not desert philosophy for purely utilitarian ends, but he may easily do so whenever such departures seem desirable. He will no longer be tied to the shibboleths of universals and permanents. Finally, these machines will facilitate and make economically feasible large concentrations of bibliographic activity in strategic centers in which truly expert bibliographic services can be performed for those agencies which are quite remote from areas of library concentration.

PROBLEMS OF PERSONNEL AND MANAGEMENT

But there are certain practical considerations that must not be neglected in the full flush of our enthusiasm for these new bibliographic potentialities. The expense will be great, for the cost of these

machines will be high and the skills requisite to their development and use cannot, and should not, be bought cheaply. Subject knowledge is essential, for we are not here concerned with generalities and superficialities, but exact specialties based on a thorough understanding of problems, needs, and points of view in the component fields. Not only is such work completely valueless if it is done without care and understanding, but it might seriously jeopardize the entire future of bibliographic organization. This will mean coordination of economic as well as bibliographic resources, a social responsibility that cannot be neglected by state and federal government and the many public and private agencies that would profit thereby. In terms of social costs and values the effective bibliographic organization of knowledge is a bargain. But we must first "educate" the public to the social importance of bibliography and the effective organization of knowledge. This will be no simple task but it is fundamental to our success.

Let no one be deceived into thinking that our present antiquated and disorganized bibliographic methods are either economical or efficient. The *American Library Directory* for 1948 lists over 11,000 libraries in the United States, of which some 7,000 are public libraries; 1,500 those of colleges and universities, including about fifty large research libraries; and the remaining 2,500 largely special libraries of varying kinds. Every day, in these libraries, many of the same books are bibliographically described, cataloged, classified, and otherwise prepared for the use of patrons in an unending procession of duplication and waste, the cost of which no one has yet been able even to estimate. Yet the price that society pays for these "hidden" expenditures cannot be rationalized by the mistaken belief that much of our cataloging must necessarily be unique to the institution by which it is performed. Centralization and coordination might appear to demand a high initial outlay and an impressive continuing expenditure, but it would represent a marked advance both in economy and efficiency over the traditional procedures to which we have for so long been accustomed.

This is not an argument, as one might at first suppose, for a simple extension of the services now offered to libraries by the card distribution systems of the Library of Congress and the H. W. Wilson Company. Such action would only perpetuate the existing weaknesses of our obsolescent methods of bibliographic analysis. What is necessary is a coordinated attack upon contemporary bibliographic

problems by groups of skilled subject bibliographers who have been adequately trained in the new theories of classification, and prepared to translate these theories into effective operations. The results might then be transmitted to the cooperating libraries as continuing services and special bibliographic investigations.

CONCLUSIONS

In conclusion, what are the possible implications of these new approaches to classification for the future of the technical processes? To put it bluntly, are catalogers confronted by technological obsolescence? The answer is emphatically in the negative, for *catalogers* are not obsolete even though their present *methods* are becoming so. Classification is central and basic to the whole problem of bibliographic organization, and far more fundamental than it has ever been to present library practice. The mechanization of bibliographic organization does not imply the degradation of catalogers and bibliographers through subordination to the machine. The objectives of this mechanization are the expedition of our mental processes, not a substitution for them. Machines can process great quantities of material at high speeds, but the results they produce can never rise above the skill that has entered into their design and manipulation. As instruments of classification they are bound by the binary principle, they have not advanced beyond the dichotomy, they cannot devise new relationships or exercise judgment in selection. In short, we must do their thinking for them, and this will demand a higher level of skills, including subject knowledge and research ability, than catalogers have been called upon to exercise in the past. Freed from the drudgery of descriptive cataloging and the largely arbitrary pigeonholing of books into an artificial classification scheme, catalogers can anticipate the opportunity to become true subject specialists in bibliography and the organization of knowledge.

To the library schools this means that classification, more than ever before, will be vital to the curriculum, that there will be a continuing demand for students trained in the bibliography of subject specialization, and that there must be both planning for and continuing research in (a) the techniques for identification of concepts of knowledge and the ordering of those concepts, (b) the changing contexts of meaningfulness, and (c) the varying and shifting patterns of use.

Specifically this means, among other things—

1. A series of studies of existing classifications, their weaknesses and virtues for specific purposes.
2. The development of new classification schemes, with a reexamination of the principles upon which they might be based.
3. Experimentation in the construction of varying conceptual frameworks upon different axes of reference.
4. The content analysis of the research literature of varying fields for the identification of terminology and concepts currently in use.
5. The careful scrutiny of subject headings in the light of such analyses.
6. The development of adequate techniques for measuring the effectiveness of all forms of classification and subject entry.
7. Study of the dispersion and concentration of materials in varying schemes of classification, and the interpretation of the results of such findings in terms of utility to the library user.
8. The precise measurement of costs of varying kinds of classification as related to the production of bibliographic values and the improvement of bibliographic functions.

Admittedly, librarians may not find immediate satisfaction in the freedom from traditional routines that these new forms of bibliographic organization promise, and they may feel very alone and helpless in an almost unexplored land, where the terrain can be but dimly seen, the landscape is strewn with strange and weird excrescences of the machine age, the atmosphere is apparently inhospitable, and where the few inhabitants communicate in a queer, unintelligible tongue. But I am convinced that the soil is fertile, the waters refreshing, the natives friendly, and that here is a country that promises to yield a rich return to those adventurous souls who love the spirit of exploration, find pleasure in the exercise of a little imagination, and are not averse to a great deal of hard work.

420300465632

BIBLIOGRAPHIC
ORGANIZATION

PAPERS

*Presented before the Fifteenth Annual Conference
of the Graduate Library School*

July 24-29, 1950

Edited by

JESSE H. SHERA

AND

MARGARET E. EGAN



THE UNIVERSITY OF CHICAGO PRESS
CHICAGO • ILLINOIS

1951