

THE ORGANIZATION OF KNOWLEDGE
AND
THE SYSTEM OF THE SCIENCES

BY

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WITH AN INTRODUCTION

BY

JOHN DEWEY



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To the
Scientist who is an organizer,
to the
Organizer who is a scientist,
and to the
Educator, who is both organizer and scientist,
and especially to the
Librarian,
who is educator, organizer, and scientist,
this work is earnestly dedicated.

. . . . the crowning race

Of those that, eye to eye, shall look
On knowledge; under whose command
Is Earth and Earth's, and in their hand
Is Nature like an open book;

Tennyson, *In Memoriam*.

The pragmatic value of organization is so conspicuously enforced in contemporary life that it hardly seems necessary to dwell upon the instrumental significance of classification and systematization.

John Dewey, *Reconstruction in Philosophy*.

INTRODUCTION

Most of us, even those who use libraries constantly, think of them, I imagine, mainly in reference to our own personal needs. We take them for granted, and judge them by their practical efficiency in supplying us with what we want when we want it. Mr. Bliss's monumental work comes as a shock to this narrow personal attitude. That the problem of the organization of libraries connects on the one side with the scientific and educational organization of knowledge and on the other side with the promotion of social organization this book makes impressively clear. It includes, moreover, the questions of psychology concerned with effective, growing assimilation of knowledge and the logical and philosophical questions involved in the problem of the unity, interrelations, and classifications of science.

On the other side, the social side, it also makes clear that our practical activities are more and more dependent upon scientific discoveries, intellectual progress and the diffusion of genuine knowledge. Social organization depends increasingly on ability to utilize organized knowledge competently, and decreasingly on tradition and mere custom.

Underlying the treatment is a sound philosophy of the relations of the special and particular to the comprehensive and general, of theory to practice, of organization and standardization to freedom and to the needs imposed by constant growth and change. The range of solid scholarship which has been drawn upon will be obvious even to the casual reader. But the learning and the philosophy are handled as effectively as the style and treatment are clear and direct.

The modern library stands at the cross-roads where meet together the two great currents of intellectual integration and practical application in the interests of a more unified social life. This work of Mr. Bliss is a well-documented and thoroughly scholarly demonstration of this fact. He has lifted the whole question of organization of libraries up to a plane where it is evident that under modern conditions of life libraries occupy a central and strategic position.

The reader learns to understand, as he follows the thought of Mr. Bliss, that a library is not a mere depository of books, and that a merely arbitrary classification does not satisfy even the practical needs. A classification of books to be effective on the practical side must correspond to the relationships of subject-matters, and this correspondence can be secured only as the intellectual, or conceptual, organization is based upon the order inherent in the fields of knowledge, which in turn mirrors the order of nature. The library serves a practical end, but it serves it best when practical tools and instrumentalities agree with the intrinsic logic of subjects, which corresponds to natural realities. The right organization of knowledge in libraries embodies, moreover, a record of attained unification of knowledge and experience, while it also provides an indispensable means to the development of further knowledge.

Knowledge grows by specialized piece-meal increments; but unless the special worker is to become unaware of the relations and the meaning of what he is doing — unless in the end chaos is to result, there must be a central order based on comprehensive and unifying principles. Yet the order must be sufficiently flexible to adapt itself to new and unforeseen growths.

In consequence of this broad and liberal spirit Mr. Bliss's book, in addition to its special value to those directly concerned with the services of books, is of importance also to all those who are interested in the bearing of the organization, and the interrelations, of knowledge upon the transition from

anarchy and chaos to order and unity in life. Intellectual coöperation and collective attack on complex problems, drawing upon materials of diverse kinds, are marked movements of present life.

Of the many special points of interest which are included in the comprehensive plan of Mr. Bliss's work, there is one which I should like to single out for special attention. In the broadest sense of education, the dominant concern of this work is educational: the problem of the ideal of library organization is the educational service it should render both to the general public and to the workers in special fields. But it is also closely connected with education in its narrower sense of what goes on in schools. There is no educational question more pressing than that of the right relation of special and departmentalized instruction to the all-round, balanced development of students and teachers. Because of this need, our colleges are introducing "orientation" and "survey" courses. There is hardly an institution that is not experimenting to produce a better correlation of studies. Specialization has been carried so far that the great need now is that of integration.

Apart from its permanent contributions to the solution of the general problem of the organization of knowledge, this work of Mr. Bliss is, in its general scope and in its details, an important and much-needed contribution to the accomplishment of this special educational task, which at the present time has become urgent and dominant.

JOHN DEWEY

Yet the fact that improvement in organization yields practical results in the various special sciences justifies our faith that a still wider improvement of organization which aims to bring all the facts and principles of all sciences into a coherent system will work an influence on practical life commensurate with its comprehensive character. . . . Improvement in the organization of facts and principles means that they are more closely related to one another; that, instead of being 'massed', they are shot through with a multitude of connections; and that in virtue of these connections, they may be recalled most readily and applied most effectively. . . .

The fact that the organization of experience in coherent systems is a fundamental factor in promoting the application of experience to the practical improvement of adjustment is profoundly significant to the process of education.

WILLIAM CHANDLER BAGLEY, *The Educative Process*.

PREFACE

THIS book should be of interest, we think, to educators and philosophical readers who recognize the intellectual and the social values of what is termed the organization of knowledge, to scientists who realize the methodic and economic advantages resulting from the systemization of scientific knowledge and research, and finally to librarians who, maintaining that books in libraries should be well classified, acknowledge the importance of making the classification consistent with the organization of knowledge as conceived and systemized by scientists and educators. These several classes of readers are in their different ways interested in the organization of knowledge.

What is meant by the *organization of knowledge*? Those who desire our immediate answer may turn to Chapter IV, which is addressed mainly to that question. But the special uses of the phrase, whether by educators, scientists, or philosophers, have become so current — if not quite definite — that such anticipation of our definition seems unnecessary here. We shall merely indicate that in the broader sense, in which the term applies to the subject of this volume, the organization of knowledge comprehends not only the *mental* processes, the development of concepts and the conceptual synthesis of knowledge, but also the *intellectual* correlation and systemization of valid knowledge, from the simpler social synthesis of common experience and elementary education to the more complex conceptual systems of science and philosophy.

In all these processes and methods there inhere classifications of some kind and form. Classification is fundamental to the organization of knowledge. The study of the principles, methods, and forms of classification should therefore be of interest.

But there are minds that disapprove, and some that just *detest* organizations and classifications, which they regard as the colt his chafing harness or the bird his imprisoning cage. The writer sympathizes, on one side of his nature and experience, with their emotional dissent. To individualists and liberalists who may be averse to such organizations of knowledge and purpose as might fortify the developing forces of social organization, which they may regard as already too oppressive, we would indicate the second section of the first chapter as intended to meet some of their objections, as well as to reassure them of our own liberal views.

The intellectual and economic needs of humanity are not fulfilled by mere coöperative accumulation and arbitrary classification of the data of knowledge and the materials of utility. In the earlier stages of organization indeed all hands and minds may be wholly occupied with the preliminary work of collecting, naming, marking, and indexing. The workers may for the time regard such methods and results as satisfactory. This state of mind the writer has termed "the subject-index illusion", with special reference to a certain famous subject-index to the contents of public libraries.

In subsequent stages tentative classifications, conceptual or practical, may be adopted; and, tho crude and arbitrary, they are likely to become established in a conservative historical and economic situation. All classifications are in truth relative to views or conceptions, interests or purposes, and are therefore in some respects arbitrary and conceptual. But with growing experience, knowledge, and education the relevant classifications become progressively rational and systematic. This developing organization of knowledge is not, however, rigidly structural and static, but functional and plastic, and it should be liberally adaptive to new interests and changing communal conceptions.

In view of the relativity of classifications it is often argued that systems are impermanent and that there is no established consensus. Yet impermanent systems may be *relatively*

permanent, and a consensus may prevail for at least a generation, and for a class of minds. In fundamentals, in general ideas and relations, the system of knowledge, the systems of classification, and the consensus in which they are established, are no less durable than other systems of nature and of human society, and in their details they are hardly more changeable. In brief, *general* ideas, general classes, and general relations are relatively *permanent*. The more consistent the general plan is with the established systems of science, the more efficient and the more permanent the system of classification will prove to be, even for special and various purposes.

The most adequate classifications are, generally speaking, those that are most consistent with the organizations of knowledge relevant to the interests in view. Their truth and efficiency depend upon two fundamental principles: (1) *subordination* of the more specific to the more generic relevant terms, or subjects; (2) *collocation* of closely related subjects for convenience in reference or use, for *maximal efficiency*.

That this is the first undertaking to treat this subject comprehensively and with an approach to thoroughness is a claim that the writer thinks he may make with truth. A second claim that he feels entitled to put forth is that he has stated and adduced certain principles that heretofore have been but vaguely conceived or have been secluded in treatises on logic. Thirdly he submits that the system of knowledge he has outlined in tabular form schematizes a more coherent system than any of those he has criticised in the historical chapters (Part IV). In this it may succeed chiefly because, without differing too radically from the truth of historic systems, it avoids their most patent errors.

The historical part is justified in that it treats the historical material in a broader topical and comparative way than does Flint's scholarly and authoritative volume; and there is no other adequate historical account.

If a reader finds that parts are irrelevant to his interests, he may turn to other parts that more especially concern him. The relation of the parts to the whole may be gathered from the epitomes that precede the sections of the chapters so as to assist readers to select or to omit. Paragraphs of very special interest are moreover subordinated in smaller type thruout the work.

We have tried to treat a very comprehensive subject broadly and without prejudice. Our personal attitudes in certain questions may, however, be expressed with a measure of vivifying emphasis. Tho the readers of the several classes we are addressing together may concur in fundamentals, they will of course differ in views and interests, and they must sometimes be taken apart.

Scientists, tho interested in the synthetic aspects, may be inclined to disregard a work that is so largely intended for educators and librarians. The obvious remark is that they may read only those chapters that most interest them. On the whole, however, it might behoove scientific readers of broad interests to know more about what educators and librarians are undertaking in their interests in a structural and functional organization of knowledge.

Some librarians may object that certain chapters are beyond their ken. But those we chiefly address have college education for all this, and more. Librarianship — as Dr. Williamson's report for The Carnegie Corporation on *Training for Library Service* affirmed some years ago — is in especial need of such comprehensive books for professional study.

But the three-fold interest and purpose inhere in the very nature of the subject. Classification for libraries can be adequate and efficient only if grounded on the fundamental principles of the organization and classification of knowledge, and this outstanding problem should not be disposed of without due regard to the educational aspects and interests involved. That the study of classification extends into logic and psychology should not deter the educated librarian, if

those matters are treated clearly and not too profoundly. That the subject is shown in its broader social relations should enhance the value of this presentation to the librarian as well as to the educator.

The problem of classification for libraries has become more difficult on the one hand from the increased momentum of certain going concerns and on the other hand from the rapidly accelerated progress of organization in science, technology, industry, and social amelioration. With this a more positive need for organized knowledge has become manifest, and a more positive demand for better classification for libraries. The time has come when this important problem should be given purposeful consideration in the interests both of library service and the functional organization of knowledge.

Scientists and philosophers may find some of these chapters superficial in places, but not, it is hoped, erroneous; for to guard against errors and vagaries the writer has submitted the several chapters to the scrutiny of colleagues well qualified in the respective subjects. Their assistance is gratefully acknowledged in naming them here; but they are of course absolved from responsibility for statements that originally and finally are the writer's, not theirs. To Professor Harry Allen Overstreet, head of the Department of Philosophy, to Professor Paul Saurel, of the Department of Mathematics, to Professor Alexander Marcus, of the Department of Physics, to Professor Reston Stevenson, of the Department of Chemistry, to Professor Bertram T. Butler, of the Department of Geology, to Professors George G. Scott and Abraham Goldfarb, of the Department of Biology, to Professor J. Salwyn Schapiro, of the Department of History, to Professor Bird Stair, of the Department of English, and to Professor Homer Curtis Newton, of the Department of History, and Librarian of the College, — to these severally I render thanks for advice, criticism, comment, and approval, regarding their special fields of interest.

The work has been rendered possible by the liberality of the executive heads of The College of the City of New York, who have permitted the writer to apply to this purpose a large part of his time during the past six years. But for twenty years or more his interest in the subject has been a dominant one.

For advice, criticism, and appreciation I am especially grateful to Dr. Harry Lyman Koopman, Librarian of Brown University, to Dr. Ernest Cushing Richardson, Consultant in Bibliography in the Library of Congress, to Mr. Charles Martel, Chief of the Catalogue Division of the Library of Congress, to Miss Grace Osgood Kelley, Supervising Cataloguer and Classifier of the John Crerar Library, to Miss Josephine Adams Rathbone, Vice-Director of the Pratt Institute School of Library Science, to Professor Andrew Keogh, Librarian of Yale University, to Mr. George Burwell Utley, Librarian of the Newberry Library, to Mr. Harrison W. Craver, Director of the Engineering Societies' Library. Professor Burton E. Livingston, Permanent Secretary of the American Association for the Advancement of Science, and Mr. Joseph Ratner, a lecturer in Philosophy in Columbia University, have read parts of the book and have given me valuable advice and criticism. To Professor Stephen Pierce Duggan, Director of the Institute of International Education, and Mr. Sidney W. Noyes, Vice-President of the New York Trust Company, I owe especial thanks for assistance and appreciation.

The books that have influenced one can never be named all together; but those that have best informed and sustained one's thought and purpose may sometimes be severally mentioned with justice as well as with gratitude. In the Bibliographic Notes that appear at the end of the volume several debts of this kind are acknowledged. Other or lesser debts are mentioned or implied in footnotes thruout the chapters.

HENRY E. BLISS.

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