APLA BULLETIN

vol. 31 no. 1 february 1967

1867 1967

atlantic provinces library association

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APLA BULLETIN

vol. XXXI (february 1967) no. 1

The APLA Bulletin, published quarterly, is the official organ of the ATLANTIC PROVINCES LIBRARY ASSOCIATION, formerly the Maritime Library Association. APLA, organized in 1918, is a registered and incorporated company under the Nova Scotia Companies Act, and serves the provinces of New Brunswick, Nova Scotia, Prince Edward Island and, more recently, Newfoundland and Labrador.

In its membership, APLA embraces every type of library: public, regional, school, college, university and special libraries in the Atlantic Provinces of Canada.

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The APLA **Bulletin** is indexed in **Library Literature** (U.S.A.) and **Library Science Abstracts** (U.K.)

Send manuscripts (typed, doubled-spaced on 8 x 11) direct to the Editor. For classified and general advertisements, including rate card, contact the Assistant-Editor.

Membership in the Association includes a subscription to the **APLA Bulletin,** Personal membership: $3.00 per year; Institutional: $4.00 per year. Contact the Treasurer, Miss Pauline Home, Halifax City Regional Library, Halifax, N. S.

The APLA Bulletin is printed by the Truro Printing & Publishing Co., Ltd., Truro, N. S.

Divina Commedia

or, It'll Getcha

Have you ever thought, as you returned from the Reference Room to your office, that your body had just traversed literally thousands of oral, digital, printed, and videofacsimile messages, including possibly a telepathic bundle of energy concerning "the obvious need for automation," just then hurled at the Head of Cataloguing from the Head, bloody but unbowed, of Circulation? That your body is at present unequipped to interpret, censor, or jam these messages is perhaps one of the few remaining safeguards against your own psychosis. If you happen to be top banana in your library organization and are among those who assume, even in 1967, that you can continue to walk 'round or through those messages like spider's webs, you have already begun to lose touch with reality, even although the clinical manifestations are not yet clear to everyone.

It requires only a cursory study of the literature to reveal that in 1966 we experienced a very distinct shift in the orientation of the library as a social institution. It is a shift from the role of a custodial agency to which people must come for information, to that of a communications centre from which information is sent forth. This change had been two decades in the making but during 1966 a surprising number of libraries were preparing for the world which Gutenberg discovered in 1454 and which McLuhan explored and mapped five centuries later. Even within five years of that event, it has already become fashionable among avant gardists and the literati to pooh-pooh McLuhan. (O, to be merely a synthesizer!) His commentary on the disappearing book notwithstanding, librarians throughout the world have begun to act as though the electric age had really arrived. Melvin S. Day can already say of the library of National Aeronautics and Space Administration that

> . . . the 'shelves' . . . are the stockrooms in the central facility; the 'card catalog' is actually a magnetic tape; the 'circulation desk' is the telephone or the United States mails; and the 'reading room' is the user's place of work at which information products and services have been made available to him.

Literally hundreds of libraries large and small are to-day pressing to get themselves "on line" to a computer; planning "total systems" approaches to their problems; programming third generation data processing facilities — all of which accept the phenomenon of videofacsimile, like the book itself, as a fact of library economy. As this issue of the **Bulletin** will testify, librarians in the A.P.L.A. region have not been merely sitting around "waiting for a better machine" (George Bonn). An article (p. 19) on information retrieval offers a synopsis of lectures delivered recently to mathematicians, computer technologists, and librarians at the Memorial University of Newfoundland. This was an experience which, in many ways, suggested parallels to Virgil's conducted tour of Dante. Time and again librarians lost sight of mathematicians on lofty, purga-

torial mountains; moments later, only a few hardware technologists could be described in the sulphurous smoke of the infernal pit; and occasionally librarians surfaced from the fog as their colleague, Dr. Jean Tague, pointed to such landmarks as subject headings, class marks, and other types of indentions on the bibliographical terrain. All participants came together once again in the corridors outside the lecture theatre but to date none has volunteered for the third tour which offers no less than a vision of the empyrean and words of solace from Beatrice herself.

Volunteers for such a pilgrimage are now being solicited from another quarter, this time at ten dollars the round trip (see **From the President's Desk,** p. 29). President Dorothy Cooke and Dalhousie University Library, host to the 28th A.P.L.A. Conference, are to be congratulated on their initiative and thanked for this expenditure of time and other resources on our behalf. We are being offered an opportunity, right on our own door-step, to listen, cogitate, and ask questions of persons, many of whom have already extended their libraries beyond physical walls and into those multi-media grids and networks which will carry recorded knowledge to the laboratory bench, the home, the factory, the executive suite, and the orbiting satellite.

Doubtless some amongst our membership will opt out of what they will rationalize as a divine comedy for these disadvantaged Atlantic Provinces. Others will wish to argue that to-morrow's automated library can hardly be of interest to a county school, or public library. This is like saying that missiles in Cuba, life on mars, or illiteracy in Wamba cannot possibly matter in Halifax, Restigouche, or Seldom Come By. Excuses not reasons, will serve those few who lack confidence in themselves; who fear a rearrangement of the pecking order; or whose falling metabolism cannot risk a change, even of their own minds. A small residue won't even gamble ten bucks on a chance to read their own professional obituary.

In a recent article, F. H. Wagman noted that

> . . . for a long time to come, any teacher or professor who hopes to use a library merely to keep himself informed about developments in his field will accept employment at a Junior College only if there is a larger institution nearby where he can have library privileges . . .

If the 1967 class of library science graduands have been reading the current literature with insight, they will not likely handicap their future carreers by accepting a position, at whatever salary, in a library that has done little more than equivocate about mechanization and automation. To those A.P.L.A. members who "can't make" the 28th Conference in Halifax, we can only recommend that they begin their search for Paradiso in a less demanding profession. As for the computer and its strange, new galaxy, we can offer only one positive assertion: it'll getcha, no matter what!

But if none of this grabs you, do have a read of Mr. Chisholm's article. It will restore your faith in more than THE BOOK and the century-old objectives of the Mechanic's Institutes — and to think that this is the Principal speaking, not the Librarian. Could it be that we chose the right profession after all but have merely selected the wrong ladder?

F. E. G.

THE SCHOOL LIBRARY COUNCIL OF THE N.T.A.

BROTHER P.V. SHEA

The Newfoundland Teachers' Association may take heart from the "Minerve" issue of *Canadian Library* in which Dr. Carlyle King quotes with approval the following from the Vainstein Report: "The schools of the province (of British Columbia) must not be allowed to continue providing token library service through dependence on their local library." Dr. King goes on to say (1)

> (Miss Vainstein) is shocked, and so am I, that the Provincial Department of Education has no supervisor of school libraries, or school libraries Consultant, to give guidance and leadership in this fundamental area of education; and she is asking only for the basic minimum when she urges that every school district should appoint at least one full-time school librarian to stimulate and co-ordinate efforts at the district level. . .

In view of Dr. King's tireless efforts on behalf of library service in Saskatchewan and the results now manifest in that province, Newfoundland teachers should listen to him with some respect. If what Miss Vainstein is recommending for British Columbia is only "a basic minimum", many of us have clearly even farther to go than we suspected.

The current renaissance of interest in the school library took its rise, sadly, from recent Russian space conquests. Doubtless the U.S. Library Service and Construction Act and ALA's "Standards for School Library Programs" (1966) will have a similarly salutory effect on Canadian planning. In fact, we have witnessed during this same year the adoption by CLA/ACB of library service standards for Canadian schools, now published by Ryerson Press (2). It is interesting to note that Francis R. St. John, whose Report on libraries stirred heated reaction in Ontario, has found general favour with Ontario's new Public Libraries Act; he feels constrained, however, to hope that something at least comparable might soon be enlisted in behalf of the elementary and secondary schools (3). That this may be said in one of Canada's most progressive provinces, even in 1967, is another indication of the distance we in Newfoundland must travel.

True, there have been recent stirrings as readers of this journal well know.(4) We have also, in this province, been examining our educational system generally. In 1964 Dr. W. J. Gushue and Mr. O. K. Crocker of the Department of Education in the Memorial University began a survey of library facilities in Newfoundland schools. The report issued as a result of this survey listed the number of schools with libraries, the number of librarians, the number of teacher-librarians, the amount of money spent for books, the amount of money spent per pupil, and other interesting items. The viewpoint of the Education Department may be gauged by Dr. Gushue's words, "It is generally agreed that the quality of any school is measured in large part by the library and the use that is made of that library." (5)

Brother Shea was born in Brigus, Newfoundland; educated in St. John's with B.Sc. at Saint Mary's University, Halifax; M. Sc. at Fordham, N.Y. and Seattle; Library Science degree at Rosary College, Chicago. Science teacher in Chicago, New York, Michigan and St. John's. Presently Reference Librarian, Memorial University of Newfoundland.

For the past 2 years the Royal Commission on Education and Youth, headed by Dr. P. J. Warren of the Memorial University, has been making a comprehensive study of education in the province.

Newfoundland teachers are also taking a personal interest in school libraries. Mr. Clifford Andrews, Principal of Macpherson Junior High School in St. John's, recently wrote "The function of a school library and an awareness of its vital significance in the learning process have not yet permeated the thinking of educators in this province" but he offers hope for the future when he adds: "I take great courage from the self-evident fact that more and more educators (and administrators) are beginning to give serious thought to this problem; to call for school libraries and books; and are beginning, very slowly in this Province to challenge the idea that 'everything necessary' will be found between the covers of the authorized textbook." (6)

In addition to these manifestations there are some movements now underway that give promise of real progress towards a good school library system. The Newfoundland Teachers' Association has been exerting pressure for several years to have a course in School Librarianship established at the Memorial University; the members of the Education Department at the Memorial University are much interested in providing training for school librarians; the Public Libraries Board is aware of the problem and has been working for improvements in school libraries; the Provincial Government grants a Specialist bonus to qualified teacher-librarians; and within the last school year a group of teachers in St. John's have formed a School Library Council to promote library service in Newfoundland schools.

The Newfoundland Teachers' Association (N.T.A.) encourages its members to form Specialist Councils. The forming of these Councils has the obvious advantage of allowing teachers in any field to discuss their problems without boring others at a general meeting but, more importantly, it enables the N.T.A. to put the influence of its large membership behind a project initiated by one of the Councils, whenever such action is deemed necessary or worthwhile. The School Library Council was organized by a number of teachers who were in charge of school libraries; who recognized the need of special training and the practical impossibility of getting such training in Newfoundland just now; and who resolved to do something about the problem themselves. The Council is confined to the St. John's area for the present but the members hope to extend this work throughout the province when they have gained more experience and when teachers in other areas begin to seek their help.

The purposes of the Council, as defined by its Constitution, are as follows:

a. To promote and encourage library services in Newfoundland schools.

b. To study new trends and developments in library services and to act as a clearing house for new ideas in this field.

c. To furnish recommendations and advice to the Provincial Executive and other committees of the N.T.A. on matters affecting library services in schools.

d. To become acquainted with library standards and library programmes in other places and to determine which of these is applicable to Newfoundland.

e. To formulate objectives for school libraries in Newfoundland.

f. To draw up a programme of library instruction for Newfoundland schools.

g. To impress upon school Boards and the general public the need for, and the function of, school libraries.

h. To encourage proper use of the school library as the intellectual centre of the school and to encourage habits of independent study by pupils.

i. To help untrained librarians in the work of setting up and operating the school library.

j. To work for the establishment of course(s) in School Librarianship and in Children's and Young People's Literature as part of the teacher educa-

tion programme at the Memorial University of Newfoundland.

k. To work for the appointment of a School Library Supervisor by the Provincial Department of Education in order to establish, develop and coordinate school library services in the Province.

The Council is not an association of professional librarians; it is, rather, composed of teachers who run libraries. To compensate, so far as they can, for their lack of specialized training, they plan for the present to hold regular, short meetings in different school libraries during the year instead of sponsoring one long annual meeting. By this means they hope to share ideas and to learn from one another. A pattern seems to be evolving for the content of these meetings. Before the formal session begins, the visiting librarians browse around the library, discuss it informally, and try to gather ideas for their own use. In the meeting the host librarian gives an account of some special features of his/her own library; some interesting history connected with it; some of the problems affecting that school and the means adopted to solve them; or an explanation of any useful or interesting special feature or topic. A question-and-answer period usually follows. Some of the topics discussed to date include cooperation with teachers, use of paperbacks, book selection, and the training of student assistants. Sometimes a prepared talk is given and the January meeting was hosted by the University Library and included tours of Main and Divisional Libraries following an audio-visual film sequence.

This may seem to be an "Operation Bootstrap," but actually it has been a delightful and rewarding experience. Even casual observers are aware of the enthusiasms of these teachers for the development of their own school library services as they begin to realize how many excellent and workable ideas may be adopted to the needs of the school libraries which they are developing. For example, at the last meeting one librarian reported that at her school a number of teachers had formed a Library Committee to promote use of the library. These teachers are very conscious of the need for university courses in librarians; but until such courses are available, they are determined to help each other in this way.

The members of the Council base their programme on the premise that the outlook of people towards school libraries is changing in Newfoundland. While some people do still look upon a school library as a fringe benefit, (something "nice to have but of no practical use"), principals, administrators, parents and teachers are now realizing that functioning school libraries are necessary if students are to take their places in to-day's world—to say nothing of the world of tomorrow. In a library that is a part of the teaching programme of the school, the pupils learn to look up information for themselves, to make comparisons between different viewpoints, to learn about the many new discoveries and inventions that are changing our lives, and to learn the knack of independent study—TO LEARN HOW TO LEARN. Our Newfoundland people are beginning to understand that the learning of answers by rote merely to pass examinations does not prepare a student for independent thinking or for leadership, although it is an excellent training for those destined merely to be followers. Newfoundlanders never did fit this prototype but they now find it necessary to destroy that image. For the good of Newfoundland, in addition to training people for clerical and mechanical jobs, we must now develop thinkers, innovators, and leaders. The school library will be a crucial instrument in the 20th century resolution now engaging this province.

Our system of public examinations has served Newfoundland well. In 1893, when the Council of Higher Education was established, there were very few trained teachers on the island and one-room schoolhouses were in the majority. As F. W. Rowe has observed, "the examinations were the only effective spark that encouraged thousands to look for higher grades. They gave some measure of uniformity to a system that had been chaotic and they provided yardsticks whereby pupil achievement, and to a certain extent the quality of teaching, could be evaluated with a fair degree of accuracy" (7) Such a system was needed seventy years ago when the aim of education was restricted, simply, to the art of reading and writing and the provision of high school education for prospective teachers, or for those who wished to enter the professions. For many years the C.H.E. certificates were proudly displayed in countless Newfoundland homes as marks of achievement.

Conditions are very different today and the schools must prepare students to enter a society where changes are occuring with disturbing speed in subjects as various as ecumenism, modern mathematics, and space travel. The schools must educate the pupils for a very flexible way of life because not only certain specific jobs but whole ways of life are disappearing; meanwhile, wonderful new opportunities are being offered those who are prepared to take advantage of them. Life may be considered a gamble, but in this game "Luck favours the prepared mind." It is the duty of the school to do this preparing.

Part of the task of the School Library Council is to create a new impression of the school library and of the work done by the school librarian. The librarian, as both teacher and librarian, must be able not only to prepare plans for library service in a school but also to carry out these plans. The librarian must be able to convince administrators, teachers, and parents that the library-centered school fulfils the needs of both teachers and pupils. He or she must be a salesman of this vital link in the learning process, this primary teaching aid in the modern school. This message will require a very "hard sell" being foreign, obviously, to many teachers and parents even in parts of Canada which were touched by the technological revolution a centennial ago.

Allow me, in conclusion, to summarize the programme which the Council has planned in order that teacher-librarians may achieve these objectives.

a. Meetings are to be frequent and short enough to catch the interest of members and to keep them in touch with each other and emerging trends.

b. The meetings will be held in different school libraries by turn. Both the host librarian and the visitors expect to learn much from this rotation of meeting places.

c. Topics of current interest are to be discussed at the meetings, with a general exchange of ideas to follow.

d. Guest speakers (professional librarians and other persons connected with school libraries) will be invited to coordinate the meetings.

It has been my observation that the School Library Council is developing a programme that will greatly help Newfoundland teachers, in the absence of professional training, to institute a working and effective system of school libraries. The enthusiasm shown at recent meetings and the increasing number of teacher-librarians present offer great hope for the future. The establishment of library-training courses at the University will give us an opportunity for still further progress.

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HALIFAX REGIONAL VOCATIONAL SCHOOL

Library Services

A. A. CHISHOLM

The objective of the Halifax Regional Vocational School is to prepare students for gainful employment. Since this is the only school of its kind in the area, the school library is unique in its make-up and function. Its most important aim is to assist the school to achieve its goal, first by maintaining a collection of books, magazines, pamphlets, and journals and secondly by assisting students from the various departments of the school to use the library efficiently. This means that our library must be an integral part of our school program; and the various departments, industrial, commercial, and general education operate in close co-operation with it.

Although we have not formally spelled out the objectives of the services of our library, beyond the fact that we want it to be a vital force in the training of our students, we do have certain guidelines of operation which insure a realistic contribution to the objectives of the School:

(1) The Librarian works closely with the Head Teachers of the various departments in the purchasing of books, trade journals, etc. for reference and recreational reading. Since the Head Teachers are curriculum specialists, there is the assurance that the library content provides materials on the industrial, commercial, and general educational subjects which are emphasized in the curriculum and which help to keep the students and teachers abreast of changes in these fields.

(2) In order to help our students use the books and reference material in their field more efficiently, at the beginning of each school term the Librarian explains to the students the classification scheme of the books in the library and helps the students become familiar with the catalogue, the arrangement of the library, and all the general library procedures. Individual assistance is given to the students in the selection of books for their assignments, background, and recreational reading.

How well students use library materials depends as much on the teacher as on the librarian. Since our teachers are enthusiastic and appreciative of the value of our library services, they have established in their shop areas small technical libraries for their students. These reference books are in daily use and kept in the shops after being accessioned and catalogued in the main library. In making books, trade magazines and the like accessible in this way, as well as through the main library, they become very useful instruments in our special type of education. Our objective is that all our students will use the library services in the school readily, intelligently, and habitually in the hope that they will also gain the habit of coming to the library for recreational reading.

(3) We aspire to make the library service an important part of the student's practical work. This is done by informal discussion between the librarian, or shop teacher, and the student in connection with a reference or research problem. These informal consultations may be time-consuming but, in the process the student may learn to use a number of library tools such as the card catalogue, bibliographies,

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Mr. Chisholm, a graduate of St. Francis Xavier University Antigonish, and of Teachers' College, Columbia University, New York, is Principal of the Halifax Regional Vocational School. We are most pleased to present our readers with this school Administrator's proud and hopeful account of his Library services.

several kinds of dictionaries, and handbooks. In learning to use these basic tools of their vocation in this way, the students will have required an educational skill of life-long benefit.

Vocational students are often erroneously classified as non-readers, but we have not found this to be so. It is true that they are usually more interested in "doing" than in abstract "understanding." However, it is our experience that vocational students cannot thankfully, be thus easily categorized. Because of this, we try to meet their needs in the following way. We keep on display and on open shelves books, paperbacks, pamphlets, and magazines. Our Library collection contains general nonfiction, technical, and educational books as well as a reference and a fiction section. It has not, accordingly, fallen within **our** experience that they are "non-readers"!

The total number of volumes is now over 18,000. From the beginning of the school year to the end of 1966, nearly 800 books, records, and pamphlets have been added to our library. We subscribe to 145 magazines and of these 60 remain in the library and 85 go to the teachers for use in the classrooms and shops. The total number of books borrowed by the students during the fall term was well over 4,000. On an average, 63 books were borrowed per day.

Our library has a full-time staff of one professional librarian and one library clerk. It serves over 900 students and over 60 teachers and staff. Most of the students have scheduled weekly library periods for reference work and recreational reading. For those who do not have regular library periods, the library is open during recess and after school.

The Board of Directors of the school look upon the library services of the school as a very important function. For this reason they are generous in their budget allotment for the library and are anxious to see that students and teachers have access to up-to-date books, periodicals, and reference resources to serve in the development of a successful instructional program.

The Library, Halifax Regional Vocational School; Mrs. Morris, Librarian, in charge.

DALHOUSIE MEDICAL DENTAL LIBRARY

a record of 99 years

M. DOREEN E. FRASER

Part I

The Medical School of Dalhousie University will celebrate its centennial in 1968 with a sudden up-surge of renewed energy and activity. Since 1868 it has provided training for students from New Brunswick, Newfoundland, Nova Scotia and Prince Edward Island. The school's stalwart and steady contribution was given public recognition when, by unanimous agreement, it was decided that the Nova Scotia Centennial project would be the Sir Charles Tupper Medical Sciences Building which will be officially opened in the summer of Canada's Centennial year — 1967. Needless to say such a gesture has given great satisfaction and relief to the Medical Faculty which has been in need of a modern plant for a long time. So fast have demands been growing that it is now fairly certain that the building will not satisfy the needs of the School's second century. It is unfortunate that financing and building must tag years behind current requirements.

An intelligible understanding of this library's development requires a brief historical review of Canadian medical schools, of their supporting library collections, and of the medical librarians who nurtured them. The forerunner of the Dalhousie Medical School was the Halifax Medical College which enrolled its first class in 1868 through the efforts of several gentlemen, one being the Hon. Charles Tupper, a man of many parts and with an overwhelming interest in politics. By 1868, three other Medical Schools had already been established in Canada — those at McGill University (1821), Laval University (1853), and Queen's University (1854). Thirteen years after this date three others followed — University of Western Ontario (1881), University of Manitoba (1883) and University of Toronto (1890). World War I was to end before others were established; these included the University of Montreal (1920), University of Alberta (1921) and a course for the first two years at Saskatchewan in 1926. Twenty years elapsed and the Second World War had concluded when a medical school was established at the University of Ottawa in 1945, followed by one at the University of British Columbia (1950), and the four-year course at the University of Saskatchewan (1951). Through the 1960's, action has been taken about schools at the Universities of Sherbrooke, McMaster and Calgary. The Sherbrooke School enrolls its first class in 1967 and interest is more than passing at the Memorial University of Newfoundland. Here, the Association of Canadian Medical Colleges and the Association of American Medical Colleges have provided assistance through a study Commission which was established in 1965 by Memorial University under Dr. J. A. MacFarlane, Emeritus Dean of Medicine at the University of Toronto. This Commission Report and that of the Government of Newfoundland's Royal Commission on Health Services, which

Formerly Biomedical Librarian at the University of British Columbia, Miss Fraser is presently Medical Librarian at Dalhousie University, Halifax.

Miss Fraser has been most active in library associations, having been President of both the British Columbia Library Association and the Pacific North West Regional Group of the Medical Library Association. She has also been Chairman and Secretary of the Canadian Library Association's Committee on Medical Science Libraries.

The second part of this article will appear in the May issue.

was published in 1966 under the authorship of the late Rt. Hon. Lord Brain, have formed the base for planning. The appointment on 1st June 1967 of the Rt. Hon. Lord Taylor as President of Memorial University augurs well for the Centre. Lord Taylor is former Editor of *Lancet*, the oldest English language medical journal to be still publishing. With its first students possibly enrolled by 1970, the University would grant its first M.D. Degrees in 1974. The University Librarian has received large quantities of periodical back runs from co-operating libraries including Dalhousie; however, the new university library is already short of space and the recommended five-year "lead time" for an adequate medical collection will necessarily be curtailed.

A present decision is pending about a medical school for New Brunswick and, in preliminary discussion of this kind throughout Canada, one gets the impression that politics (of every variety) seems to have greater influence on whether a medical school is to be established than the actual capacity of the medical profession to operate a school which will satisfy more than minimal requirements. Accrediting committees do, in the end, assure this much; but library planning is clearly one area which is apt to receive short shrift when other expenditures must be faced.

It should perhaps be mentioned that the Dental Faculy at Dalhousie was established in 1911/12, it being one of se early Canadian schools. The first dental student had been registered through the N. S. Dental Association in 1891; the School had developed into the Maritime Dental College with 4 students by 1908. It has remained a teaching school until the present time, but plans are being laid for a greatly increased programme when the extension to the Dental School's building is completed.

With the possible exception of those at the University of Toronto and McGill, Canadian medical schools were caught unprepared for the tremendous explosion of post-war scientific research. The impact has been upsetting. Until very recent years, the Canadian schools have been largely **teaching** schools, not too heavily engaged with research programmes; and their libraries have been expected to serve both hospitals and practitioners without reasonable financing and staffing. By 1959, post-war developments were having sufficient effect on all campuses for two things to occur which had consequences for the Dalhousie Medical-Dental Library. The Committee on Medical Education recommended to the Dalhousie Medical Faculty that a more active research programme should be developed. This policy was accepted with apparent unawareness that it would change the whole course of their library's future. It took three years before the effects of this decision became evident. The second influence was the Medical Library Association's 58th Annual Conference at Toronto in May, 1959. The theme of this conference naturally dwelt on Canada's contribution to the medical sciences. The Medical School Group was chaired by Miss Grace Hamlyn, Librarian of McGill Medical Library. For several years, two or three Canadian medical librarians had met occasionally at M.L.A. conferences but since few of the eleven were permitted to attend at the expense of their schools, and because distances were frequently very great, attendance was intermittent and the opportunity to meet regularly was lacking. Between 1953 and 1962, the librarians of McGill Medical Library and of the University of British Columbia Biomedical Library were the only regular Canadian participants at MLA meetings. When in 1957 the *Union List of Scientific Serials in Canadian Libraries* was published, the Biomedical Librarian at the University of British Columbia, whose collection was then only 6 years old and was recorded for the first time, suddenly caught the full impact via Interlibrary Loan requests of the inadequacies of other collections, many of which were decades older than her own. To the McGill Medical Library, which had been playing the role of Fairy Godmother for years, this was not news. Out of this experience, and the opportunity to learn what was happening elsewhere, the two Librarians planned an historically unique session for the Medical School Group Meeting.

For the first time eleven Canadian medical school librarians worked together to assist one of their number to prepare a paper about their mammoth problems. Of the eight who attended the Toronto meeting, the majority were meeting for the first time. It was shock treatment for many to hear a paper (1) which uncovered private skeletons before a group of some 125 knowledgeable librarians. Nonetheless, they valiantly rallied in special session to discuss what could be done about their plight.

The paper proved to be the opening move which had issue in the Association of Canadian Medical Colleges/Association des Facultés de Médécine du Canada being asked for rescue action in September 1961, the same month which saw the Royal Commission on Health Services publicly announced. Results were immediate and a series of meetings were held in Ottawa on the 8-10th February 1962. The President of ACMC/AFMC, Dean Chester B. Stewart of Dalhousie University, chaired the main meeting which resulted in the decision to sponsor a survey and which encouraged the librarians to organize themselves into an effective committee: the impetus which resulted from this first meeting of deans and librarians (together with the National Librarian, the National Research Council Librarian and the Medical Research Council's Administrative Staff) was, to put it mildly, startling.

As a consequence of prior negotiation with the Council of CLA/ACB, and through the assistance of the Association's Executive Secretary, Miss Elizabeth Morton, the Committee on Medical Science Libraries was formed even before the librarians departed from Ottawa. Miss Grace Hamlyn was named the Committee's first Chairman and by April, 1962, a Brief to the Royal Commission on Health Services (2) was submitted to the Commission in May 10th, the very day upon which Miss B. V. Simon, Assistant Librarian of McGill University Library, began her survey tour at the University of Toronto. The Survey was jointly sponsored by ACMC/AFMC and the CLA/ACB's Committee of Medical Science Libraries; but crucial support and assistance was provided by the Medical Research Council and the Special Committee on Medical Education of the Royal Commission on Health Services.

Miss Simon's visits were completed by August 1962 and the working drafts were circulating in January 1963. Although not officially published until November 1964 (3) reaction to her visits and her findings were immediate and much improvement had occurred on all campuses by the time her Report made its public appearance. The Royal Commission's Report, which arrived the following spring, included a recommendation (No. 220) that "in the provision of educational facilities for health professional personnel at research institutions, medical schools, dental schools, schools for public health and schools of nursing, adequate library facilities must be provided, these to be financed from the Health Facilities Development Fund and the Health Professions University Grant". (4) Further support was provided in one of the Commission's special studies by way of an unequivocal statement titled *Library Resources for Medical Education and Research.* (5) It was encouraging to receive such support after many years in the wilderness. Although discussions centred around medical school library services, at no time did these librarians permit the other health sciences to be omitted. The committee was deliberately given an inclusive name and dental school librarians have been members since 1963.

The reason for this sudden concern requires yet another historical glance. In 1934-39, a respectable medium-sized library subscribed to 275 journals and held 20,000 volumes in its collection. By 1950 when the new medical library at the University of British Columbia was begun, it was generally agreed by medical librarians that a minimal core of subscriptions to serve a medical school with teaching and research programmes was 450 medical titles — discounting dental titles, gifts and exchanges — and a working collection of 30-40,000 volumes. By 1959, the basic list had risen to 700, and in 1962 the list reached 1,000 titles and a collection of 50-65,000 volumes. (6)

Carroll's contribution in 1958 (7) was beneficial in the U.S.A. but had had no effect in Canada. He stated flatly that a completely centralized university library will not prove satisfactory for the medical school unless linked by a connecting corridor. He also made the cryptic comment that a first-class library is necessary to hold to level faculty and he recommended that journal lists should run between 900-1100 titles and that collections should hold 100,000-125,000 volumes. He stated further that enrolment has little bearing on library budgets and he deplored the fact that library budgets were always the first to receive cutbacks. This kind of thinking was still foreign to most Canadian campuses in 1962 when our own Survey was begun. By 1966, the waters had calmed and such matters were being discussed without choler. At present a working collection is estimated to be 1200-1500 journals and 75,000-100,000 volumes is being recommended for a library to support a health services operation in the middle range.

TABLE I

Canadian University Medical Libraries in 1958, 1962 and 1964

Library

(Data for 1958 from the 1959 paper at MLA conference; data for 1962 from the Simon report; data for 1964 from the Committee on Medical Science Libraries of the Canadian Library Association.)

Library		Population - Physicians of Canada				Serials and Monographs Number of Volumes			Current Serials Number of Titles Subscriptions: Gifts: Exch.			Total Expenditures		
		1958[1]	1961[2]	1958[3]	1960	1958	1962	1964	1958	1962	1964	1958/9	1962	1964
Atlantic Prov.		1,349,000	1,897,415	1,352	1,518									
Dalhousie	1890					27,000	30,000	32,000	384	490	806	16,065	31,628	54,810
Ontario	1920	5,405,000	6,236,092	7,046	7,908									
Ottawa	1946					12,000	17,000	19,000	637	707	782	NA	36,170	41,704
Queen's	1850					20,000	30,000	35,000	335	420	500	NA	....	....
Toronto**†	1890					80,000	83,000	100,000	1,425	750	1,000	NA	....	....
Western Ontario	1881					52,290	58,186	66,008	782	879	900	23,275	37,570	55,025
Quebec		4,628,000	5,259,211	5,091	5,863									
Laval	1852					23,000	26,533	32,000	586	768	1,100	25,500	35,630	66,500
McGill†	1823					99,500	96,000	100,466	1,895	1,560	2,225	NA	75,725	127,850
Montreal	1920					60,000	27,750	45,000	1,595	428	1,100	NA	53,300	70,889
Western Prov.														
Alberta†	1921	1,123,000	1,331,944	1,175	1,280	19,000	23,416	28,819	496	958	1,509	NA	39,486	70,308
British Columbia*	1950	1,399,000	1,629,682	2,087	2,010	30,000	36,588	59,698	1,270	1,399	1,539	56,482	69,118	142,598
Manitoba	1878	850,000	921,686	914	1,033	22,789	30,416	34,158	493	442	720	34,005	36,900	74,310
Saskatchewan	1926; 1951	881,000	925,181	803	895	10,000	15,380	19,065	539	531	625	NA	30,350	39,800

1: Canada Yearbook 1957/8; 2. Canada Yearbook 1965; 3. AMA Directory 1958; 4. Count inconsistent — Base differed for 3 Lib.
* Biomedical Library and its Branch Library in Vancouver General Hospital
** Staff for entire Science and Medicine Department.
† Dental titles included

Figures concerning staffing were not collected for the 1959 paper.
1958/9 Budget figures taken from working paper for CLA/ACB Committee on Medical Science Libraries Brief to Royal Commission. 1962.

In 1959, Canadian medical schools were all accommodating research programmes, most of which were supported by government grants. If the interlibrary loan services of McGill, Toronto, U.W.O. and U.B.C. had been inoperative, many of these projects would have been strangled at birth. In 1960 when McGill Medical Library was forced to charge for its enormous interlibrary loan service, a shockwave reverberated from the Atlantic Seaboard to the Rockies through dozens of laboratories and it provided a very real stimulus to the development of local collections!

So much then for a brief historical survey which is intended to elucidate the statistics immediately following.

It was hoped that the 1965/66 statistics from the annual questionnaire, submitted to all medical school libraries, would be available at this time, if only to up-date Table 1; however, we can supply only the following at present:

After the appearance of the Simon Report in 1964, steps were taken to study its recommendations and to plan necessary action. A second joint-meeting was held in February, 1965. A report of progress made since the 1962 survey was presented, and a Sub-Committee was established to study Miss Simon's recommendations and to report back concerning the location and nature of the proposed National Health Sciences Bibliographic Centre. Dr. John Firstbrook, Queen's University, chaired the Sub-Committee which tabled its report in June 1966. (8) A joint meeting of ACMC/AFMC and the CLA/ACB Committee on Medical Science Libraries convened in Ottawa on the 20th October 1966 and agreed to the recommendations in the Firstbrook Report. Especially encouraging was the recommendation that a National Health Sciences Resource Centre be established as a Division within the National Science Library in Ottawa, and the Federal Government has been asked to establish such a service. It will be a prime

TABLE II

	Number of Volumes	Number of Titles Subscript; Gifts, Exch.	Total Expenditures
British Columbia	99,844**†	2,660†	$200,000*
Dalhousie	36,973**	1,016	$ 97,975††
Manitoba	35,832	820	$ 74,310
McGill	102,630 † Dept. Coll.	1,823	$136,401
Montreal	48,000	1,200	$118,000

* Centralized cataloguing costs not included

** Includes dental collections

† Includes biological sciences

†† Includes $20,000 Capital grant and $575 special fund income for the collection

responsibility of the Centre to co-ordinate and assist with the development of regional services from coast to coast, using established health science library services as a base. One of thse regional centres will be the Dalhousie Medical-Dental Library.

So much for the impact of the outside world on the local scene. What about the Dalhousie Medical-Dental Library?

It seems most fitting to take a long backward glance at its past just as it gathers strength to take a forward stride during 1967 under its new name, the W. K. Kellogg Health Sciences Library. One is unaware of self-commitment until it has been put to the test. In the reading of fifty years of Library Committee Minutes and numerous Budget Statements and Annual Reports, I have run the emotional gamut of irritation, despair, fury, exasperation, impatience, disgust, sympathy, admiration, and awe, while struggling with an inarticulate, inconsistent, and incomplete record. How does one communicate the decades of willing labour by the devoted few who, between 1868 and 1962 worked under great handicaps? It cast my thoughts back to the depression days of the 1930's, the effects of which the rest of Canada managed to throw off more quickly. It also took me back to my reading of the Vancouver Medical Association Library's Minutes dated 1906 et seq the same era, the same attitudes the same spirit, the same problems.

(To be continued)

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CORRECTIONS

There were two mistakes in the last Seascopes column (xxx. 4, p. 131)

- The name of **Miss Isabel Abernathy**, the new Chief Librarian, Annapolis Valley Regional Library was misspelled.
- In the report from the Halifax County Regional Library I wrongly identified the Chief Librarian as Miss Kathleen Currie. The Chief Librarian, Halifax County Regional is, of course, **Miss Diane MacQuarrie.** Miss Currie is Chief Children's Librarian, Halifax City Regional Library.

Sincere apologies to Misses Abernathy, MacQuarrie and Currie.

- Assistant Editor.

THE AUTOMATION OF INFORMATION STORAGE AND RETRIEVAL SYSTEMS

JEAN TAGUE

Information storage and retrieval systems may be categorized as document retrieval systems or fact retrieval systems. A fact retrieval system will provide a direct answer — e.g. 1260-C — to the question "What is the melting point of manganese?" A document retrieval system will provide one or more documents which, with varying degrees of probability, will contain this answer. This paper will be about document retrieval systems, and these will be defined as procedures for retrieving those documents in a file which are judged to be relevant to an informational request. Described this way, information storage and retrieval sounds like glorified library practice, and in a sense it is. Two properties distinguish it from traditional librarianship: (1) an interest in developing the theory and more particularly mathematical models for document file organization and searching. (2) an interest in machine (particularly computer) manipulations to replace and hopefully improve upon traditional library practices.

Information storage and retrieval is a field of inquiry which has grown up over the past 15-20 years. In the exploratory uses of data processing equipment for library operations in the early fifties, documents were represented on punched cards or magnetic tape by indexing terms prepared by professionals, and were then retrieved in response to an inquiry by various sorting and matching procedures. Although these techniques turned out well for small experimental files, they proved too costly for the large working files of a university or public library. Another drawback to their general acceptance was that users complained of the lack of browsibility in automated systems.

Attention then turned to the more clerical aspects of library work — ordering, circulation, and the sorting and printing of the various records needed in library work — while the use of computers for retrieval operations involving the subject content of the file fell into disfavor, particularly after a number of high-priced failures. The trouble with computers in the usual library situation is that they have proved most economical for a few users with large-scale problems. On the other hand, a library specializes in small-scale problems for many users. These users will generally prefer to browse through the catalog on their own, rather than wait a day while their search is scheduled on a computer.

Lately, the trend appears to have reversed with the advent of on-line time-sharing computer systems with decentralized input-output stations. These developments in computer technology mean that a user will be able to sit at an individual input-output consul and communicate directly with the machine, state his request in response to earlier outputs. This capability, together with the development of random-access storage systems, which substantially reduce searching time, has reawakened interest in the automation of what is really the core problem of library systems — the storage and subject searching of an index file.

Dr. Jean M. Tague (née Smith) presently at the Memorial University of Newfoundland, took her undergraduate degree from the University of Alberta. She is a graduate of the McGill Library School '55, and recently completed requirements for the Ph.D. degree in Library Science at Western Reserve, her thesis topic being "Statistical Measures of Term Association in Information Retrieval".

Recent developments in four areas of information storage and retrieval will be reviewed in this paper. One cannot hope, of course, in so short a space, to do more than introduce many of the topics, and interested readers will find further details in the references terminating this paper. The four areas of my present concern are:

1. representation and storage of file items in mechanized information storage and retrieval systems
2. procedures for the retrieval of relevant documents
3. automated content analysis
4. over-all design of information retrieval and library systems.

Although, as has been mentioned, mathematical models are of great interest to information retrieval people, little use will be made of them in this paper. A number have been proposed, ranging from lattice theory to epidemic theory in medicine (on the grounds that ideas are contagious like disease). However, none has gained general acceptance or proved particularly useful at the present time.

1. *Representation and Storage of File Items*

The input side of information storage and retrieval systems consists of representing the content of a document so that it is available for retrieval in response to a request; coding this representation so that it can be manipulated by the system; and then storing the coded representation in some orderly fashion in the system. If the entire corpus of a library or document file could be scanned in response to a request there would be no need to "represent" the document. But, except for very small files, this is not a practical approach for a computer any more than it is for a person. Hence the document must be represented in a special searching file by what are now called "document surrogate", better known as index terms, subject headings, keywords, classification codes.

A document may be represented in the catalog or index in any of three different ways:

a. A list of terms is assigned, by a professional cataloger or by one of the automatic methods to each document in the file, as will be described.

b. The terms assigned to each document are weighted in some fashion in accordance with their importance in the document.

c. Some account is made of the relations, such as syntactic or hierarchical relations, between the assigned index terms.

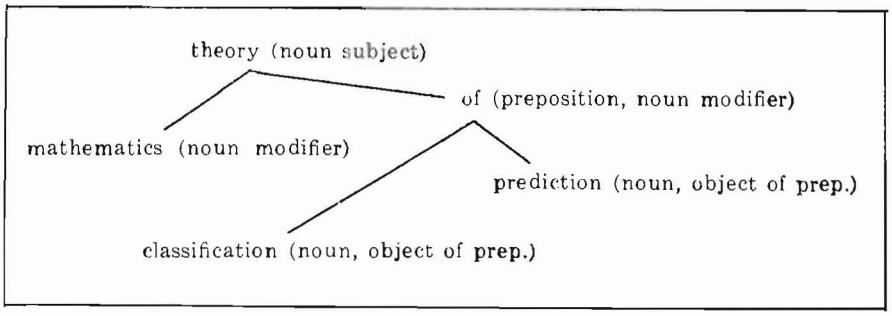
As an example, consider a paper entitled "An Elementary Mathematical Theory of Classification and Prediction." If a keyword type of indexing were employed, this paper might, for the first type of index, be represented by the terms

mathematics
theories
classification
prediction

In the second type of index one might assign some weight between 0 and 1, indicating the importance of the keyword, for example,

mathematics	.01
theories	.001
classification	.5
prediction	.2

If it was desired to distinguish this paper from another entitled "A Classification of Mathematical Theories", the third type of index could be employed, indicating the syntactic relations between terms in some such form as the following:



In order to store and manipulate large document index files efficiently, the document representations are generally recorded in some coded form, rather than as English words. The most economical code, as far as storage space connected with a digital computer is concerned, is one which associates with each index term used in the file a unique binary number. The length of the binary number will in general be proportional to $\log_2 n$, where n is the number of distinct index terms. If one uses an alphabet of more than 2 symbols (e.g., the 26 letters of the English alphabet), the codes will be shorter (i.e., proportional to $\log_{26} n$), but since the binary representation must eventually be used in a computer, no computer storage space will be saved. Superimposed coding, where all the codes relating to one document with edge-notched punched cards (and a variant of this technique, known as learning matrices) offers interesting possibilities for condensing the computer storage space needed for a document index file. Any method of superimposed coding, however, results in some loss of information so that unwanted documents (false drops) may be retrieved in answer to a search. However, one may derive mathematically the probability of a false drop associated with any particular superimposed coding scheme, and hence hold this probability below a desired figure.

It is not always desirable to use the most efficient code in terms of storage space. Some machine systems use semantic codes, which indicate the semantic concepts involved in the index term. In such a system, words related in meaning will have similar codes. The classification symbols assigned to books from the Library of Congress or Dewey Decimal Classifications are well-known examples of semantic codes.

A relational type index (type 3) requires, in addition to codes for index terms, codes for the various types of relationships (noun subject, preposition, etc. in our example) and special codes called "punctuation" to group words together. The relations and word groupings in the example might be represented as follows:

..	theory	ns
.	elementary	m
.	mathematical	m
.	of p, m	
	classification	no
	prediction	no

Single dots here set off words grouped together in a phrase, double dots words grouped together in a clause.

Codes for relationships are sometimes called "roles" and codes for punctuation "links". Of course, the relationships need not be syntactic. In a metallurgy file, for example, the roles represent such things as material processed, process, agent of process, condition of process, properties determined, etc.

If coding is employed at all a dictionary must be stored somewhere in the system which matches the correct code to each English word index term. When document representations are to be entered into the file, the index terms assigned to them will first be sorted alphabetically, then matched against the dictionary, and then stored in coded form in the system. This step involves a great deal of sorting, and in early systems, the sorting was frequently carried out on punched card sorters rather than on the computer — and this for reasons of economics. Now, however, with better computer sorting programs, the preliminary input procedures are generally carried out completely by computer.

Once coded, document index files can be stored in either of two possible orders: document order, or inverted order. In a document order file, document numbers are listed sequentially with their associated index term codes. In an inverted or term order file, each term is assigned a specific location in storage; at this location are listed the associated document numbers Thus if "d" represents a document number and "w" an index term code, the ordering of the two types of files may be represented as follows:

Document order: d1 w3 w5 w9; d2 w6 w8 w10; d3 w4 w6 w7; d4 w3 w10 etc.

Inverted order: w1 d5 d7; w2 d6 d9 d10; w3 d1 d4; w4 d3 d9 d10 etc.

The type of storage employed will to some extent depend on the storage medium. For a punched card file, the inverted form is generally used; for magnetic or punched paper tape, the document order; for magnetic disc or drum storage, again, the inverted order.

2. *Retrieval of Relevant Documents*

Once a set of document representations has been stored, it is available for searching in response to an informational request. Generally, the searching algorithm used should be one which will provide the maximum number of relevant answers in the shortest possible response time; but this ideal is usually not attainable in practice and one must compromise between the rapidity and relevance of the response.

The usual method of searching, given an index file stored for searching by computer or other data processing equipment, is to represent the request as a Boolean function of index terms — i.e., statements involving index terms and the conjunctions 'and', 'or', and 'but not'. For example, the following search requirement:

$$(w1+w3).\ w5.\ \overline{w6}$$

means that a search is made for a document indexed by term w1 or w3 and w5 but not by w6. This search requirement would be satisfied by d1 in the above example of a document order file.

In order to carry out this search with a magnetic tape file, or any other document-order file, each document index in the file must be scanned to determine whether or not it satisfies the search requirement. This procedure is necessary because the file is not ordered with respect to the characteristic of interest, i.e., combinations of index terms. Generally, it is not economical to use term order with magnetic tape files, unless the file is a static rather than growing one, because such an ordering means rewriting tapes every time new documents are added to the system. If we are searching for a particular document number — i.e., for a characteristic which is ordered — searching time may be reduced by using "binary" and more generally "n-ary" search techniques. Binary search is the technique most people would use if they were faced with a catalog drawer with cards running from, say, AD to BO and they wanted to locate an entry headed "American Institute of Physics". One would not make a serial scan — i.e., examine each card from the first one on until the desired entry was reached. Rather, one would check at the approximate midpoint of the drawer, then forward or backward, by halves, from this point, approximately, until the correct entry had been reached. However, since tape files are not ordered in the same way that catalog drawers are ordered, (i.e., alphabetically, by subject), binary search is of no help in subject searches, and the file must be scanned from beginning to end. Some improvement can be effected by batching requests; but this leads to the problem of dissatisfied customers who do not want to wait for their answers.

Searching is very much more efficient with a random access storage — i.e., a magnetic disc or drum where, as with the catalog in a library, one can enter at any point. As mentioned earlier, files with this type of storage will usually offer inverted, or term order. If a request is stated as (w1+w3). w5.w6 the locations w1 and w5 are examined and the two lists of document numbers compared for items appearing on both lists. The same procedure is followed for documents at w3 and w5. Then the document numbers satisfying the first two requirements are compared with those stored at w6, and numbers appearing on both lists are discarded from the combined list of document "hits".

A variation of the term entry file, known as a Tabledex file, which further improves search time, involves a kind of chaining Each index term location will contain a "table" of the following type:

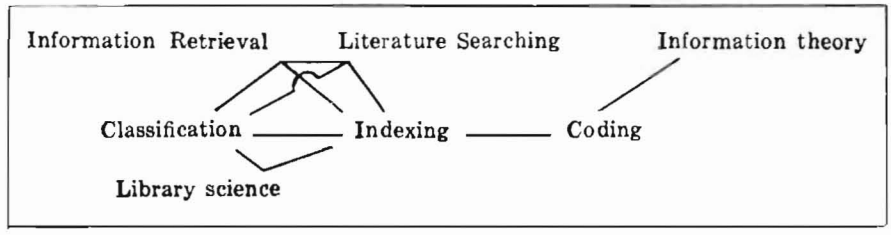
w1: d5 w7 w9	w2: d6 w8 w11	w3: d1 w5 w9	w4: d3 w6 w9
d7 w10	d9 w4 w11	d4 w10	d9 w11
	d10 w4		d10

With each document are listed terms further on in the term code sequence which apply to that document. Thus, by examining immediately the location for w3, the computer determines that d1 satisfies the search requirement. Because a Tabledex file takes up more storage space than an ordinary term entry file, it may become too bulky if the number of terms assigned to each document is large.

There are really three methods of searching a file: sequentially, fractionally, and simultaneously. Computer searching is of the first or second type; the third, which is exemplified by needling two holes in a pack of edge-notched punch cards, is probably the most efficient of the three methods but, unfortunately, not readily adaptable to programming on ordinary computers. Another example of simultaneous searching is the "peek-a-boo" or optical coincidence system. Here, each term is assigned to a card which is laid off in a rectangular grid system. Each intersection of the grid represents a document, and if the term is assigned to the document, a small hole is punched in this position. To find documents indexed by a set of terms in combination, the term cards are superimposed before a strong light. Holes through which light passes represent documents satisfying the search requirements.

All of the search algorithms described assume that there is a one-to-one correspondence between the terms used in a request and the index terms used in a file. Unfortunately, as all librarians know, the problem is more complicated than this. When someone frames an informational query, he selects one of a number of possible verbalizations of it; and in a similar way, when an indexer indexes a document, he selects one of a number of possible lists to describe it. Added to this, the librarian or system operator may reinterpret the request before entering it into the system. Accordingly you have a loss or possible mismatching of information at three points in the system. In manual systems, one compensates for this loss by cross referencing the index; by classifying the document collection in addition to indexing it; and by preparing thesauri to the language of the subject field. All these devices add a measure of browsibility to the collection, a feature which is lacking in most machine systems. Recently, a number of attempts have been made to simulate these "browsing" procedures on a computer. The suggested techniques usually involve some form of "associative" retrieval.

By associative retrieval is meant the technique of expanding the terms of a request to include other terms related to them on the basis of co-occurrences within documents in the file. For example, if half of the documents indexed, by "diabetes" were also indexed by "insulin". and half the documents indexed by "insulin", were also indexed by "pancreas", then it would be concluded, in this type of retrieval, that seachers interested in diabetes would also be interested in insulin and pancreas. Actually, the measures of term association or document association used in associative retrieval are not as simple as this; investigators have used, among others, the product moment correlation coefficient, the Chi square based on the difference between observed and expected frequency of co-occurrence, the conditional probability of a co-occurrence, given a single occurrence, and a number of others. A disadvantage of many of the proposed procedures is that the request is automatically expanded as part of the searching algorithm and the searcher has no control over the terms which are added to the request. Doyle (1) met this problem by what he called "semantic road maps". The searcher would be presented, via the TV-like device, with a picture or map of the terms which were highly associated with the request terms. For example, if the request involved the term "information retrieval", the map might look as follows:



The searcher would select those clusters which were of interest and the documents which had produced the clusters would then be listed. Naturally, the TV screen is not essential to the process; a simple listing of associated terms with the corresponding association factors would allow a searcher to expand his request in the direction he wished.

At present, associative retrieval appears to be at a standstill. For the system to work, the association measures must be derived from a large document collection. On a small scale, the associations are for the most part meaningless in the sense of a semantic relationship. The problem is really, "what constitutes a statistically acceptable collection both as to size and randomness?"

3. *Automated Content Analysis*

The term content analysis refers to the process of determining what a document is about and representing this "aboutness" in a searching file. Content analysis includes such procedures as indexing, classifying, and abstracting. In recent years there have been a number of attempts to carry out content analysis by automatic means, usually by some form of computer analysis. The first worker in this area was H. P. Luhn, of IBM, who introduced both statistical indexing and autoabstracting.

In statistical indexing by computer, documents are represented by the most frequent words used after the program has eliminated designated non-significant words such as articles and prepositions and after it has employed some form of suffix cut-off to confound such terms as "program", "programming", "programmer". The problem with this procedure is that the input is necessarily the complete document text. One may object, and many have, that it obviously takes more time to prepare the entire text of a document for computer input than for an indexer to assign index terms. However, this is not sufficient reason, at the experimental stage, to ignore techniques which may become feasible with advances in computer technology. For a number of years it has been possible to obtain from publishers, as a by-product from some photocomposition processes, a punched paper tape corresponding to the original typing of various documents. This paper tape has been used as input for a number of automatic indexing experiments. Nor should one conclude that human indexing is always superior to computer indexing. Recent studies have indicated that indexers are only about 50-60 per cent consistent in the terms they apply to a document. A computer, since it will always apply the same set of rules, will be consistent; and furthermore, it is more likely to be sensitive to changing terminology. More sophisticated approaches in automatic indexing, in recent years, take into account the syntactic relationships of the document terms as well as their frequency, or select words on the basis of relative frequency in a document compared to the expected frequency in a large body of text.

One of the simplest automatic indexes is the KWIK index, which can be generated on punched card equipment or on computer. An example of a KWIK index is the journal *Chemical Titles*.

The input for KWIK is simply the words of the title for each document. The program excludes words which have been designated as non-informative and prepared an alphabetical file of the remaining words, with each word surrounded by its original context.

Another completely computer-generated index is the citation index, introduced by Eugene Garfield, of the Institute for Scientific Information. *Science Citation Index* is an example of this approach, which is really an index to all papers which cite a given paper. The preparation of a citation index is a purely mechanical problem, involving only the consistent coding of author, journal entries and then a sorting procedure.

The second form of automated content analysis introduced by Luhn, the auto-abstract, also requires the complete document as input. The program then uses various machine-recognizable clues in order to weight each sentence in the document such as the location of a sentence in the paper, and the occurrence of certain words in the sentence including title words or high frequency words. A fixed percentage of the highest weighted sentences are then selected to form the abstract.

Probably the liveliest area of machine content analysis at the present time is automatic classification. Information scientists have suddenly discovered that it is faster to subject search a classified file than a file ordered only as to document accession number, something librarians knew before the advent of the Dewey Decimal Classification. In most automatic classification procedures, the input consists of lists of index terms (automatically derived or assigned by indexers) for each document in the file. From these lists is derived a set of mutually exclusive document groupings, where documents within a grouping are more like one another, with respect to the assigned index, than like the members of the other groupings. One of the earliest attempts at automatic classification was carried out at the Cambridge Language Research Unit by Roger Needham and A. F. Parker-Rhodes. Their method was called clump analysis. Harold Borko and L. B. Doyle at System Development Corporation in Santa Monica used the multivariate statistical technique known as factor analysis, and later a profile grouping procedure which was used originally to group Air Force personnel by skills and aptitudes.

Most of the proposed methods functioned well with small collections. However, it must be realized that they amount, in effect, to comparing each document in the library with every other document in order to classify it. Doyle has pointed out that it would take 25,000 man years to thus organize material in an average-size university in this fashion, but only 10 computer years. For this reason, if automatic classification is to be applied to large collections, it must first be applied to a small sample of the collection. Then the entire collection is classified, and the classification scheme adjusted in some fashion as a result of the new index term weightings for each class. The System Development Corporation group has tested the consistency of human as against machine classification. The average correlation between three skilled classifiers was .87 between classifiers; for the machine it was .76.

4. *Design of Information Retrieval and Library Systems*

The discussion to this point has been limited to files of document indexes and retrieval from these files but, as we know, the file must be considered as part of a total system. This means that in planning an information retrieval or library system one must consider, in addition, the ordering of the documents; the determination of category (books, journals, or technical papers); the technical processing flow; the form of storage for the physical records (as opposed to the index); and the circulation of the documents.

Until recently, library and information retrieval systems tended to grow haphazardly, the particular equipment and systems used depending for the most part on local tradition and the experience of the librarian. Currently, with so many competing types of equipment available, attention is turning to an over-all systems approach to library design. This means that one begins by specifying, as far as possible in quantitative terms, the characteristics or parameters of the operation. The following have been suggested as the parameters of an information retrieval system:

Document Files: type of document
—technical paper, journal, book
—size
—growth rate
—form of document (hard copy, microfilm, etc.)
—organization of file
—activity distribution within the file

Index File: —number of distinct index terms assigned in the file
—number of index terms assigned to each document
—organization of index file

Searching: —volume
—type of request
—response time requirements
—form of output (document number, complete citation, abstract, etc.)

Costs: —documents
—equipment and supplies
—wages and salaries

After specifying the parameters, one can set up a model which accounts for all specified parameters, and then develop the various consequences, from the model, of variation in the parameters. However, in order to compare several competing systems, one must be able to specify the objectives of the system in quantitative terms, and it is here that one runs into difficulty in the systems approach. One possible objective might be obtaining the fastest response at the least cost, and if this were the sole objective one could apply such techniques as linear programming, or PERT, to minimize response time or cost, while subjecting other variables to diverse constraints. However, the primary objective of an information retrieval system is to obtain relevant documents in response to an informational request; and the quantification of relevance has so far eluded most workers in the field. The problem is that people vary in their judgment of the relevance of a document to a request; also, documents are not just relevant or nonrelevant, but have varying degrees of relevance which are difficult to describe quantitatively. Finally, the reformance of a system is not judged merely by relevance to the retrieved output, but also by the number of relevant answers missed by the searching algorithm; and this last variable is difficult to determine without going through the entire file.

If the value of the retrieved output is ignored, a systems model can be set up which shows the variation in cost or response time induced by variation in one or more of the input parameters. Stanford Research Institute, for example, has developed a computer program which simulates the five-year operation of an information system and computes estimates of the expected operating costs, as well as the amount of equipment and personnel required during that time. The program may be used to compare how costs differ under various file input and search demand rates; also, how a number of systems will compare over a range of conditions. One could, of course, design similar programs to compare systems on the basis of response time.

The usual measures introduced when talking about the effectiveness, rather than the efficiency of a system, are relevance and recall. Relevance is defined as the ratio of the number of relevant answers retrieved to the total number of answers retrieved. Recall is the ratio of the number of relevant answers retrieved to the total number of relevant answers (in the file). Effectiveness refers to some function of relevance and recall, but the form of this functional relationship has not yet been agreed upon and, in fact, would probably vary from system to system depending on the requirements of the user.

Manfred Kochen, now at the University of Michigan, suggests that the over-all performance measure should be expected benefit. This he defines as the extent to which a given system provides the difference in effort. If 'U' is the number of users of the service; 'n' the number of queries/unit time/user; 'p' the price/query a user is willing to pay; and 'C' is the cost figure for maintaining the system, then expected benefit (B) is given by the formula:

$$B = Unp - U'n'p' - (C-C')$$

where U,n,p,C indicate the new system, U',n',p', C', the old system. U' generally, will be a function which varies inversely with p; and p is a function of the effectiveness and efficiency of the system. Obviously the problem is to determine the form of this functional relationship.

In conclusion, it seems unlikely that the information storage and retrieval process will be constructed which can account for all the variables in the process and describe quantita-

tively all of the objectives. As a corollary to this, one should not expect that the process will ever be completely mechanized. The factor of human judgment will likely continue to play an important role in indexing and retrieving from a document file. However, the present interest in mechanization, even where it may be misplaced, is enlarging understanding of the objectives of a library system and how, most effectively, to achieve these objectives.

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Seascopes

Approximately 500 teachers from all Roman Catholic schools as well as librarians throughout the region attended the 1967 Christian Brothers' Educational Conference held in St. John's, Nfld. February 23-24. **Mr. John Wright,** Supervisor of School Libraries for Saskatchewan was the principal speaker, the theme of the Conference being "The Library and the School".

Miss Elizabeth Jeffers, who assumed duties as Newfoundland's Legislative Librarian in 1949, the date of Confederation, has retired following "salt of the earth" speeches from parliamentarians including Mr. J. R. Courage, former Speaker of the House. Miss Jeffers plans a trip to Expo and a European tour following which she will be "at home" in Carbonear.

Two new libraries have been added to the Newfoundland Regional Libraries System according to Director **Miss Jessie Mifflen.** These have been opened at Gander and Winterton.

A recent Report of **Prince Edward Island Libraries** reveals that the system now embraces 22 branch libraries with book-deposit stations in two colleges, 12 high schools and ten elementary schools. Classroom collections are now being supplied to 472 elementary schools. Some 3,651 books were added during the year bringing the total at central to 115,000.

A.P.L.A. librarians note with regret that **Laurie Allison** has resigned as Chief Librarian at Mount Allison University to assume similar duties at Bishop's University in Quebec. Meanwhile, President L. H. Cragg of Mount Allison has announced that the present library is to become a University Centre and that a new library is to be built on a site west of Allison Hall. (Cf. Mount Allison Record, XLIX (1966), 8 ff.)

We apologize for the late delivery to subscribers of the December issue of the **A.P.L.A. Bulletin** which was caused by a breakdown in the printing plant at Truro. The Editors were not impressed.

NEW BRUNSWICK

Early in January the Saint John Common Council approved the opening of a branch of the **Saint John Free Public Library** in a shopping center in the west end of the City. This expansion has become necessary because library registration has increased 344% in the adult department, 325% in the boys' and girls' department, since amalgamation of the City of Saint John.

The **Restigouche County Regional Centennial Library** was officially opened December 28, 1966 in Dalhousie, N. B. Included in the new building is a Museum.

Construction of the **Nepisiguit Regional Centennial Library** in Bathurst, N. B. has been completed and almost all furnishings installed. The official opening has been delayed to the lack of professional staff for the new library and the long-awaited arrival of the new book stock. Plans for art displays and music appreciation courses in the library are progressing.

Overheard in the Interlibrary Loan Department, **Albert-Westmorland-Kent Regional Library:**

1st Voice: **Intonation** by Vivian Holland. Does that mean something to you?

2nd Voice: Vivian Holland. . . . . Isn't that Oscar Wilde's son?

1st Voice: You're right! Is this his latest?

2nd Voice: (Looking through **Books in Print**) It is a paperback by Vivian Holland. **Into a Nation** . . . . . .Brotherrrrr!!

HALIFAX LIBRARY ASSOCIATION

Nova Scotia has had a long history of printing and publishing. During the summer months there will be a display at Citadel Hill illustrating this rich heritage.

Through the courtesy of the Historical Branch of the **Nova Scotia Museum of Science** space is being made available in the Cavalier Block of the Citadel during July and August for a special exhibit of Nova Scotian books and authors prepared by the **Halifax Library Association** as its Centennial project.

The display will recall such facts as the beginning of printing in Canada with the publication of the first newspaper, the **Halifax Gazette,** in 1752. It will recall that the first Canadian periodical was published in this Province, the **Nova Scotia Magazine** in 1789. Also the first authentic history of Nova Scotia by Judge Thomas Haliburton was printed by Joseph Howe in 1829 on a famous handpress which is now travelling across Canada on the Centennial train.

There will be many other items of interest which will reflect the printed heritage of a Province that has contributed immeasurably to the political, social, educational and literary growth of Canada.

The display, which will cover the period from 1752 to the present, will highlight many original books and pamphlets about Nova Scotia and by Nova Scotians as well as pictorial material, such as maps, prints and photographs. Visitors will be brought closer to the colourful past of the Province by seeing many original examples of the printed word by Nova Scotians famous in varied fields of endeavour. All these will graphically illustrate the importance of the printed works that have come out of Nova Scotia.

An attractive, readable booklet is being prepared by a committee of librarians which will contain illustrations and descriptions of the exhibits and will be available during the display.

FROM THE PRESIDENT'S DESK

The Conference—May 26th—28th—can you afford to miss it?

An **Opportunity** - to meet fellow librarians from the Atlantic Provinces and beyond - (1) to discuss mutual problems at the small group meetings Saturday night; (2) to visit libraries, many of them new, on Sunday morning; (3) to socialize at the APLA President's Reception on Friday night and at the official meals on Saturday.

A **Responsibility** - to take part in making important decisions on APLA policy on the Bulletin, the Checklist and other matters at the Annual meeting on Saturday morning on our attitude toward CLA Chapter Status, under the guidance of CLA President John Archer, on Sunday night.

A **Challenge** - the two afternoon Symposium sessions on Saturday & Sunday will bring to us a group of librarians with a wide knowledge in their varied fields to share with us their concept of libraries and the future. They will expect from us an intelligent and active participation in the discussion - and we can gain much from them.

Remember the dates - May 26-28 - and preregister now, c/o Miss Nancy Stuart, Dalhousie University Library, Halifax. See you at the Conference!

Dorothy L. Cooke

NOTICE OF NOMINATIONS

In accordance with Article III, Section 1 of the Constitution of the Atlantic Provinces Library Association, I hereby submit the report of the Nominating Committee for Executive Officers of the Association, 1967-1968.

PRESIDENT: Miss Alberta Letts, Provincial Library Service, Halifax, Nova Scotia

VICE-PRESIDENT (N.B.) and PRESIDENT-ELECT: Mrs. Eileen Travis, St. John Free Public Library, St. John, N. B.

VICE-PRESIDENT (N.S.); Miss Shelagh Keene, The Law Library, Dalhousie University, Halifax, N. S.

VICE-PRESIDENT (NEWF.): Miss Barbara Hann, The Library, Memorial University, St. John's, Newf.

VICE-PRESIDENT (P.E.I.): Mr. Edward Benson, The Library, St. Dunstan's University, Charlottetown, P.E.I.

SECRETARY: Miss Annabelle Taylor, The Library, National Research Council, Halifax, Nova Scotia

TREASURER: Miss Pauline Home, Halifax City Regional Library, Halifax, Nova Scotia

PAST-PRESIDENT: Mrs. Dorothy Cooke, The Library, Dalhousie University, Halifax, N. S.

Respectfully submitted,

Douglas B. Boylan, Past-President,
Atlantic Provinces Library Association.

10 February 1967

Classified

Rev. John C. MacMillan

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Salary: Commensurate with qualifications and experience.

Apply to: Professor H. S. Granter,
Library Committee, Chairman
University of King's College,
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ONE USED BOOKMOBILE

Tenders are invited to March 1, 1967 for 1960 International Bookmobile complete with shelving, tires and all regular equipment. Suitable for temporary library service for one to three years.
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The Library of the University of Waterloo requires:

Cataloguer for materials in science, mathematics and engineering, preferably with one or two years experience and working knowledge of Library of Congress classification. Special consideration will of course be given to science background and language qualifications.

Reference Librarian, Arts Library. Background in German and Slavic languages and literature, and experience in a university library preferred.

For both positions the minimum requirements is a bachelor's degree and a degree from an accredited library schoool. Salaries will depend on qualifications and experience. Minimum salary for 1966 library school graduates without experience was $6000, and it is fully anticipated that this will be increased for the 1967-68 academic year. New library building, excellent working conditions, opportunities for study and promotion, outstanding fringe benefits.

Please apply to: Mrs. Doris E. Lewis, University Librarian,
University of Waterloo,
Waterloo, Ontario, Canada.

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General Librarian - AP II (6,800-7,800)
Senior Librarian - AP III (7,600-9,000)

(Opportunities also to develop experience for ranking positions in AP IV and AP V)

Must have considerable library experience in academic libraries for AP III level, or above. Faculty status; Health, accident and medical plan; removal allowance; sabbatical; four-week vacation; data processing in use and automation on the way. Staff of 65; budget $650,000; bookstock 150,000; periodicals subscribed, 2,000.

b) **Sub-professional staff,** B.A. degree or better, for 'in service' training in several technical service divisions, mainly cataloguing; salary $5,000 up, depending on additional experience or degrees, or other specialist potential.

c) **Bursary Applicants**—$2,000 per annum, four of these being available during 1967-8 academic year; renewable for two-year course applicants in good standing; applicants must have B + standing on B.A. academic degree; also acceptance from recognized North American library school. Two-year indenture period.

Persons interested should apply
with curriculum vitae, to
DIRECTOR OF LIBRARIES,
Memorial University of Newfoundland,
St. Johnn's, Nfld.«

Position Open

Dalhousie University—W. K. Kellogg Health Sciences Library, Halifax, N. S., Canada.

Applications are invited from graduates of ALA accredited Library Schools for newly established positions in a rapidly expanding service. Beginning salaries range from $6,200.00 to $7,000.00 depending upon experience which need not be in medical libraries. The usual University Academic perquisites apply. An interest in mechanized methods is necessary, languages are useful. Date of appointment 1st July, 1967.

Cataloguing Librarian: to catalogue medical science materials and undertake duties assigned as developments take place.

Serials Librarian: to process journals, continuations, government documents and annual reports; to supervise clerical staff and bindery routines.

Faculty of the Health Professions Librarian: to participate in the acquisitions, cataloguing and information services required by the Schools of Nursing, Pharmacy, Physical Education, and Physiotherapy; to administer two Faculty Libraries when current building programmes are completed. Nursing or Pharmacy Degrees would be useful.

Plans are developing towards coordinated Library Service for Teaching Hospitals, and a Regional service for professional health science personnel in the Atlantic region is anticipated for 1968/1969. Opportunities abound

SUPERVISOR OF SCHOOL LIBRARIES

Applications will be received by the undersigned for the above position for the Halifax County Municipal School Board for the school term 1967 - 68.

The successful applicant will be required to work in co-operation with the Halifax County Regional Library, and be responsible for the promotion of School Library development in the Municipality of the County of Halifax. Duties will include assisting Teacher-Librarians in establishing proper school library methods and service, coordinating book ordering and processing procedures and assisting in book selection.

Qualifications: B.A., B.L.S. Degrees
Minimum of two years experience
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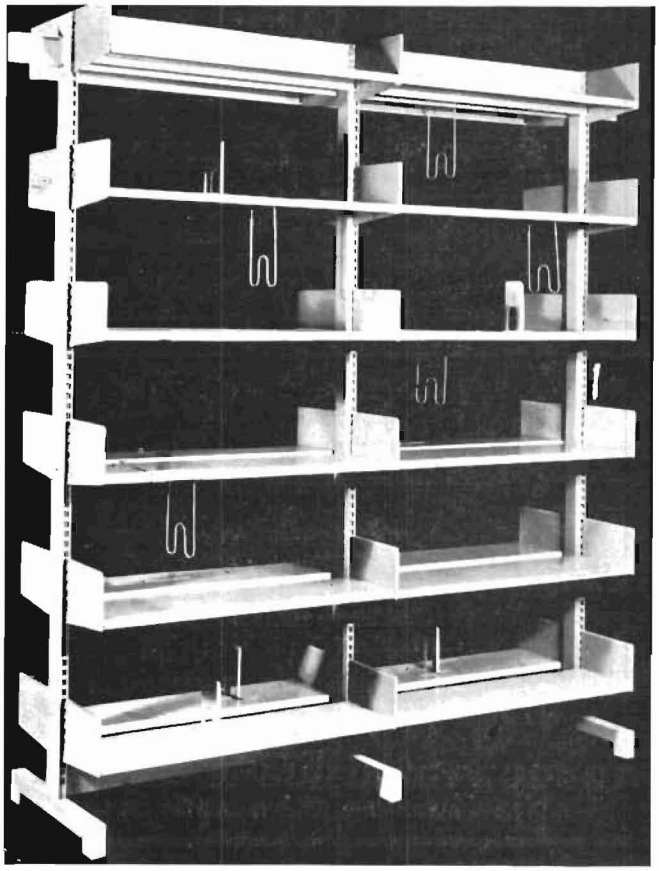

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