Book Reviews

AMBROSI, Klaus: Aggregation und Identifikation in der numerischen Taxonomie. (In German)
(Aggregation and Identification in Numerical Taxonomy). Königstein/Ts.: Verlag A. Hain 1980. III, 100 p. = Quantitative Methoden der Unternehmensplanung, 15.

This booklet treats on and overviews some special problems from data analysis. The starting point is a set X of n objects i whose properties are measured by q features or variables $M_1, \ldots, M_q$ (with values in sets $A_1, \ldots, A_q$, respectively). Generally, the sets $A_1, \ldots, A_q$ bear some structure S_ℓ (rendering M_ℓ e.g. an ordinal, nominal or numerical variable; hierarchical or uniform structures are considered, too) which, generelly, is different for different ℓ's (mixed data situation). The first problem is to aggregate the structures $S_1, \ldots, S_q$ into a single structure $S = F(S_1, \ldots, S_q)$ of the same type (Chapter 2). Many aggregation methods are presented in cases when S_ℓ resp. S are given by a relation, a distance measure or a sequence of relations. — The second problem results when a fixed structure S_0 is given beforehand on the set X of objects (e.g. a partition, a covering or a hierarchy) and we ask, which of the variables $M_1, \ldots, M_q$ contribute mostly to the 'explanation' of this structure. This problem is solved by defining a distance $w(S_0,S)$ between structures and searching for weights $\alpha_1, \ldots, \alpha_q \geqslant 0$ which minimize the distance $w(S_0, F(\alpha_1 S_1, \ldots, \alpha_q S_q))$ (here F is a modified aggregation function giving weights $\alpha_1, \ldots, \alpha_q$ to the variables $M_1, \ldots, M_q$). Many similar procedures are described, too. — The book proceeds in a mathematical and very formal way (even if no theorems or proofs are given). The usefulness of the methods remains open since no examples, applications or real data problems are given.   H.H. Bock

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NEELAMEGHAN, A. (Ed.): **Ordering Systems for Global Information Networks.** Proceedings of the Third International Study Conference on Classification Research, Bombay 1975. Bangalore, India: Documentation Research and Training Centre 1979. XXVI, 511 p.

If A. Neelameghan in his "Welcome Speech" emphasizes "the inspired guidance of the late Dr.S.R.Ranganathan" at the first two Study Conferences in Dorking (1957) and Elsinore (1964), this statement can safely be extended to the Bombay Conference as well, fulfilling as it did a longstanding wish of Ranganathan's - the holding of such an FID Conference in India. Even though he did not live to see this event take place - Ranganathan is and remains in many respects "our Guru", as Eric de Grolier so aptly put it in his memorial address "A Tribute to Dr. Ranganathan". The outstanding research results are taken up, continued and developed further in numerous contributions to the Third Study Conference, with the almost perplexing richness and variety of whose subjects this reviewer now finds himself confronted.

The publication of the present "Proceedings" is organized along the same formal lines as that of the material on the Elsinore Conference: the volume contains the welcoming and inaugural addresses, most of the papers read at the Conference (in some cases - especially where the texts had already been published elsewhere - reduced to abstracts by decisions of the Organising Committee) in thematic arrangement, the Conference Organisation data including the complete timetable and a list of participants, and finally an alphabetic index. The value of an index to a composite volume of heterogenous contributions is of course debatable. The Elsinore Proceedings remarked in this connection: "This index grew from the natural language of the conference participants, and their words have only been edited slightly to bring related topics together". That, at least, is better than nothing, but one should not expect the index of the Bombay Proceedings to produce more than that, even though it imposes somewhat higher claims, using as it does subject subheadings for topic specification and indicating relations of various kinds. Regrettable features are the non-inclusion - such in contrast to the Elsinore Proceedings - of the discussion remarks to the papers read and the long delay in time (impression 4 whole years after the date of the Conference, as against only 3/4 year in the Elsinore case); however, so the Editor hopes in his Preface, most contributions are still readable even today. All the happier one would therefore have been with a better quality of paper and particularly of binding (my reviewing copy literally went to "pieces" before I had even read all articles). The various typographical errors do not carry too much weight, considering the immense editorial achievement which the publication of such a mammoth volume undeniable represents.

The Elsinore Conference had been devoted to the general - and very broadly conceived topic "Classification Research". Besides the thematic areas "Mechanized Classification" and "Evaluation Techniques - Comparison of Systems" (they played, to a different extent, a part in Bombay as well), contributions on "General Theory of Classification" and on "Selected Specialized Schemes" were in the centre of interest. As a connecting link to similar thematic areas of the Bombay Conference Ranganathan's Elsinore paper "General and Special Classifications" may be recalled. He termed it a "false antithesis" to place general and special classifications in opposition to each other or even to play off the ones against the others. Subsequent developments showed that despite Ranganathan's warnings (each special classification implies a considerable duplication of efforts in the "borderline areas" of the given field and at the same time isolates itself from other special classifications) the trend toward the creation of classifications and/or thesauri for single fields of knowledge intensified while on the other hand voices were heard again and again which pointed to the need for a comprehensive national and international information exchange such as can only be effectively and rationally realized on the basis of a uniform classification system. Hence, various attempts were undertaken at the same time to create a new type of general and uniform classification to replace

the much criticized UDC. In his aforementioned paper, and undoubtedly with a view to the work on the "depth version" of his Colon Classification, Ranganathan formulated almost enthusiastically: "In fact, a Do-All-Classification is now possible". What also seemed to be a promising new starting point was the wellknown project of the British CRG on the basis of the integrative level theory and the facet principle. In his paper "Trends of the Future: Two Ordering Systems Used Together" presented at the Bombay Conference Jiri TOMAN points out that ten years after Elsinore neither the one nor another project has led to a practicable solution and that the realization of an optimal universal classification - particularly as a uniform classification - is not to be expected for the near future either. It cannot be denied: Ranganathan's optimistic faith in the "Do-All-Classification" has not been fulfilled. More modest aims were therefore envisaged: the creation of an umbrella classification to furnish a comprehensive framework for existing general and special classifications and capable of serving as "switching language" in a word: compatibility instead of uniform classification.

The general theme of the Bombay Conference "Ordering Systems for Global Information Networks" - contributed a special accent, also with a view to the UNISIST programme of UNESCO. To this end the SRC project, later called BSO, was created, which at the time of the conference was in a decisive state of its development. The status of end 1974 as presented by TOMAN (also in a second contribution together with G.A. LLOYD) is of course outdated by now. By the time the Proceedings went to press the third revised edition of the BSO, published in 1978, was already available - it has met with approval as well as with an equal amount of criticism, partly based, however, on false preconditions inasmuch as expectations had been raised which the BSO, by virtue of its objections, cannot fulfill. - A similar branch-oriented ordering system has meanwhile been created in the USSR in the form of the "rubricator" for the scientific-technical information system of the Comecon countries.

Compatibility can, of course, not only be achieved through the means of an umbrella classification but indeed in a variety of ways. This thematic complex formed a center of interest of the Bombay Conference and will be dealt with extensively in the following. In addition, particularly those contributions will be given attention which deal with various basic problems of classification theory*. I hope that in selecting these areas of emphasis I have succeeded in drawing a connection line to the 4th Study Conference in Augsburg (as far as this is possible in anticipation of the event) which will again - and in my opinion wholly rightly so - concentrate on the theme "General Classification" while paying due attention at the same time to the dialectical relationship to special classifications. Wether and what progress has been made in the 18 years after Elsinore is something we will know at the end of the Conference.

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* I feel in no way competent to judge on the thematic complexes "mechanized and automated classification and indexing" and ask for the reader's forbearance if I do not evaluate the conference papers in this field. Moreover, any selection required for reviewing - from a tremendous host of individual contributions to a composite volume must of necessity remain subjective.

Contributions on the thematic field:
General Classification as a Basis for a
Worldwide Information Network

Tor HENRIKSEN ("A linguistic description model for indexing languages", p.38) tackles the problems concerned from the theoretical point of view. After expounding various correct (if anything but new) insights he formulates in conclusion possible criteria to serve as a basis for the classification of indexing languages, which criteria, however, are oriented too much to formal characteristics, get mired in the noncommittal and regrettably do not lead to concrete classification proposals. It is undeniable: the solution of the problem of a scientifically tenable classification of indexing languages is of great importance for the theoretical understanding of the nature of different indexing languages. Whether one agrees with H.'s concluding view ("we need a model before we can develop projects like global information networks") is a matter of opinion. I personally believe that waiting for the completion of a theoretical model for optimal indexing languages will lead to no practical results. The construction of a worldwide information network is primarily a political and organizational problem, while the ordering system required for it is no more (though no less either) than an important aid of secondary importance.

Cordelia R. CAVALCANTI's contribution (Universal Integrated Media for Information Processing, p.100-118) goes right into the center of the conference theme. In the present situation, integration and universality are the characteristics necessary for classifications for international exchange of information. Analyzing the large universal classifications since Dewey under this aspect, C. arrives at the conclusion that "solutions for classification schemes are no longer found in abstract schemes" (which Tor Henriksen advocated) but rather must be looked for in the direction of "the statistical observation of existing data banks, patterns of information flow and user needs". Pertinent solution possibilities are indicated, with attention also being given to the problem of optimal notation, the importance of automation as well as of cooperation on the most varied levels. "Truly international cooperation reflecting UNISIST guidelines will provide the right approach to find the right solution", and with respect to automation: "The global information network requires ... hardware as well as software compatibility". A solution in the direction of creating a global information memory (envisaged by H.G. Wells as a "world brain" as early as 1938) is proposed by Manfred KOCHEN (p.142-149). What needs to be created is a "network of information and referral centers which is to help its users express and cope with needs in such a way as to choose most wisely among technological options". As the final goal, K. envisages a "World Information Synthesis and Encyclopedia" (abbreviated WISE) as an aid for people "to act more wisely"; however, in view of the existing political-ideological differences its realization in the field of many social sciences is probably no more than an illusion. In an extensive contribution (p. 326-340), Derek AUSTIN communicates important results of his research in the decade from 1963-1973: the search by the British CRG for a theoretical basis for a novel, faceted classification system not based on a subdivision

into main and subclasses; the search for a general citation order better than Ranganathan's PMEST formula; the failure of this project and the transition to a new indexing system for BNB based from the very beginning on computer application and having PRECIS as its final result. Austin wants to prove that there can be no classification which is simultaneously suited for shelf ordering and as an indexing language for computer retrieval, with the result that the enumerative universal classifications continue to have their full justification, as book arrangement systems, alongside the descriptor languages developed in information retrieval. With this, one can agree wholeheartedly - but hardly with the concluding view that now is rather the future of the facet classifications (among which Austin counts the UDC and CC) which is called into question, not being optimally suited as they are for either shelf ordering or computer retrieval. A solution to this problem is offered by A.V.SOKOLOV (p.394-397) with the application of "compound indexing languages" consisting of two or more interconnected indexing languages having different structural principles and functions. According to S. the following combination is the most promising one:

IL I   for the ordering and retrieval of documents (type: hierarchical universal classification); to be used for book stacks, as classification system for information services, and the like

IL II   for the description and retrieval of subjects, i.e. also of parts of single documents (type: faceted, macro- (universal) thesaurus).

In addition an IL III (whose type still needs to be researched in detail) for the description and retrieval of isolated propositions within the framework of factual ILs or of factological information processing. As examples for development trends toward such compound indexing languages S. mentioned SYNTOL, SMART, THESAUROFACET and the Semantic Code (BIT system) the latter created in the USSR.

The ensuing remarks by S.C. VILENSKAYA (p. 398-406) demonstrate a possible practical application of Sokolov's proposal: the construction of a thesaurus for the social sciences with the USSR Academy of Sciences, Moscow, which integrates a rubricator (as an IL of type I) and a descriptor part (as an IL of type II).

Contributions on the Thematic Area: Compatibility and Adaptation of IRS Codes to User's Thinking and Searching Habits

As a rule the user of an IRS must condition his thinking to the code used by the IRS (e.g. to a universal classification in a general library) or in the case of a free text retrieval to the given parlance of the authors of documents. A main problem of all IRS's consists therefore in adapting the manner in which they provide access to the literature or the information contained in documents to the thinking and searching habits of their potential users. To solve this problem, Christine A. MONTGOMERY (Toward a Natural Language Communications Interface, p.914) proposes the creation of a mediative instrument working on the basis of the natural language, this being the preferred communication means of the searchers for information. If it is accepted as correct that the basic problem of each retrieval effort can theoretically be reduced to laying down a list of words containing all imaginable synonymous indications of the concepts (descriptors) functioning in a given IRS, then this mediative instrument for the user must "automatically generate ... all functional synonyms of the terms contained in his ... retrieval query and match these against the ... data base". Details of a possible realization are stated. It remains to be asked whether the expense of a highly automated procedure can guarantee significantly better results than conventional aids on a natural-language basis (keyword registers, alphabetic descriptor lists with indication of hierarchical relations) - particularly since the language barrier can, in principle, be overcome in no other way than has been possible for a long time already through a classification equipped with notations as code, for what is needed, in the final analysis, is "a natural language communications interface for each language to be represented in the document collection and in the user community".

In contrast, H. SPANG-HANSSEN (p.15-19) does not believe the language barrier can be overcome with the aid of an instrument "looking like mother tongues". He feels that "the socalled traditional classification systems are more fit for global networks, because they are ... less sensitive to differences between various natural languages", from which it follows that "the best international solution might be a system not too similar to any natural language".

Another way, again, for overcoming the language barrier in information exchange is opened up by an interesting attempt by Spyros E. DIAMESSIS (p.22-37), who makes use of the fact that numerous European languages have a common root (the Indo-European) "to produce a new basis for computer-aided language translation". This version of a machine translation system contains the new element that "the computer is instructed, essentially, to transliterate rather that translate". This method, developed and described in detail for the relationship English/Modern Greek with emphasis on the field "Electronic Engineering", is, in Diamessis' opinion, absolutely capable of being applied on a broader scale and is particularly of importance for developing countries in the Indian and African regions, although he admits that "there are considerable difficulties and limitations to the method and further work is recommended". That decentralized organizational forms can likewise, with good success and considerable effectiveness, lead to a uniform system of international information exchange is shown by M.K. RAGHA-VANDRA RAO and V.A. KAMATH (p.454-465), using the INIS (International Nuclear Information System) as an example. The potential possibility of overcoming the language barrier is viewed by the authors as a special advantage of such decentralization. They regard the translation of the INIS Thesaurus into French and Russian as "a forward step towards the feasibility of future multilingual global systems".

Similarily to Ch.A.Montgomery, Kjell SAMUELSON (p.438-446) likewise made the study of the behaviour of information seekers a central area of his paper. The more freedom and flexibility there is in formulating the search question and in comparing with the information store, the more probable will it be that in retrieval conformity will be achieved "between knowledge universe and the

individuals unique schemata". To meet the users' thinking patterns to the maximum extent, it should be possible to combine the most varied access elements (e.g. keyword chains, bibliographic description, full text of the document with computer support) as search characteristics in retrieval. Samuelson further calls attention to the fact that the solution of the problem "Information Ordering in Worldwide Communications" required making use of even the most uptodate technical means in telecommunications, including communications satellites.

This aspect is likewise emphasized by S.W. MASSIL (p.448-453) with the objective in mind "to participate in eliminating the information gap that exists in acute forms in Asia".

To solve the problem of a uniform classification, three ways, according to K.I. KURBAKOV and V.G. BOLDOV (p.150-156) are available in principle: (1) create a new, standardized universal classification, (2) select (the best) one of the already existing universal classifications as a basis and optimize it, (3) combine the existing classifications and/or make them mutually compatible. In the authors' view only the third approach can lead to success be it through a lengthy process taking place stepwise. Somewhat differently from Kurbakov and Boldov, Gernot WERSIG (p.423-430) sees the following possibilities for achieving compatibility: (1) use of a single IRL in all IRS's (hence: uniform classification), (2) establishment of a concordance between the various IRL's used in existing IRS's, (3) as the latest approach: development of a "switching language" for switching from one to another IRL. Wersig further outlines a descriptive theory for investigating fundamental questions of IRL equivalence measurement and communicates pertinent research results.

Elaine SVENONIUS (p.204-210) demonstrates a method for bringing the hierarchies of enumerative classifications into "one linear arrangement" without appreciable loss of information in order to ensure by means of such "strings"' the translation from one IRL into another - hence: compatibility. Using examples from LC and DDC, Svenonius investigates this possibility, derives from it an abstract classification model and generalizes her translation method with the aim of arriving at a switching language.

Another way to achieve compatibility is taken by Ejnar WAHLIN, who since some 30 years has been preoccupied with, among other things, the theoretical foundations and the elaboration of a modern universal classification as a coordinating center for special classifications of the most varied kinds. Here he presents in clear, intelligible fashion his idea (already outlined in a somewhat complicated form at the 1971 Ottawa Conference) of "The AR Complex" (Special Classification Systems Used Together with a Common Reference System, p.407-422). The R (=Reference) System - which by the way can also be used seperately as a universal classification - has the task of giving every concept its "proper place" and, not being subdivided by disciplines, can serve as a switching language for all associated special A (=Adapted) Systems. Wahlin's noteworthy ideas agree in principle with Sokolov's idea of compound indexing languages.

M. WOLFF-TERROINE (p.431-436) reported finally on a "macrothesaurus" being worked out in France to comprise all scientific and technological disciplines. It must (1) exercise the function of an umbrella thesaurus and ensure compatibility among "sectorial networks of information", and (2) also permit direct classification at a medium level of generality limited to 5000-odd concepts for better overseeability. Difficulties occur e.g. when identical concepts have different designations in different disciplines.

On individual problems of classification theory

From a profound knowledge of the literature, Ingetraut DAHLBERG (On the Theory of the Concept, p.54-63) deals in a searching manner with the philosophical problem of concept formation: the question as to the nature of the concept, its relationship to the extrahuman world, the relationship between concept and designation, and the relationships between concepts. The theoretical illumination of this problem area is of great importance for classification theory and, in the final analysis, for the elaboration of scientifically sound classifications and thesauri, and I.D. places her remarks under this aspect. She argues from the position of the nominalists (nominalism as understood as the progressive current in medieval philosophy: as a form of materialistic thinking and recognition). In her view of the nature of the concept I.D. comes close to that of the "rational image" as it is explained by the reflection theory, whose consistent application, in my opinion, might lead the author to even more lucid insights and more precise results. From the insight into the dialectics of language and thought the realization results that in the construction of classifications the terminological aspect must not be regarded as something absolute (the natural language as the sole basis for information retrieval leads only in computer-online retrieval systems to acceptable results, as shown by Lancaster's paper reviewed below); on the other hand, concepts can only be defined in the form of language (designations). It should be recognized as undeniably correct that concepts (and not designations) form a constituent element of classifications and thesauri (I.D.'s point of departure). If this is true, however, then it is also possible to replace the designations, in any mother tongue, of concepts by coded notations: "Such concept notations then would also supply an internationally understandable concept language". With this practical conclusion I.D. subscribes to Spang-Hanssen's view on the solution possibilities of the problem of the language barrier in global information networks.

Eric de GROLIER's remarks (In Search of an Objective Basis for the Organisation of Knowledge, p.64-73) remain heterogeneous and without a pointed conclusion - thus indeed constituting "more a programme for future research than the results of accomplished studies".

An attempt to define fundamental classification concepts with the aid of the set theory is undertaken by Gerd BELING (p.77-82) but does not lead to fundamentally new insights. Wholesale agreement, however, may be expected for his definition of "classification research": "Classification Research in information science is a field of scientific research concerned with foundations, design, application, processing, comparison, and evaluation of any kind of documentary languages used for indexing, storing and retrieval in information systems".

P.P.M. MEINKE and Pauline ATHERTON (p.158-164) advocate the view that a wholly new conceptual basis needs to be found to make the structure of information and/or of knowledge visible, as the "Existing Methods of Classification and Indexing" are not adequate to the needs or the thinking and searching habits of the users. Letting themselves be inspired by natural scientific methods - e.g. by the space model of the atom as an aid for visualizing elementary particle structure, the authors present a "multidimensional space model for knowledge structering" contructed by means of vectors. It may be due to my inadequate powers of abstraction that I cannot quite follow their reasoning; in any event I am unable to perceive, in the postulated advantages of this method, any advantage for the practice of information retrieval.

The question of whether traditional and faceted classifications can reflect the multidimensional structure of knowledge at all is also dealt with by the contribution: "McLuhan and Classification" by S.D. NEILL (p.177-187), while Phyllis A. RICHMOND and Nancy J. WILLIAMSON (p.188-203) are concerned with "Three-Dimensional Physical Models in Classification". Starting from the graphic method of demonstrating hierarchical relationship or clusters by means of arrowgraphs, various attempts are described and discussed to correct the shortcomings of traditional linear systems with the aid of spatially arranged models. Useful though they may be bor didactic purposes, it appears doubtful to me that they might help overcome the language barrier; even the authors admit: "we would not be so naife as to insist that use of such materials would greatly advance international understanding".

An important question is treated by M.A. GOPINATH and S. SEETHARAMA: "Interdisciplinary Subjects and their Classification" (p.121-135). Starting out from a definition of the concept "interdisciplinary subject" and by stressing the necessity of interdisciplinary cooperation they present a theory of a "typology of relations". According to the latest state of recognition of the Indian School there are seven types of relations between disciplines, which are explained and illustrated by means of examples (the theoretical distinction strike me as quite complicated, however, and are perhaps somewhat overly differentiated). Finally it is attempted to show from two tables in what manner CC and DDC have tried to solve the problem of the classification of interdisciplinary ojects, with what the authors regard as the methodical superiority of the CC being made clear here.

The very broadly conceived investigation by G. BHATTACHARYYA (Fundamentals of Subject Indexing Languages, p.83-99) searches for doundations which might be common to all IRL's. The hypothesis, probably formulated first by Ranganathan, of a possible coincidence on a very deep conceptual plane, of an "absolute syntax" which possibly might have common features with an absolute syntax of (normal) human thinking, is a research subject which is as fascinating as it is dificult. "This theory would ultimately lead to the development of an all-purpose, adaptable subject indexing language". Whether this is meant to again conjure up Ranganathan's 1964 faith in a "Do-All-Classification" is something I will not go into. Closer to reality is Bh.'s conclusion that

a possibly recognizable "common logical form" might serve as switching medium and that an IRL to be developed on such a basis would be of great importance for the construction of global information networks. POPSI is regarded by Bh. as a promising IRL from this point of view. Similar conclusions are reached by A. NEELAMEGHAN, who in his contribution "Absolute Syntax and Structure of an Indexing and Switching Language" carries on Bh.'s topic in detail.

The two most uo-to-date, computer-supported methods of verbal indixing - POPSI and PRECIS - are compared by T.N. RAJAN and B. GUHA in a most interesting study (p.369-381). Starting out from the Chain Indexing method, to which both procedures are indebted in the final analysis, development and basic concepts of PRECIS and POPSI are described and illustrated by means of examples. While PRECIS puts more emphasis on natural-language syntax in bringing word relations into relief, POPSI is based more on a word order resulting from facet analysis and a sequence of concepts according to Ranganathan's fundamental categories. A superiority of POPSI over PRECIS cannot be convincingly proven. The resulting conclusion: "Both PRECIS and POPSI are precoordinate indexing systems" and have as such a "classificatory base", The authors do not take the side of the advocates of natural-language indexing: "... what we intend to stress is that abandonment of a classification is hardly a solution. The real solution lies in adopting more classificatory ideas for indexing purposes".

Such apodictic statements are avoided by F.W. LANCASTER in his study on "Vocabulary Control for On-line, Interactive Retrieval Systems" (p.40-52). Most noteworthy is his admonition that one should not assume "that approaches to vocabulary control that appear most effictive for card or printed indexes are also most effective in computer-based systems, or that approaches that have worked successfully in offline systems are also optimum in an online enviroment". For The latter case L. investigates 4 basic possibilities of vocabulary control: (1) with input and output, (2) with input only, (3) with output only, (4) neither with input nor with output (=natural language search), with particular attention being paid to the question of in what manner the vocabulary can be offered with optimum operationability both to the indexer and the information seeker (vocabulary display). L.'s professed concern is to objectively present various solution possibilities and to avoid subjective evaluations. He cannot and will not offer patent solutions: "The paper ... raises more questions, perhaps, than it attempts to answer". As most important result (and L.'s firm conviction, not presented for the first time in this paper) we can note: Manual systems working with a wholly uncontrolled natural language have no chance of yielding good retrieval results (example: the UNITERM procedure in its original form). Things lie differently with computer-based systems: more than 10 years of experience show that natural language systems work at least as well, if not better, here than controlled vocabulary systems, while being easier to handle for the scientist, who only imperfectly and with difficulty finds his way around in the intricacies of an artificial language while having an excellent command of the natural-language terminology

in his special field. A further valuable hint be passed on here: Since on-line natural language systems work quite well in special searches but not in comprehensive generic searches, what deserves to be recommended in this latter case is a controlled vocabulary on the output side in the form of retrieval aids such as tables of synonyms and conceptually related terms. This adds to the natural language system advantages of vocabulary control, a method which in L.'s opinion offers much flexibility in retrieval strategy. The reverse procedure: control in input and natural language in retrieval does not, on the other hand, appear to make much sense.

Last not least, the contribution by John P. IMM-ROTH: "A Lexical Essay Towards the Development of the Theory of Indexes to Classification Schemes" (p.136-141) deserves to be mentioned. The study of alphabetic indexes to classifications so far having been neglected. He outlines fundamental thoughts on this matter and concludes by recommending 4 central areas for future index research.

Among the numerous **Recommendations** of the Conference that were confirmed at the final session the following deserve to be singled out as direction-setting in a wide sense!

(1) In future the needs and problems of developing countries must be given special attention and considera-tion in the construcion and development of international information networks. Much was already said about this in the papers presented at the Conference. Moreover the Bombay Conference marked the fulfilment of one of the Elsinore recommendations: "The exploration and implementation of compatibility among classification systems and `thesauri" (sec.2.2,letter c). Needless to say that far from all of the likewise numerous 1964 recommendations could be realized.

(2) The training of specialists in the classification field must recognize the development trends and changes in classification research and practice and include them into the curricula. In my opinion this important theme might be made the subject of a special conference.

(3) Interdisciplinary communication and cooperation of experts from all branches of learning who are concerned with classification problems or interested in classifica-tion research must be improved and rendered more effective.

Major contributions toward the fulfillment of this demand may be seen in the founding of the journal "International Classification" and of the "Society for Classification" with its annual conferences, the sixth one of which - in Augsburg in 1982 - will be at the same time the Fourth International Study Conference on Classifica-tion Research. Its result may be awaited with keen interest.

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Obituary

JESSE HAUK SHERA Dec. 8, 1903 — March 8, 1982

With the passing of Jesse Hauk Shera, the library profes-sion and field of information science simultaneously lost one of their last truly articulate scholars. An era of great promise, which began with the foundation of the Gradu-ate Library School at the University of Chicago, has come to an end. The replacement of the scholar by the technician and pragmatist is everywhere, even in acade-mia.

Shera never lost his broad view of the ultimate intel-lectual merging of library/information science. His last paper, published appropriately in an Indian journal, was at once a reiteration of eternal values and an elegy for their apparent demise in the troubled world of the present day. One may hope, accepting Arnold Toynbee's view of the permanence of civilization as a cyclic pheno-menon, for an eventual revival of active, humanistic scholarship when the present technological yen to digitize, measure and count has run its course. Great literary skill and flawless logic are still mandatory. The very existence of the journal in which this éloge appears holds promise for the eventual achievement of this goal.

Shera began his career as a librarian, despite the handicap of being legally blind from birth. His visual limitation quickened rather than dampened his other senses. Until the last few years of his life, it was almost impossible, in conversation, to be aware of any visual handicap at all. He was the easiest person to find at any gathering and the easiest with whom to converse. A con-versation interrupted could be resumed in another place and another time without awareness of the interruption. Where he got all his marvellous jokes and stories remains a mystery and the fact that he rarely repeated them an even greater one. His fondness for cats mirrored his ap-preciation of their freedom and if he was an iconoclast, it was as a practitioner of a similar freedom.

Shera has left his mark on the world as a legacy. His work is timeless in scope and execution. His words will be read and re-read long after those who remember him are gone, whether the future is printless or bookless — but still intellectual life in another dimension, still evidence that we stand on the shoulders of giants.

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