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The Communication System of the Social Sciences

Traditionally, bibliographic communication in the social sciences has been viewed in descriptive or taxonomic terms. It seems possible to construct an abstract theoretical scheme within which such formal or bibliographic communication may be seen in relation to informal information exchange. The communication system thus conceived comprehends both formal and informal dimensions of social science communication. The ultimate rationalization of social science communication is dependent on the negative feedback that promotes the equilibrium of this system.

In the early 1930's, Douglas Waples of the graduate library school at the University of Chicago and C. Seymour Thompson, assistant librarian of the University of Pennsylvania, engaged in a most interesting debate over the possibility, indeed the desirability, of constructing a legitimate library science. The very character of that debate is instructive since it represents a benchmark against which one can measure the evolution of librarianship over the past thirty-five years. Professor Waples, as one might anticipate, was the exponent of scientific method and of the development of intellectual foundations for librarianship through its application. But Waples was more Baconian than Einsteinean, less the devotee of deductively formulated theory than of the formulation of generalizations by induction from systemic empirical studies. Thompson, on the other hand, viewed librarianship as a "Fine Art."[1] It is perhaps safe to suggest that now terms of an analogous debate might be quite different. Such a debate might now turn on the comparative utility of inductive empiricism and deductive theorizing as major methodological orientations in the development of a library science that could lay claim to liberation from the constraints of "natural history" modes of inquiry. It is within the context of this latter-day debate that the bibliographic organization of the social sciences can be most adequately surveyed.

It is one thing to be exclusively descriptive and taxonomic in an overview of social science bibliography. It is quite another matter to view problems of bibliographic access to social science knowledge conceptually in systemic terms. Whereas the former approach has been rendered less obsolete than inadequate of itself by research on scholarly communication, the refinement of systems theory in the social and natural sciences has made the latter approach remarkably useful.[2] To be more specific, it seems possible to view the array of bibliographic devices developed to provide access to social science knowledge as a constituting subsystem of the larger communication system in social science. Bibliographic communication may then be seen as the formal component of a larger system of communication which also

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NOTE: Footnotes for this article follow the text, beginning on page 249.

has an informal dimension, or subsystem, representing the interrelated set of channels for the more personal exchange of knowledge. Figure 1 shows the relationship of interaction which prevails between the bibliographic and personal exchange subsystems of the communication system of the social sciences.

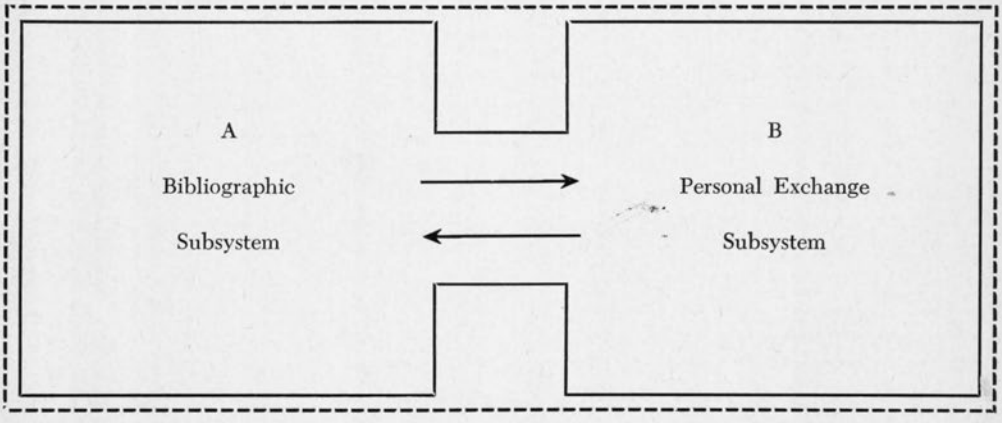
The reverse arrows are meant to suggest this interaction and, by extension, the mutually causal relationship between subsystems A and B. The larger system C can, therefore, be conceived as a feedback system in which the structure and function of B affects A while A influences B, either simultaneously or alternately. The relationship of subsystems A and B cannot, as a consequence, be linearly causal, but must be circular in character with the structure and function of A governed by feedback from B regarding its structural-functional response to some initial state of subsystem A or vice versa. For system C to move toward a state of equilibrium or optimization with respect to its internal arrangements, the feedback prescribing change in both A and B must be negative.

The relationship of mutual causation within system C is, given rational goals for both subsystems, that of opposition; that is to say, if B varies directly with A, then A must vary inversely with B. In other words, if subsystem A has as its most reasonable goal bibliographic organization which takes into account the structure and function of subsystem B, then the goal of subsystem B, if the thrust of system C is to be toward equilibrium, must be an informal structure of communication whose channels perform functions which are not performed or, to be more accurate, not adequately performed by the bibliographic subsystem A.

In this model, the complete rationalization of the social science communication system obviously depends on total surveillance of each subsystem by the other or, put another way, on the flow of complete and accurate information between subsystems. It need hardly be observed that the intelligence needed by the designers of bibliographic devices and by the scholars who define the configuration and functions of the personal exchange subsystem, if system C is to reach and maintain internal equilibrium, is not yet available. As a result, this model of the social science communication system must, for the time being at least, be recognized as positing an ideal.

For the present, it is more realistic to believe that the "managers" of subsystem A, typically librarians, scholars, publishers, or some coalition thereof, operate on incomplete and occasionally inaccurate information regarding the ongoing

FIG. 1.—Subsystems of the Communication System of the Social Sciences.



structure and function of subsystem B, and that those who define the parameters and nodes or switching points in the informal networks of communication represented in subsystem B are constrained by a parallel shortage of information about the structure and function of subsystem A. The consequence of stunted information flow can be shifts in structure and function in either subsystem based on positive or amplifying feedback rather than on the dampening influence of negative feedback. The exchange of distorted or untruthful information could result for example, in the design and development of a bibliographic device or set of such devices incorporating communication functions which are more *properly* and *optimally* handled by the personal exchange subsystem.[3]

It is, of course, entirely possible bibliographically to formalize selected informal channels of communication and to loosen or informalize the bibliographic subsystem, as studies reported later in the article have already demonstrated. Great care should be exercised, however, in the selection of those elements in the bibliographic and personal exchange subsystems which are to be informalized and formalized respectively. In the first place, the informal channel or bibliographic mechanism selected for such reorientation, whether it be the exchange of unpublished papers made more universal through bibliographic acknowledgement of their existence or the personalization of formal bibliographic access through selective dissemination, must be seen in its functional context. Indeed, not only the means by which a given element in the communication system of social science is to be formalized, or informalized but the very selection of the element itself, if it is to be done on more than intuitive or partially scientific grounds, must be founded on an adequate understanding of the structure and function of the subsystem of which the element is *not* a part and of the structural-functional relationship of the element to the other elements in its own subsystem.

Secondly, if the communication system of the social sciences is even loosely articulated, and one has every right to expect something tighter than "looseness" in such a system, defined as it is by the sheer density of its social science knowledge exchange relative to its environment, a modification of one of its elements might well reverberate and cause adjustments, however slight, throughout the entire system. Only thorough knowledge of the communication system in social science would enable one to predict the scope and intensity of these adjustments even on a probabilistic basis. It is unlikely that the promoter of innovation in the social science communication system will have access, in the immediate future, to the kinds of information suggested above.

He does, however, have access to the arsenal of intellectual tools generated by the systems sciences, particularly operations research, for coping with organized complexity about which only limited information can be obtained. Chief among these are model-building and its extension, simulation. Also emerging are mathematically-based theories of inventory, allocation, queuing, sequencing, routing, replacement, competition, and search which are rooted in the exotically titled subfields of statistics—Bayesian statistics, Monte Carlo method, Markov and stochastic processes, Gaussian distribution, and the like.

It would be a mistake to regard the social science communication system as a closed system devoid of environing systems with which it can effect transactional relationships. It would likewise be incorrect to picture it, in enlarged perspective, as anything but a subsystem itself comprehended by a larger system. With regard to the first point, the social science communication system has interactional relationships with communica-

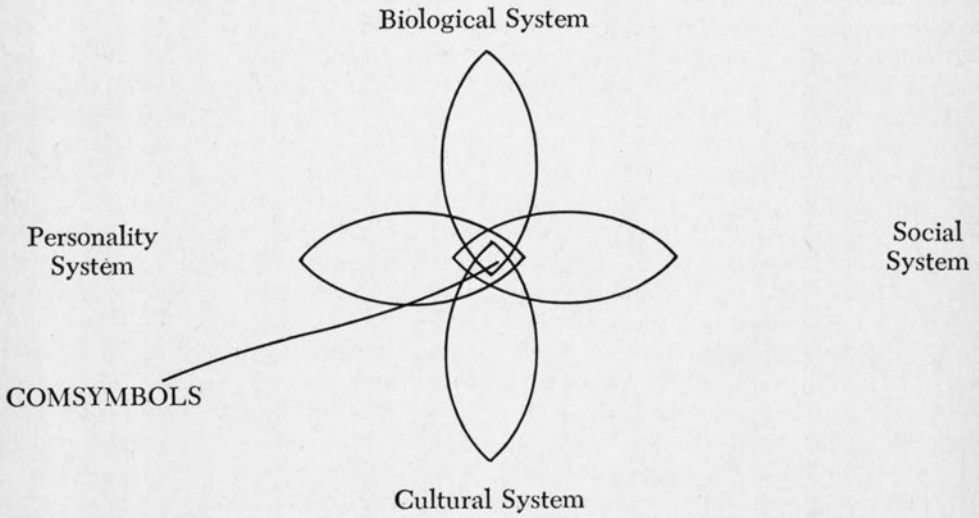
tion systems of the humanities, the physical sciences, the biological sciences, and technology. These relationships suggest that it is imperative to view scholarly communication as a complex, interacting whole, a suprasystem within which one can gain a holistic perspective on interdisciplinary intercourse. But the social science communication system may also be seen in hierarchical context as a subsystem of the social system of the social sciences which, in turn, is infused with the normative or value-prescriptive content of that vast cultural system which may be called the "world of learning."[4] The systems may be arranged horizontally in terms of interpenetration or interlock as well as hierarchically in terms of comprehensiveness.

Talcott Parsons, on whose systems theory the following discussion is based, has accepted the four-leaf-clover schematization[5] of interpenetrating systems presented in Figure 2. The area of overlap consists of those symbols shared by all systems but which have their genesis in the cultural system.

Parsons refers to the interrelated set of systems diagramed above as the culturally organized system of action. The cultural system, in this case the cultural subsystem of the world of learning, imparts to the social system, in this instance the social system of the social sciences, its overarching patterns of meaning as they are embodied in individual symbols and in complex sets of symbols. The norms, beliefs, and ideas of the cultural system are also transmitted to the personality system which, consisting as it does of learned cultural patterns, may be analytically distinguished from the biological system or physical organism itself.[6]

The center of action in the Parsonian scheme is the social system, in this context the social science social system (with its subsystem for communication which has heretofore been called the social science communication *system*), which mediates between that subsystem of the larger cultural system called the world of learning on one side and the personality and biological systems on the other.[7] The four systems, while decidedly interrelated, are analytically separable and each individual system has its own organization of elements, boundaries, boundary maintenance problems, and equilibrium tendencies. Social ac-

FIG. 2



tion is thus concretely defined by the various ways in which the four systems interpenetrate.

In order to gain insight into how the social science social system impinges upon the communication system of the social sciences and its bibliographic and personal exchange subsystems, it seems necessary to examine at least two of the fundamental problems with which social systems must cope if they are to reach a state of equilibrium. The first problem may be described as internal. The social science social system, if it is to become ordered and integrated, cannot, over the long term, run counter in over-all behavior to the needs, motives, and potentials of the persons occupying social roles within the system. In the perspective of this discussion, the social system of the social sciences would consist of those persons who, as academicians, practitioners, researchers, or students, have internalized at least some of the general norms of the world of learning (*e.g.*, that credit should go to those upon whose ideas and data one draws), as these norms have been modified or given a special formulation within the ethos of the social sciences, and who are at least minimally engaged in either study or research on a social science problem. The foregoing may be referred to as system integration or, more particularly, as the internal stability of the social science social system.

Secondly, the social system of social science, which generates a complex of norms relevant to its own special functions, cannot, again over the long term, vary radically from the norms of its appropriate cultural system, in this case the world of learning. Hence, the informing function of the cultural system cannot be frustrated within the social system for any great length of time if the social system is not to become dysfunctional.[8]

One of the important ways in which the world of learning, as a cultural subsystem, affects the normative structure of the social system of the social sciences is through the transmission of certain value propositions on which there is widespread academic consensus. One of the most powerful of these normative propositions is rationalism or the certification of knowledge based on what Parsons and Norman W. Storer have called the "shared structure of communicable thought which must underlie empirical argument."[9] The strength of this norm may be attributed, as Robert Merton has observed, to the rise of science and to the increasing importance of scientific methodology. It is this norm of rationalism that, to a very large extent, defines the structure of influence within the social science communication system.

A social scientist acquires influence when his academic peers judge his contributions to be rational and valid, not to mention original and reflective of some imaginative genius. Once a social scientist has established some influence, even his weaker publications tend to be received more favorably than they otherwise would be. Other scholars grow accustomed to citing his work, frequently in an attempt to acquire some of his prestige.[10] Indeed, the very frequency with which a small coterie of scholars is cited is at least partially reflective of the flow of influence in the social science communication system. This intellectual convergence on a group of key influentials also suggests something about the personal exchange subsystem of the social science communication system. One suspects that this influential minority of social scientists occupies the modal positions in the informal network of communication. The audiences to which these select scholars mediate the unpublished knowledge of the social sciences will determine, at least approximately, the boundaries of the personal exchange subsystem.

The academic cosmopolitans, most of

whom are connected with major universities having eminent graduate schools, are probably more theoretically oriented than social scientists generally and are perhaps more inclined to operate intellectually in the interstices between disciplines as well as within the bounds of their native field. The influence of theoreticians and scholars of interdisciplinary catholicity is not at all accidental. It is the concepts of the theoreticians which articulate and organize the empirical generalizations and data of social scientists with less range. It is the work of those with interdisciplinary inclinations which demonstrates the analogical suggestiveness of concepts born in a particular discipline for other fields. Much more, needless to say, must be known about the flow of influence in social science before its communication system can begin to be rationalized.

The message of the preceding discussion is that bibliographic services in the social sciences cannot be examined *in vacuo*. In the late 1940's, a distinguished University of Chicago committee, headed by Bernard Berelson of the graduate library school and Ralph W. Tyler of the division of social sciences, sought the advice of social scientists and librarians regarding lacunae in social science bibliography. Such an approach has some utility, to be sure, but only in the light of reasonably adequate knowledge of the functions performed by the bibliographic and personal exchange subsystems within the social science communication system can the outcomes of such opinion-seeking be meaningfully assessed. Such knowledge was not available to the investigators at Chicago nor is our knowledge of the structure and functioning of the social science communication system even at the present period anything like adequate.

Furthermore, there is a definite need for more knowledge of the ecology of the communication system itself. It has been suggested, for example, that methodological differences among the various social sciences strongly condition styles of information seeking and help to define which forms of publication will be most heavily used. Certain social science librarians in England, including Barbara Kyle, D. J. Foskett, and Peter R. Lewis, see methodological differences as crucial to the effective bibliographic organization of social science literature.[11] That there is some merit in the point of view would appear to be demonstrated in the following quotation from David Reisman.

> The historian sees the social scientist, in general, as an uncultivated person, without knowledge of, let alone reverence for, the past. His vulgarity appears in putting himself forward in what he writes—his often self-conscious effort to declare his own values, his own biases. In contrast to this the historian tends to minimize the role of his own self, of his own projectivity if not his selectivity, so that even a Collingwood, no *echt*-historian, is gingerly in handling a personal anecdote. (A nice example turned up the other day when a historian was talking to a seminar largely composed of sociologists. He told us how he had happened to study Latin-American cities and then apologized for the surely not tasteless revelation.) Moreover, the historian sees the anthropologist (and his allies among the *novi homines* of behavioral science) as able by grandiose or sexy talk to capture students and foundations, leaving historians to hold hands with professors of Greek; by the same token, anthropologists have the ear of governments, always flying to Washington or Micronesia, or advising market researchers-promoters rather than scholars. Yet there is an ambivalence in this disdain. These new men must have something. They talk a lot about methods—so much so that one of their number was recently heard to exclaim: "Oh, dear, why can't we just go out and *do* ethnography the way we used to." They know a lot of jargon which is villainous enough but impenetrable; they know about Rorschach tests, interviewing, and even sampling.[12]

Still, the above remarks are now over

a decade old. There is undoubtedly much more collaboration and rapprochement now between historians and more behaviorally oriented social scientists (especially sociologists, psychologists, and anthropologists) than there was at that time. And despite the persuasiveness of the "methodological differences" thesis, the writer is more inclined to look for methodological and conceptual isomorphism among the social sciences than to be swayed by the more seductive and obvious dissimilarities.[13] It seems likely that the behavior of a deductive theorist in sociology vis-a-vis the graphic record is more likely to resemble that of a deductive theorist in anthropology than that of a "barefoot" empiricist of his own disciplinary breed.

It seems possible, if this hypothesis is basically valid, at least to reduce methodological differences as defined by the different social science disciplines. This is possible if each discrete social science discipline is seen as possessing (1) its deductive theoreticians and philosophers who are not preoccupied with identifying the empirical correlates of their thought; (2) its empirical generalizers who seek to discover "laws" of limited range which accord with the results of empirical inquiry; and (3) its raw empiricists whose major concern is with fact gathering and who pay limited attention to the formulation of conceptual contexts within which their empirical results might find greater meaning. These epistemological categories are not constrained by the boundaries separating one academic field from another but cut across disciplinary lines and may ultimately suggest a great deal more about user behavior in the bibliographic subsystem, indeed the over-all communication system of the social sciences, than can a conception of methodological divergence defined by the disciplines themselves.

Much more will be known about this matter, it is hoped, after William D. Garvey completes his projected study of scholarly communication at Johns Hopkins University. This study will have a library or bibliographic dimension and will be comparative in the sense that it will note similarities and differences between the communication system in psychology, about which the American Psychological Association's studies have already revealed a great deal, and the communication arrangements in a physical science and another social science.[14]

One way of demonstrating conceptual interlock in the social sciences would be to trace the migration of abstract, organizationally potent theories (e.g., culture, entropy, indeterminancy) from their genesis in a particular social or physical science through their ultimate consumption and application in several different social science disciplines.[15] Such an approach, while hardly original, might well provide knowledge of considerable importance in the design of bibliographic devices. Arthur Lovejoy devoted much of his life to mapping the portability or analogical suggestiveness of "thoughts concerning particular aspects of common experience, implicit or explicit propositions, sacred formulas and catchwords, specific philosophic theorems, or the larger hypotheses, generalizations or methodological assumptions of the various sciences."[16] A similar approach has more recently been followed by several members of the Society for General Systems Research including Milton Marney, Frederick B. Wood, and the writer.

In like manner, those who seek greater economy in the transmission of knowledge have begun to identify broad-gauge concepts, thought models, or "representative ideas," many of which have cross-disciplinary relevance.[17] This latter approach, inspired largely by the research and research syntheses of Jerome Bruner and Jean Piaget, has been accompanied by attempts to reinterpret conceptually an entire aggregate of disciplines. Alfred Kuhn, to cite only one example, has

sought to interpret political science, sociology, and economics as an integrated whole through the application of fundamental, intellectual machine tool concepts like communication, transaction, and organization[18] to which he equates the three vital components of a cybernetic system, a detector, a selector, and an effector.[19]

Quite related to the foregoing are the studies of Derek John DeS. Price and Eugene Garfield on citation networks in the sciences, all of which have implications for studying the generation, organization, transmission, and consumption of knowledge in the social sciences. Price has employed the image of "knitting" to describe the texture or topography of citation networks in the cumulative sciences in contrast to the random, more entropic networks which he suggests are likely to exist in the humanities. Applied to the social sciences, citation network analysis, refined by qualitative information on just how a citation is employed by a citing source,[20] might permit more complete identification of key academic influentials and more complete knowledge of the different ways in which they are catalytic in the growth of knowledge within their own disciplines and the social sciences in general.[21] It would then be possible to compare the flow of influence and information in the bibliographic subsystem with parallel flows in the personal exchange subsystem of the communication system of the social sciences.[22] It could be hypothesized that within a social science communication system in equilibrium, some influentials may be best adapted to the structure and functions of the bibliographic subsystem while others will find it more suitable to exploit informal channels of communication; still others, perhaps a majority, will exercise equal influence in the two subsystems. It would also be interesting to observe the flow of information from *applied* social science to *basic* social science, as those two dimensions of any scientifically oriented discipline are currently, if somewhat vaguely, defined.[23]

The rapid growth of area studies[24] and multidisciplinary approaches to specific social problems provide excellent opportunities for identifying those concepts and influentials which seem to exercise hegemony in the intellectual open market of collaborative, yet competitive, interdisciplinary research. At all events, better knowledge of concept migration and the parallel flow of scholarly influence in the social sciences should contribute to the rationalization of the social science communication system and to the even more central intellectual task, crucial to the construction of a library science, of monitoring the generation, growth, and integration of all human knowledge.[25]

In a sense, much of the epistemological tension present in the modern social sciences may be traced to the influence of Europe; Simmel, Pareto, Freud, Weber, Durkheim, and others still exert influence in American social science. It should be recalled that the social sciences are themselves a consequence of the progressive evolution and differentiation of moral philosophy, a broad domain of inquiry which was, at least initially, largely speculative and normative in character. During the last quarter of the nineteenth century and the first quarter of the twentieth, however, the social sciences were introduced to the empirico-quantitative methods of the natural sciences with German social science showing the way.[26] In more recent decades, the social sciences have taken a further step by appropriating, so suggestive do they seem to be, some of the most deductively fertile concepts of the natural sciences, mechanism and organism during an earlier period, entropy, uncertainty, and more recently complementarity. Scholars in the social sciences who share the systems-communication orientation which incorporates a number

of natural science concepts are now displaying more optimism about the emergence of what Comte called a "social physics."[27]

Kenneth Boulding has made what seems to be an excellent distinction between modern scientific knowledge, increasingly encountered in the social sciences, and the folk knowledge which, even now, can be found in contemporary approaches to social problems. He writes:

> The fundamental difference between scientific knowledge and folk knowledge . . . is that folk knowledge is derived essentially from empirical inference and causal observation whereas scientific knowledge is derived from necessary inference from theoretical models according to mathematical logic and carefully organized observation guided by inventions which extend the power of the senses.[28]

Boulding cautions, however, that despite the scientific revolution in the social sciences, the "internal" insight of the humanist and the more normative speculations of the social philosopher should not be neglected as valuable and necessary complements to the efforts of the model builders and deductive theorists.[29]

To the writer, there is unquestionable utility in the quest to understand those epistemological problems which are shared in common by all of the social sciences. To do otherwise would be to deny that the rationalization of the social science communication system is ultimately dependent on the search for commonality. In the 1930's, Karl Mannheim reflected that European social science seemed concerned mainly with large-scale phenomena, with that sheer breadth of inquiry epitomized in the work of a man like Herbert Spencer, who as Paul F. Lazarsfeld recently put it, "concerned himself with development of all societies from beginning to end."[30]

American social science, at that time, appeared to Mannheim to be much more microscopic in its inquiry. Over thirty years later, there has undoubtedly been a rounding out of this picture on both sides of the Atlantic.[31] Both here and abroad, social science has its macroscopic dimension represented by the deductive theorists and social philosophers, and its microscopic orientation exemplified by the empirical generalizers and the fact gatherers.[32] The common epistemological problems existent at both of these levels of inquiry have been thoroughly, if over-pragmatically, discussed by Roylo Handy on the basis of his ten-year survey of the literature of the social sciences.[33]

From the standpoint of developing mechanisms of access to social science knowledge, it is the macroscopic component, with its attendant epistemological problems, which is of greatest importance. Because it is the macroscopic social scientists who dictate how empirical generalizations and data will be ordered, it is to the writings of men like Parsons, Boulding, Carl J. Friedrich, Herbert A. Simon, and Robert K. Merton, the Einsteins of modern social science, that those who would develop access to social science literature should turn.[34]

Having suggested some of the factors that need to be considered in any effort to rationalize the communication system of the social sciences, the writer would like to turn, at this point, to a consideration of the current bibliographic situation in the social sciences and to an assessment of the environment of that subsystem.

The librarians in the University of Chicago's survey of some two hundred users of the bibliographic apparatus of the social sciences regarded it as weaker than the bibliographic services then provided in the physical sciences, biological sciences, and humanities.[35] The social scientists surveyed shared this disenchantment, but differed with the librarians in their judgment of precisely what would be required to improve the situation.

The librarians, oriented basically to locating information for others rather than its actual consumption, wanted a comprehensive index to social science literature covering all, and perhaps more, as *Social Science Abstracts* once did, of the literature now covered in, say, *Psychological Abstracts, Sociological Abstracts, PAIS*, and what is now called the *Social Sciences and Humanities Index*. The social scientists, oriented on the other hand to the actual consumption of social science knowledge, sought abstracting services and bibliographic reviews.[36]

Fifteen years later, this tension between the location of literature and the consumption of the knowledge-content therein appears little attenuated in view of the results of a recent comprehensive survey of social science information centers completed by Jack Ferguson and his colleagues at Columbia University's Bureau of Applied Social Research.[37] A more limited and highly tentative survey of sixty research oriented economists, psychologists, and anthropologists sponsored by the *American Behavioral Scientist* also confirmed the social scientists' press for improved descriptive abstracting and for better, more multidimensional mechanisms of access to social science knowledge. This survey also showed, as evidenced by the response of the psychologists, who are now by no means alone in having to contend with a diffuse, hard-to-control report literature, that where a quality abstracting service exists, it is used.[38]

The experience of Patricia B. Knapp at Monteith College of Wayne State University tends also to reflect a scholar-librarian dichotomy. Professor Knapp observed that bibliographical devices—periodical indexes, catalogs, and the like—which are developed by scholars and their professional associations, were more oriented to concept and discipline and, at times, methodology. In the face of this evidence, however, doubt still exists about whether this is a legitimate dichotomy to make. Positing a continuum of bibliographic sources ranging *from* those providing broad literature coverage and low information provision *to* limited literature coverage accompanied by high density information provision, Professor Knapp suggests that the amount of knowledge an inquirer brings to his search will determine which end of the continuum he finds most useful.[39]

The writer would suggest, on the contrary, that the epistemological stance of the inquirer—macroscopic and deductive or microscopic and inductive—and the nature of the conceptual structures within which he organizes what he has already learned will be more influential in determining whether he will find the bibliographic devices of librarianship or scholarship most useful; or whether, indeed, he finds it indispensable to use both in combination. Many scholars who are oriented to the theoretical and interdisciplinary aspects of knowledge can, one might argue, both have their cake and eat it. Such scholars are inclined to depend heavily on books and articles by those with whom they share an epistemological orientation, the footnotes and bibliography therein permitting them simultaneously to optimize both their coverage of the literature (through insight regarding works which are analogically suggestive for their own work) and information provision (due to the shared epistemological perspective). Again, further inquiry in this area is certainly needed.

A good place to begin in any discussion of the problems of bibliographic access in the social sciences is with classification. Perhaps the most outstanding effort in this direction is the Kyle Classification (or KC) developed by Barbara Kyle at the request of the International Committee on Social Sciences Documentation. This is a faceted classification scheme based on an underlying notion of the hierarchical structure of organized social complexity, ranging from the in-

dividual up to large social organizations or systems. It employs two prime facets, Activities and Personalities, under which all other terms are organized. In the classification of a document, the Activities facet is employed before the Personalities facet. Activities are defined simply as those actions in which Personalities or groups engage.

The great advantage of this classification is that it is not based upon those man-imposed boundaries which separate disciplines, as different ways of looking at the same reality, from one another. One of its drawbacks, as Foskett has observed, is the occasional difficulty in determining whether a given entity is an activity or a personality.[40] A greater difficulty, in the judgment of the writer, is the scheme's inability to differentiate between those authors who discuss social organizations as if such systems are inherent in nature itself and those who write about social systems from a conceptual point of view or as simple constructs imposed upon a reluctant reality as an aid to understanding social behavior. Social scientists differ on this matter and the epistemological variation is reflected in the publications they produce.[41] As a consequence, any hierarchy of social organizations or systems will be confused and inconsistent if it does not in some way distinguish those sets of interacting entities which are defined by relatively perishable intellectual constructs and those which are conceived as immanent in nature.

More recently, Claude Levi-Strauss and Jean Piaget have presented interesting discussions bearing upon the relationship between epistemology and the organization of social science knowledge.[42]

Over fifteen years ago, the authors of the University of Chicago report on social science bibliography made three proposals for action. The most exciting of these proposals, the authors suggested, would take at least a generation to implement. That proposal was the complete rationalization of social science bibliography.[43] This article has tried to suggest that such rationalization, indeed the rationalization of the larger communication system in social science, need not forever remain a dream. ■■

NOTES

[1] See C. Seymour Thompson, "Do We Want a Library Science?," *Library Journal,* LVI (July 1931), 581-87; Douglas Waples, "Do We Want a Library Science: A Reply," *Library Journal,* LVI (September 15, 1931), 743-46; and Thompson, "Comment on the Reply," *Library Journal,* LVI (September 15, 1931), 746-47.

[2] In political science, for example, the systems orientation pervades Karl W. Deutsch, *The Nerves of Government: Models of Political Communication and Control* (New York: Free Press of Glencoe, 1963); David Easton, *A Systems Analysis of Political Life* (New York: Wiley, 1965); and Easton, *A Framework for Political Analysis* (Englewood Cliffs, N.J.: Prentice-Hall, 1965).

[3] In systems or operations research, the goal most typically sought is the optimization of system performance. See Russell L. Ackoff, *Scientific Method: Optimizing Applied Research Decisions* (New York: Wiley, 1962), especially Chapter 1, "The Nature of Science and Methodology," p. 1-29, and his "The Development and Nature of Operations Research and Its Relevance to Educational Media Research" (Mimeographed paper prepared for a conference on New Dimensions for Research in Educational Media Implied by the "Systems" Approach to Instruction, Center for Instructional Communication, Syracuse University, Syracuse, N.Y., April 2-4, 1964).

[4] My intellectual debt to Talcott Parsons will be obvious in the following paragraphs. It is my hope that this application of his systems theory will not do violence to it. It should be stated, moreover, that this is by no means the first utilization of Parsons' theory in connection with bibliographic problems. In 1952, Jesse H. Shera and Margaret E. Egan tentatively explored the relevance of his structural-functional approach as a means of conceptualizing the impact of knowledge on society in their "Foundations of a Theory of Bibliography," *Library Quarterly,* XXII (April 1952), 130-31.

[5] This scheme was developed by Charles Morris in Roy R. Grinker (ed.), *Toward a Unified Theory of Human Behavior* (New York: Basic Books, 1956), p. 351.

[6] The cultural system, defined originally by religion, differentiates over time in more modern societies into cultural subsystems based, in many instances, on the cultural content of the academic disciplines. These subsystems then interpenetrate one another within the confines of the over-all cultural system. For a discussion, see Parsons, "Social Systems and Subsystems" in David L. Sills (ed.) *International Encyclopedia of the Social Sciences* (New York: Free

Press of Glencoe, forthcoming). In the processed version of this article, the relevant pages are 36-37.

[7] Parsonian systems theory is elaborated in many books and articles. It is derived by and large, from a synthesis of the insights of Freud, Durkheim, Weber, Cooley, and Mead. See *ibid.*, p. 2-4.

[8] Alternatively, Parsons and Norman W. Storer have viewed the cultural and social systems respectively as (1) the world of learning and the university or college and as (2) an academic discipline and a specific teaching or research unit. Clearly, the systems described in (2) are subordinate to those described in (1). In these alternative schemes, the points of intersection between cultural and social systems are respectively (1) the academic profession and (2) a department. See Parsons and Storer, "Proposal for a Study of *The Academic Profession: Faculty Roles and Functions in American Colleges and Universities,*" (Cambridge, Mass.: Department of Social Relations, Harvard University, 1964). In the processed version, the relevant pages are 3-7. For a partial exposition of this matter, see Parsons, "Unity and Diversity in Modern Intellectual Disciplines: The Role of the Social Sciences," *Daedalus,* XCIV (Winter 1965), 39-65. As a level of analysis, the social system of the social sciences has been favored over the university or college *or* the specific teaching or research unit because the social science communication system itself cuts across the boundaries of educational, research, and professional organizations.

[9] Storer and Parsons, "The Disciplines as a Differentiating Force" in Dan Bergen (ed.), *The Foundations of Access to Knowledge* (Syracuse, N.Y.: School of Library Science, Syracuse University, forthcoming). The reference is to page 10 of the processed version of this essay. The sociology of science is apparently very much an "in" field these days. Storer himself has sought to apply systems perspectives to the social organization of science in his *The Social System of Science* (New York: Holt, Rinehart, and Winston, forthcoming). See also Norman Kaplan (ed.), *Science and Society* (Chicago: Rand-McNally, 1965), especially the sections on "Science as a Changing Institution" and "Prologue to the Future"; Warren O. Hagstrom, *The Scientific Community* (New York: Basic Books, 1965); Herbert Coblans, "The Communication of Information" in Maurice Goldsmith and Alan Mackay (ed.), *The Science of Science* (London: Souvenir Press, 1964); and Kaplan, "Sociology of Science" in Robert E. L. Faris (ed.), *Handbook of Modern Sociology* (Chicago: Rand-McNally, 1964), 852-81, especially "The Communications Systems in Science," p. 857-60.

[10] Kaplan, "The Norms of Citation Behavior: Prolegomena to the Footnote," *American Documentation,* XVI (July 1965), 181-82. For a more generalized picture of the notion of influence, see Parsons, "On the Concept of Influence," *Public Opinion Quarterly,* XXVIII (Spring 1963), 37-62.

[11] See Foskett, *Classification and Indexing in the Social Sciences* (Washington: Butterworth, 1963), especially Chapter 2, "The Data of the Social Sciences," p. 18-36.

[12] Riesman, "Some Observations on the 'Older' and the 'Newer' Social Sciences" in Leonard D. White (ed.), *The State of the Social Sciences* (Chicago: University of Chicago Press, 1956), p. 325-26. Riesman's observations do, of course, raise the question of history's inclusion in the social sciences. It is indeed a difficult field to categorize. Because of the scope and complexity of the systems with which it deals, most historians are reluctant to build theoretical models. When such models are built, the more modest claim of their heuristic value usually supersedes any claim to final explanation. There appears to be some tendency for younger historians to identify themselves as social scientists, while their older colleagues seem to gravitate more naturally toward the literary and humanistic aspects of the discipline. See Kenneth E. Boulding, *The Meaning of the Twentieth Century: The Great Transition* (New York: Harper, 1964), p. 54-55, and Robert H. Knapp, *The Origins of American Humanistic Scholars* (Englewood Cliffs, N.J.: Prentice-Hall, 1964), p. 157.

[13] In more macroscopic terms, Pierre Teilhard de Chardin has referred to the ultimate convergence of the mental system of humanity or the "omega point." See the introductory comments by Julian Huxley in his *The Phenomenon of Man* (New York: Harper, 1959), especially p. 13-14 and 17-18. While most observers would employ a differentiation model to explain the emergence of the discrete intellectual disciplines, a kind of reverse "epigenesis" can be employed in discussing their unification or re-fusion. See Amitai Etzioni, "The Epigenesis of Political Communities at the International Level," *American Journal of Sociology,* LXVIII (July 1963), 407-409.

[14] See Garvey, "An Interdisciplinary Project on the Behavioral Study of Scientific Communication" (Washington: American Psychological Association, 1965), processed, p. 6.

[15] The writer has dealt in a very tentative and elementary way with patterns of concept migration in "The Implications of General Systems Theory for Librarianship and Higher Education," a paper presented at the annual meeting of the Society for General Systems Research, annual convention of the American Association for the Advancement of Science, Berkeley, California, December 30, 1965.

[16] Maurice Mandelbaum, "The History of Ideas, Intellectual History, and the History of Philosophy" in John Passmore (ed.), *The Historiography of the History of Philosophy* (The Hague: Mouton, 1965), p. 35. Also of importance are the writings of Lovejoy himself including *The Great Chain of Being; A Study of the History of an Idea* (Cambridge, Mass.: Harvard University Press, 1936), and his "The Historiography of Ideas" in *Essays in the History of Ideas* (New York: Braziller, 1955), p. 1-13. Some of the methods of the modern social scientists who have studied the diffusion of information are also relevant here, even though most of their work has been concentrated on the diffusion of physical rather than conceptual units. See Everett M. Rogers, *Diffusion of Innovations* (New York: Free Press of Glencoe, 1962).

[17] Philip H. Phenix, *Realms of Meaning: A Philosophy of the Curriculum for General Education* (New York: McGraw-Hill, 1964), especially p. 323-26.

[18] See Kuhn, *The Study of Society: A Unified Approach* (Homewood, Ill.: Dorsey Press, 1963). A somewhat more archaic notion of social science unification based on the overarching quality of the concept of culture is presented in K. W. Kapp,

Towards a Science of Man in Society (The Hague: Martinus Nijhoff, 1961).

[19] Kuhn, "Systems Analysis as a Basis for Teaching Unified Social Science," a paper presented at the annual meeting of the Society for General Systems Research, annual convention of the American Association for the Advancement of Science, Berkeley, California, December 30, 1965. The reference, in the mimeographed version of the paper, is to pages 12-14.

[20] See Ben-Ami Lipetz, "Improvement of the Selectivity of Citation Indexes to Science Literature through the Inclusion of Citation Relationship Indicators," *American Documentation*, XVI (April 1965), 81-90.

[21] See, especially, Price, "Networks of Scientific Papers," *Science*, CXLIX (July 30, 1965), 510-15, and his "The Scientific Foundations of Science Policy," *Nature*, CCVI (April 17, 1965), 235. Garfield has even suggested, somewhat over-buoyantly it seems to me, that citation indexing to the literature of the social sciences would be preferable to the more archaic and frequently ambiguous subject headings typically found in more conventional indexes to such literature. This argument is based in large measure on Garfield's contention that each new citation, in effect, reindexes the source it cites in much the same manner in which a self-organizing system develops new goals and a new internal structure on an ongoing basis. See his "Citation Indexes in Sociological and Historical Research," *American Documentation*, XIV (October 1963), 289-91, and his "Citation Indexing: A Natural Science Literature Retrieval System for the Social Sciences," *American Behavioral Scientist*, VIII (June 1964), 59-61.

[22] It is the writer's intuition that informal influence may at times differ from bibliographic or formal influence as measured by citations. Very frequently, the author of a book or article will acknowledge the assistance of key individuals and the formative role they have played in the development of his manuscript. Such persons are not always cited in the footnotes of the completed publication. Other qualities, like verbal facility, appearance, personality, and the capacity for argumentation, are elements which may be supportive of the informal influence of an individual who, for some reason, is not yet in print with his ideas or data. Then there are always scholars whose really important work is, in their judgment, "never in final form" and who meet the "publish or perish" dicta of their own institutions with publications which by no means reflect the depth and insight of their unpublished or even unwritten reflections.

[23] See Thomas A. Cowan, "Decision Theory in Law, Science and Technology," *Science*, CXL (June 7, 1963), 1065-75, and his "What Law Can Do for Social Science" in William M. Evan (ed.), *Law and Sociology: Exploratory Essays* (New York: Free Press of Glencoe, 1962), p. 91-123.

[24] Chauncy D. Harris, "Area Studies and Library Resources," *Library Quarterly*, XXXV (October 1965), 210, 212-14.

[25] Vladimir Slamecka and the late Mortimer Taube saw the optimization of the total system of intellectual and conceptual relations as dependent upon information about how knowledge is actually developing operationally in their "Theoretical Principles of Information Organization in Librarianship," *Library Quarterly*, XXXIV (October 1964), especially pages 356-59. And Victor Yngve has foreseen the possibility of optimizing the paradigmatic, or *a priori*-conceptual of the SYNTOL (or Syntagmatic Organization Language) on the basis of a monitored feedback of information regarding the intellectual relations actually being expressed in documents. See J. C. Gardin, *SYNTOL* (New Brunswick, N.J.: Graduate School of Library Service, Rutgers—The State University, 1965), p. 95-96.

[26] See Jurgen Harbst, *The German Historical School in American Scholarship: A Study in the Transfer of Culture* (Ithaca, N.Y.: Cornell Univ. Press, 1965), p. 215-16, 219, 242.

[27] See, particularly, the discussion in Anatol Rapoport, *Fights, Games, and Debates* (Ann Arbor: Univ. of Michigan Press, 1960). Also Charles A. McClelland, "The Scientific Revolution and the Social Sciences," *General Systems*, VI (1961), 9-14; Rapoport, *Strategy and Conscience* (New York: Harper, 1964); Nicolas Rashevsky, *Mathematical Biology of Social Behavior* (Chicago: Univ. of Chicago Press, 1951); Rashevsky, *Mathematical Theory of Human Relations: An Approach to a Mathematical Biology of Social Phenomena* (Bloomington, Ind.: Principia Press, 1947); Lewis F. Richardson, *Arms and Insecurity: A Mathematical Study of the Causes and Origins of War* (Pittsburgh: Boxwood Press, 1960); Richardson, *Statistics of Deadly Quarrels* (Pittsburgh: Boxwood Press, 1960); George K. Zipf, *Human Behavior and the Principle of Least Effort: An Introduction to Human Ecology* (Cambridge, Mass.: Addison-Wesley, 1949); and Zipf, *National Unity and Disunity: The Nation as a Bio-Social Organism* (Bloomington, Ind.: Principia Press, 1941).

[28] Boulding, *op. cit.*, p. 55. See also, in this connection, Phenix's discussion of the method of theoretical science in his *op. cit.*, p. 101-102. An example of the relevance of mathematics to the social sciences is the application of Monte Carlo method to the study of queues or waiting lines in libraries or any other kind of service institution. This method, which is based on the notion of probability, has also been found useful vis-a-vis social phenomena on which it is impossible to experiment at first hand. See Abe Shuchman, "Queue Tips for Managers" in Shuchman (ed.), *Scientific Decision-Making in Business: Readings in Operations Research for Nonmathematicians* (New York: Holt, Rinehart and Winston, 1963), p. 291-92, 296-97, 300.

[29] Despite the acrimonious debate in social science between the theoreticians and philosophers and their more empirically oriented colleagues, see John C. Charlesworth (ed.), *Mathematics and the Social Sciences* (Philadelphia: American Academy of Political and Social Science, 1963); Evron M. Kirkpatrick, "The Impact of the Behavioral Approach on Theoretical Political Science" in Austin Ranney (ed.), *Essays in the Behavioral Study of Politics* (Urbana: Univ. of Illinois Press, 1962), p. 1-30, and Leo Strauss, "An Epilogue," in Herbert J. Storing (ed.), *Essays on the Scientific Study of Politics* (New York: Holt, Rinehart and Winston, 1962), p. 305-27, modern physical science itself is becoming increasingly agnostic about the validity of its own methods and more sensitive to its own unexamined and implicit assumptions, many of which rise out of the master matrices provided by philosophy and religion. As a result, scholars like Boulding cite the importance of introspection in the social sciences as a foil to the scientific social scientist's tendency to rely almost

exclusively on "external" observations. See his *op. cit.*, p. 58-60. It is interesting, finally, that Robert H. Knapp has empirically demonstrated that where the social sciences have strength in an American university so also, more often than not, do the humanities. The situation seems to be one of mutual support. See his *op. cit.*, p. 6-17.

[30] Lazarsfeld, "Philosophy of Science and Empirical Social Research" in Ernest Nagel, Patrick Suppes, and Alfred Tarski (eds.), *Logic, Methodology, and Philosophy of Science* (Stanford, Calif.: Stanford Univ. Press, 1962), p. 463.

[31] See Parsons, "Recent Trends in Structural-Functional Theory" in Earl W. Count and Gordon T. Bowles (eds.), *Fact and Theory in Social Science* (Syracuse, N.Y.: Syracuse University Press, 1964), p. 153.

[32] On this epistemological dichotomy, the comments of the late C. Wright Mills are enlightening, if somewhat macroscopically biased. See his "Two Styles of Social Science Research" in Irving Louis Horowitz (ed.), *Power, Politics, and People: The Collected Essays of C. Wright Mills* (New York: Oxford University Press, 1963), p. 554-66.

[33] Handy, *Methodology of the Behavioral Sciences: Problems and Controversies* (Springfield, Ill.: Charles C Thomas, 1964), especially p. 4-6, 20, and Chapter 2, "The Theoreticians and the Laboratorians," p. 22-51. See also, in this regard, the following provocative studies, especially the last, in which the author argues the controversial thesis that the concepts of the social sciences actually penetrate concrete social life itself thereby making predictions of social behavior at times self-fulfilling or self-defeating: Chapter 1, "Induction and Deduction in Science and Technology" (p. 1-31), Chapter 4, "Scholars, Scientists, and Philosophers" (p. 66-90), and Chapter 5, "In Conclusion" (p. 91-5) in James Bryant Conant, *Two Modes of Thought: My Encounters with Science and Education* (New York: Trident Press, 1964); F. S. C. Northrop, *The Logic of the Sciences and the Humanities* (New York: Macmillan, 1947); Abraham Kaplan, *The Conduct of Inquiry: Methodology for Behavioral Science* (San Francisco: Chandler, 1964); and Peter Winch, "Philosophical Bearings" in Maurice Natanson (ed.), *Philosophy of the Social Sciences: A Reader* (New York: Random House, 1963), p. 101-18, as excerpted from Winch, *The Idea of a Social Science And Its Relation to Philosophy* (London: Routledge and Paul, 1958).

[34] It is at this point that the writer must disagree with Foskett, whose writings he otherwise greatly admires. Foskett quotes, with apparent favor, the following passage from Donald G. MacRae's *Ideology and Society* (Glencoe Free Press, 1962): "Most of the great sociologists can be thought of as trying to produce theories of Newtonian ambition about society . . . what, in all probability, sociology most needs at the moment is not either a Newton or a Darwin, but a Linnaeus to elaborate a really workable classification of social structures and the range and variety of institutional patterns and sequences." Quoted in Foskett's "Information Problems in the Social Sciences: With Special Reference to Mechanization" (London: Institute of Education, University of London, 1965). The reference is to page 3 in the processed version. It is my judgment that in order to do what MacRae would have his Linnaeus do, Linnaeus would also have to have Newtonian or Darwinian capacities. More reflective of the writer's point of view is Karl W. Deutsch's excellent discussion of the role of abstract theoretical structures in the organization and retrieval of knowledge in "On Theories, Taxonomies, and Models as Communication Codes for Organizing Information," *Behavioral Science*, XI (January 1966), 1-17.

[35] "Bibliographical Services in the Social Sciences," *Library Quarterly*, XX (April 1950), 81-83.

[36] *Ibid.*, p. 83-84, 87, 99. Implicit in this dichotomy, if it is valid, is the suggestion that bibliographic tools should be designed in terms of the audiences or user groups which are likely to employ them. There are certain parallels, it seems to me, between the positions of the librarian and the scholar and what Yeosha Bar-Hillel calls "reference-providing" and "data-providing" and Barbara Kyle, "dowsing" and "browsing." See Foskett, *Classification and Indexing in the Social Sciences*, p. 99-100. It is noteworthy that the editorial boards of the new bibliographic publications put out by the *American Behavioral Scientist* consist of both scholars and librarians.

[37] See Ferguson, *Specialized Social Science Information Services in the United States* (New York: Bureau of Applied Social Research, Columbia University, 1965). At least one of Ferguson's respondents suggested the need for a "concept archive," a demand with which the writer is strongly sympathetic. Several years earlier, Lazarsfeld undertook a somewhat parallel survey at the Bureau on the nation's social relations laboratories, bureaus of applied social research, and other research centers. This survey is reported in his "The Sociology of Empirical Social Research," *American Sociological Review* (December 27, 1962), 757-67.

[38] John S. Appel and Ted Gurr, "Bibliographic Needs of the Social and Behavioral Scientists: Report of a Pilot Survey," *American Behavioral Scientist*, VIII (June 1964), 51-54.

[39] See Knapp, "The Meaning of the Monteith College Library Program for Library Education," Address to the Association of American Library Schools, Washington, D.C., January 23, 1965, the reference in the processed version being to pages 10-11; and her "Involving the Library in an Integrated Learning Environment" in E. D. Duryea, Jr., and Dan Bergen (eds.), *The Library and the College Climate of Learning* (Syracuse, N.Y.: Program in Higher Education, School of Education and School of Library Science, Syracuse Univ., in press). The reference to the processed version of this essay is pages 25-26.

[40] Foskett, *op. cit.* p. 33, 120-26. As the writer understands it, the Kyle Classification (KC) follows a notion of "emergence" and is theoretically based, in some respects, on the kind of systems hierarchy suggested in Boulding's "General Systems Theory—The Skeleton of a Science," *General Systems*, 1 (1956), 11-17.

[41] See Bergen, *loc. cit.*

[42] See, especially, Julian Hochfeld, "Introduction and Special Features of a Study of Research Trends in the Social Sciences and Humanities," *International Social Science Journal*, XVI (1964), 479-95.

[43] "Bibliographical Services in the Social Sciences," p. 90-91.