COMMUNICATION SYSTEM HABITABILITY: THE NEED FOR BEHAVIOURAL RESEARCH (L'HABITABILITÉ DES SYSTÈMES DE COMMUNICATION: LE BESOIN D'UNE RECHERCHE DU COMPORTEMENT)

Alfred Pietrzyk
Center for Applied Linguistics
Arlington, Virginia 22209

ABSTRACT

Modern systems for the communication of information may satisfy or frustrate their users depending on the habitability of given system environments. Communication system habitability, which entails many facets of individual and social user behaviour, is not being explored in a coherent framework. Studies of user behaviour in such environments as telecommunications call for nontrivial behavioural criteria. This paper is focused on Canadian needs for pragmatic research strategies and project inventories--first steps toward a refinement of behavioural criteria. (Les systèmes modernes pour les communications d'information peuvent satisfaire ou frustrer leurs usagers selon l'habitabilité de l'environnement du système donné. Cette habitabilité qui comprend plusieurs aspects du comportement individuel et social de l'usager n'est pas étudiée dans un cadre d'activité homogène. Les études du comportement de l'usage dans de telles conditions comme dans la télécommunication, exige des critères surs du comportement. Ce document pointe les besoins canadiens pour une stratégie d'application pratique de recherche et de relevé de projets--les premiers pas vers un raffinement des critères du comportement.)

In 1960, Mooers argued that customer use of an information system tends to be inversely proportionate to the amount of "pain" which access to information entails. We can utilize such essentially behavioural arguments to shed light on certain research priorities. In the following sketch, I shall attempt to highlight the need for behavioural research focused on uses of information systems in Canada. I shall include some comments on workable preliminaries.

CONTEXT

Information systems are considered to be systems for the communication of information. The term "communication" is, in this context, used in the classical sense entailing a flow of messages from informa-

tion producers to information consumers through appropriate channels.

My remarks are confined to scientific and technical information. This is not meant to imply that Canadian users of such information consist entirely of professional researchers and practitioners. Information scientists are becoming increasingly sensitive to the needs of non-professional audiences--a trend which is especially evident in recent publications by Heaps and Ingram (1971, 1972), Ironside (1971), and several others.

We can, by now, take it for granted that individual and social user behaviour--the human aspect--is crucial to the intelligent design and long-range maintenance of a modern communication system. In the Telecommission (1971) Report, the "social and environmental" aspects of new communication technologies are included among special priorities which call for "domestic innovative capacity." In terms of human consequences, the scenarios range from an Orwellian disregard for privacy to a utopian abundance of choices. Most of us look forward to communication innovations whose human impact is in some sense likely to be beneficial. However, we find it difficult to agree on specific kinds of desirable benefits.

In my view, progress in this complex area depends on the extent to which our collective wisdom can be based on behavioural research within a coherent framework. I shall therefore address myself briefly to the need for conceptual integration and, thereafter, consider the environmental viewpoint and the concept of habitability as possible catalysts toward conceptual unification.

NEED FOR CONCEPTUAL INTEGRATION

Behavioural research in scientific and technical communication is fragmented: it tends to cluster around a number of different conceptual models entailing different theoretical and methodological viewpoints. This conceptual fragmentation is clearly exemplified in the Annual Review of Information Science and Technology (Cuadra 1966-) which has dealt with behavioural matters in its regularly recurring chapter on "Information Needs and Uses" and to some extent also under such occasionally featured headings as "Man-Computer Communication," "Automated Language Processing," and "Design and Evaluation of Information Systems."

The conceptual organization of the "Needs and Uses" chapter has to a significant degree followed the outline introduced by Paisley (1968). The scientist is considered within nine communication-behaviour settings: his own head, his work team, a formal organization, an invisible college, his reference group, a membership group, a formal information system, a political system, and his culture. This kind of paradigm is, of course, not meant to account for the deeper complexities of scientific

and technical communication behaviour. It is merely a taxonomic summary which tells us nothing about the dynamic interplay among the various behavioural aspects.

The variables involved in scientific and technical communication behaviour are complex, numerous, and for the most part ill-defined. If the concepts and criteria of a narrow behavioural framework are applied to system design, we may have to face the consequences of suboptimization: certain user requirements within, for example, Paisley's (ibid.) nine behavioural settings may not be satisfied. The need for a comprehensive and coherent behavioural framework is obvious from, among other things, the CAN/SDI user study findings of Wolters and Brown (1971) and Mauerhoff (1971).

THE ENVIRONMENTAL VIEWPOINT

It may not be reasonable to expect early proposals for a specific unified framework. We can, nevertheless, speculate about the broader orientations. Among the more suitable options, the environmental viewpoint appears to be especially promising. I am not suggesting this merely because it is fashionable to think in these terms. I hope to show that the environmental emphasis may point to a working concept of considerable cohesion and operational scope.

Concerns referred to as environmental are discussed in many contexts in the Telecommission (1971) Report. Environmental interests are being pursued deliberately in some government programmes dealing with communication. These are significant trends which, however, seem to lack an explicit emphasis on one crucial aspect: the systematic nature of communication environments. This is understandable in light of the fact that an ecology of communication accounting for the systematicity of communication environments does not yet exist in any meaningful sense.

A theoretically sophisticated ecology of communication might some day be added to the burgeoning pursuits of human ecology and man-environment studies. In such a context, the behavioural value systems to be explored in an ecology of communication might eventually be related to the quality of life in general--something that would have a liberating effect on our current parochially oriented "needs and uses" research. From a theoretical standpoint, the explanatory potentials of an ecology of communication may ultimately depend on concepts that are in some way analogous to those used in general ecology; the communication system may come to be viewed in terms of a dynamic ecosystem (Whittaker 1971).

Habitability

In order to account for the impact of the environment on organisms, ecologists use the holocoenotic principle. Holocoenosis pertains to those environmental factors which act as a complex whole rather than

separately and independently (Platt 1971). Using this principle as a general guide, we can outline a working concept--habitability--for the integrated study of scientific and technical communication behaviour.

In my suggestive definition, the habitability of a given communication system is equivalent to the aggregate or profile of all evaluations which characterize the environmental impact of this system on user behaviour. Thus, among candidates for inclusion in the composite assessment referred to as habitability are all qualitative and quantitative evaluations in terms of user satisfaction, frustration, cognitive responses, convenience, privacy, access, overload, research duplication, productivity, savings, etc. The evaluations would include user perceptions of environmental attributes and system performance in terms of quality, relevance, recall, precision, speed, novelty, coverage, selectivity, language, time, pricing and many other still poorly understood variables (cf. King 1968). It is, moreover, assumed that such evaluations are, in important ways, relatable to one another and to habitability as a whole. This would reduce the implications for suboptimization mentioned earlier. The term "habitability" is not unprecedented in the information science literature; its previous definition and use by Watt (1968) were, however, confined to the special case of man-machine interface languages.

My conception of habitability has tangible practical implications for the analysis of user behaviour. The initial tool for habitability assessment would be relatively simple as far as its general parameters are concerned: it would take the form of a two-dimensional environmental impact matrix of the kind employed in regional and industrial development surveys (e.g. Truswell 1972). One of the two basic parameters would consist of factors in a particular communication environment. The taxonomy of these factors may range from macroanalytic categories, such as the generic settings of Paisley (1968) referred to earlier, to the microanalytic performance details of given system functions and components such as the search protocols, keyboard features, and display capabilities of telecommunications terminals. The second parameter would specify the users' behavioural variables--satisfaction, frustration, etc.--within appropriate sets. The grid spaces of a habitability matrix would contain qualitative and quantitative evaluations of the impact of given environmental factors on given behavioural variables. The resulting habitability profile could be further analyzed for distinctive features in its overall gestalt. Because of the simplicity at their general level, habitability matrices would be conceptually open-ended and hospitable to diverse research trends. They would provide for variable foci and degrees of conceptual detail. Eventually, computer processing may be needed in order to deal with the large number and complexity of items in certain matrices.

Communication system habitability is a relative concept comparable

to that proposed for the habitability of dwellings (Fraser 1969). This means that the habitability of given communication innovations in Canada may vary in significant ways depending on whether the user is, for example, a professional, paraprofessional, or layman, francophone, anglophone, bilingual, or multilingual, and an urban, suburban, rural, or northern resident. For certain users, sophisticated technologies such as satellites or, in the future, glass fibre optics, may or may not have a noticeable effect on the habitability of a telecommunications network. The network may be habitable to the extent that these users also have hard-copy access in a conventional library--unless libraries are replaced by habitable modern alternatives.

Clearly, such considerations call for refinements of the evaluation criteria and measures proposed within various behavioural research paradigms. We need more effective techniques for determining the precise nature and amount of, for example, a given user's satisfaction with given aspects of the system environment. Scientific and technical communication is in the final analysis a cognitive process; the evaluation of habitability in cognitive terms may have to include new, nontrivial criteria from psychology, sociology, anthropology, linguistics, and related areas. The concept of habitability would serve as a heuristic device for these refinements. Other applications of this concept would, of course, include (1) behavioural assessment of existing communication systems to improve their habitability, and (2) behavioural assessment of proposed innovation alternatives to determine their habitability tradeoffs, module options, and the like.

Strategies

Provided we can agree that the environmental viewpoint and, in particular, habitability merit further exploration, we shall need workable research strategies. Heaps and Ingram (1972) have recommended an orientation toward specific national goals as the key strategy for Canadian information science. A goal-oriented strategy is not inconsistent with the integrative behavioural research envisaged here. In fact, the proposed conceptual integration and refinement could not be accomplished without massive empirical feedback from real-world situations including problems of national importance. Among major impediments to information transfer in Canada, the problem of "local habitation" (note the environmental flavour), which involves communication behaviour at "local" levels, is thought to be especially serious in terms of such responses as "personal frustrations" (Heaps and Ingram ibid.).

It is clear that cooperation based on enlightened self-interest will be needed to cope with the ramifications of the suggested behavioural research. Voluntary cooperation among relevant industries, government programmes, and academic institutions is vital to this endeavour.

HABITABILITY

We shall need a coordinated set of activities. Specific tasks might include data base activities, long-range planning, case studies, conceptual integration and criteria refinement, testing, and applications to meet particular needs.

FEASIBLE PRELIMINARIES

The first of the tasks just mentioned--creation and analysis of a data base--is, in principle, feasible in the near future. I am exploring specific options with Tom Atkinson of York University's Institute for Behavioural Research. We are assuming that a data base covering documents and projects with in-depth specialization in scientific and technical communication behaviour would have considerable utility for the information science community, regardless of its ultimate use in the proposed integrative research. A behavioural data base ranging over the expanded topical scope envisaged by us is not available anywhere. The need for such specialized data collections is underlined in the Science Council (1969) document known as the "Katz Report." Because of the specialized focus, our data base effort would be relatively modest in terms of its input volume. It would, however, entail computer-based processing and cooperative input exchanges with related information-gathering efforts.

The data base would emphasize behavioural research priorities in Canada, including the man-machine interface problem. It would contain (1) titles, abstracts, and indexes of the relevant literature, and (2) inventories of relevant research in progress. Taxonomic and state-of-the-art analyses of the data base contents would be attempted as a prerequisite to the suggested research.

REFERENCES

CUADRA, C.A., ed., 1966-, Annual Review of Information Science and Technology: Chicago, Encyclopaedia Britannica/William Benton; Washington, D.C., American Society for Information Science.

FRASER, T.M., 1969, "Relative Habitability of Dwellings--a Conceptual View," Ekistiks, v. 27, no. 158, p. 15-18.

HEAPS, D.M. and INGRAM, W.D., 1971, "Computer Recognition and Graphical Reproduction of Patterns in Scientific and Technical Style," Proceedings of the American Society for Information Science, v. 8, p. 257-261.

_____, 1972, "Information Transfer in Canada," in: Piternick, A.B., ed., American Society for Information Science/Western Canada Chapter: Proceedings, Fourth Annual Meeting: Vancouver, University of British Columbia, p. 171-181.

HABITABILITY

IRONSIDE, D.J., 1971, "Some Thoughts on Uses of Data Banks," Canadian Library Journal, v. 28, no. 1, p. 2-7.

KING, D.W., 1968, "Design and Evaluation of Information Systems," in: Cuadra, C.A., ed., Annual Review of Information Science and Technology: Chicago, Encyclopaedia Britannica/William Benton, v. 3, p. 61-103.

MAUERHOFF, G.R., 1971, "Some Aspects of Canada's Highly Qualified Manpower Resources with Special Reference to the CAN/SDI Project," American Society for Information Science/Western Canada Chapter: Proceedings of the Annual Meeting: Calgary, University of Calgary, p. 11-23.

MOOERS, C.N., 1960, "Mooers' Law: or, Why Some Retrieval Systems Are Used and Others Are Not," American Documentation, v. 11, no. 3, ii.

PAISLEY, W.J., 1968, "Information Needs and Uses," in: Cuadra, C.A., ed., Annual Review of Information Science and Technology: Chicago, Encyclopaedia Britannica/William Benton, v. 3, p. 1-30.

PLATT, R.B., 1971, "Environment," McGraw-Hill Encyclopedia of Science and Technology: New York, McGraw-Hill, v. 5, p. 12-15.

Science Council of Canada, 1969, Report No. 6: A Policy for Scientific and Technical Information Dissemination: Ottawa, Queen's Printer.

Telecommission, 1971, Instant World: A Report on Telecommunications in Canada: Ottawa, Information Canada.

TRUSWELL, J.S., 1972, "The Development of a Northern Environment Information System," in: Piternick, A.B., ed., American Society for Information Science/Western Canada Chapter: Proceedings, Fourth Annual Meeting: Vancouver, University of British Columbia, p. 7-18.

WATT, W.C., 1968, "Habitability," American Documentation, v. 19, no. 3, p. 338-351.

WHITTAKER, R.H., 1971, "Ecosystem," McGraw-Hill Encyclopedia of Science and Technology: New York, McGraw-Hill, v.4, p. 449-453.

WOLTERS, P.H. and BROWN, J.E., 1971, "CAN/SDI System: User Reaction to a Computerized Information Retrieval System for Canadian Scientists and Technologists," Canadian Library Journal, v. 28, no. 1, p. 20-23.