Media Impact

Vol.1 Interim Report

A Research Study On Science Communication

by
Orest Dubas
and
Lisa Martel

October, 1973

Ministry of State Science and Technology
Ministère d'État Sciences et Technologie

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Chapter One

Science, the Public and the Mass Media

The press of the sixties and the seventies contained many reports about the thalidomide children born with deformed arms and legs. As a result of modern biomedical engineering techniques, many of these children are leading comparatively normal and useful lives.

More recently, Canadians were informed about the launching of the world's first domestic communication satellites into space orbit. These Canadian .satellites, Anik I and Anik II, will provide an effective means of telephone, television and other communication links in previously inaccessible areas of Canada's north.

You may also have read of or heard about Canadian scientists helping in the fight against pollution by developing plastics which disintegrate when exposed to light. Or of a Vancouver group producing high-yield potatoes free of viruses. Or of an Ottawa company manufacturing a crash position indicator for airplanes to save lives and millions of dollars.

These achievements and hundreds of others have been made possible through research in science and technology. From the food we eat, to the clothes we wear, to health care and our jobs, to transportation and communications — and the list goes on — science and technology are integral features of our daily life.

It is impossible to remain outside the influence of these two forces. Science and technology continually alter the quality of our lives, be it through changes in our physical environment or in the social structures which govern the nation and planet.

Whether it be concrete achievements such as those above, or the plugging-in of a government energy policy, the launching of an oceans policy, or a plan to fund university research, most Canadians are alerted to these developments through the mass media of radio, television, newspapers or magazines. Yet here a crucial question arises: Are Canadians being provided with adequate and accurate information on science and technology to better understand the world and the choices they face? This question is at the heart of this study, project *Media Impact*.

Chapter Two

Genesis of Project *Media Impact*

Media Impact, as the name suggests, is a research program designed to answer many questions about the flow of science news to the Canadian public via the mass media, and to evaluate the **impact** that this news has on Canadians. The program was conceived in the fall of 1972 as a result of ideas put forward by its coordinator, Mr. Orest Dubas, to the Director of Information Services of the Ministry of State for Science and Technology, Mr. Ken Kelly.[1]

As early as 1971, the need for such an investigation into the presentation of science by the mass media became apparent within the framework of research being undertaken in other countries in the fields of journalism, communication, education and the social sciences.[2] Canadians, it seemed, lagged decades behind other countries in fostering studies into scientific communication. Moreover, while many foreign countries had begun such studies or were developing and expanding them, no university, industry, or government agency in Canada had yet recognized the need for such research.

The importance of promoting the popularization of Canadian scientific achievements in science and technology was underscored by MOSST's first science writing program during the summer of 1972. Mr. Dubas and Miss Lisa Martel were among the 15 university and collegiate students from across Canada who were assembled in Ottawa for this program and assigned the task of writing, in laymen's terms, about some of Canada's contributions to science and technology. Here too, the need for a more extensive knowledge of media coverage of scientific and technological activities was evident.

In the fall of 1972, personal meetings and discussions were conducted with officials from several government agencies,[3] journalism departments, and the mass media. With their advice and the recommendations number of U.S. experts in science communication,[4] a tentative budget and timetable were drawn up for *Media Impact*.

By mid-November of 1972 a pretest of a questionnaire to science communicators in the mass media was taken at a seminar of

the Canadian Science Writers' Association in Halifax.

In early 1973, the feasibility of conducting *Media Impact* under the mandate of MOSST was being investigated and by May, 1973, the project was officially accepted as an independent study contracted for Information Services by MOSST.

The objectives and methodology of ***Media Impact*** will be described in chapter VIII of this report. For now, however, it is appropriate to summarize the present status of research related to the project and future needs in this area.

Notes and References

1. We are especially indebted to Mr. Kelly and the staff of Information Services for their continued guidance and help throughout the project.
2. An extensive literature search on science writing in various countries was carried out by Mr. Dubas, with the assistance of Professor Mack Laing of the Journalism Department, during the former's journalism studies at the University of Western Ontario. The results of this search will be described in later sections of this report.
3. In particular we wish to thank: Mrs. Nicola Barry, Chief of Research & Evaluation, Regional Operations, Information Canada and formerly Research Director for the Special Senate Committee on Mass Media; Mr. L.E. Rowebottom, Assistant Chief Statistician of Canada, Statistics Canada; and Mrs. Pauline Dodds, Special Assistant for Programs and Management Evaluation, Statistics Canada, for their assistance in the project.
4. Personal consultations were held in New York City during February, 1973, with the following: Professor Hillier Krieghbaum, Chairman of the Journalism Department, New York University, and author of several books on science journalism; Professor Kenneth Goldstein, Director of Information Services, School of Engineering and Applied Science, and lecturer in Graduate School of Journalism Department, Columbia University; Professor David Rubin, Journalism Department, New York University, and author of "Mass Media and the Environment"; Mrs. Audrey Armstrong, Director of Press Relations, Public Information Division, American Institute of Physics, and briefing coordinator of "New Horizons in Science" programme of AIP; Professor John Kochevar, Journalism Department, New York University, consultant in U.S. survey research techniques.
   Also, discussions as to the feasibility of the study were held with Phillip J. Tichenor, Professor of Journalism and Mass Communication, University of Minnesota; G.R. Funkhouser, Assistant Professor of Communication Research, Pennsylvania State University; James Butler, Director of Communication Programs on the Public Understanding of Science, American Association for the Advancement of Science (AAAS); and several others, to whom we extend our thanks.

Chapter Three

Science Popularization: Past Research

As one examines the literature on the dissemination of information between the scientific community and the general public, one finds Canada's contribution to this area virtually nonexistent. Few major Canadian studies have dealt with the subject of scientific communication or of specialized mass media reporting.

For instance, Canadian research on science news within the mass media was given only a cursory glance by the Special Senate Committee on Mass Media headed by Senator Keith Davey[1a]. This study provided an extensive overview of the printing and broadcasting industries in Canada. In light of these broad objectives, the Committee could hardly have been expected to investigate so specialized an area as the handling of science news by the mass media.

The 1969 study for the Davey Committee by Professor Joseph Scanlon,[1b] however, provided some statistics on the type of news and the breakdown of news coverage contained in 30 Canadian daily newspapers. Science news, both stated and implied, was tabulated under several categories.

The table from this study (Table I, reproduced on the following page) shows the areas of news interest used by Professor Scanlon and his research staff.

As can be noted, Science and Space (2.6 per cent), Medicine and Health (3.0 per cent) and Agriculture (1.5 per cent) fall well down the list of items given coverage by the Canadian daily press, although, undoubtedly, various aspects of science and technology also enter, in varying degrees, into politics and government, business and finance, and other sections of the newspaper.

However, even the total of these areas is barely comparable to the 15.8 per cent found for Human Interest items, the 15.0 for Sports, or even the 5.7 for Crime and Vice and 3.2 for Accidents, Fires and Disasters.

Another table from the Scanlon study (Table II) lists the percentage of news items supplied by staff, Canadian Press wire services (CP), and foreign services such as Reuters, Associated Press (AP) and

TABLE I: AREAS OF NEWS INTEREST

Percentage of items according to various categories:		
1.	Human Interest[+]	15.8
2.	Sports	15.0
3.	Politics and Government	12.7
4.	Women	8.8
5.	Business and Finance	7.5
6.	Arts	6.0
7.	Crime and Vice	5.7
8.	Foreign Affairs	4.4
9.	Accidents, Fires, Disasters	3.2
10.	Medicine and Health	3.0
11.	Education	2.9
12.	Science and Space	2.6
13.	Labor and Industry	2.5
14.	Religion	1.9
15.	Agriculture	1.5
16.	All others	6.5

[+] Defined, according to the International Press Institute as 'a wide variety of feature material on oddities in nature and human temperament, personalities and celebrities, sex, beauty contests, amusements and so on'. The 'and so on' included such items as comic strips, horoscopes, crossword puzzles and jokes.

Agence France-Presse (AFP). Medicine and Health news, as well as Science and Space news, were found to have among the lowest percentage of staff-written news of all the categories listed.

Due to the complex nature of the news process and of the news material, it is difficult to draw conclusions on Canadian vs. foreign science coverage from the statistics provided.

In effect, the Scanlon study showed that, in 1969, science and medical news ranked far down the list of staff-written news, well behind other items in the daily press.

Yet statistics from the United States and Britain indicate that there indeed exists a sizeable audience in those countries for the science news "marketed" by the mass media.[2-8, 14] Can Canadians be so different?

In the 1958 U.S. study "Public Impact of Science in the Mass Media"[2] it was found that on the overall average one out of three adults (in the U.S.) claimed that he or she read *all* the science news that got into print, indicating high readership and interest in science. Moreover, three of every four could recall one or more science items they had read or seen recently.

Furthermore, of the 1,919 respondents surveyed in this study, two out of every five said they wanted more medical news. More than one of every four expressed a desire for more non-medical science news.

Based on their statistics, the survey committee drew a composite picture of the person who is oriented toward science

TABLE II: PERCENTAGE OF NEWS ITEMS SUPPLIED BY STAFF, (CP) AND OTHER SERVICES

		Staff	(CP)	Reuters AP, AFP	Total
1.	Human Interest	35.3	15.4	11.9	62.2
2.	Sports	47.3	18.2	17.2	82.7
3.	Politics and Government	45.4	24.7	11.7	81.8
4.	Women	67.6	6.4	5.2	79.2
5.	Business and Finance	30.1	38.9	11.1	80.1
6.	Art	46.4	16.9	12.1	75.4
7.	Crime and Vice	45.5	23.0	21.1	89.6
8.	Foreign Affairs	15.7	13.9	45.9	75.5
9.	Accidents, Fires, Disasters	42.6	18.5	25.0	86.1
10.	Medicine and Health	30.1	27.4	17.9	75.4
11.	Education	67.0	23.6	2.6	93.2
12.	Science and Space	12.2	6.4	52.1	70.7
13.	Labor and Industry	46.4	35.9	5.3	87.6
14.	Religion	46.0	7.3	27.4	80.7
15.	Agriculture	48.5	31.3	9.1	88.9

news in the mass media. Some of these characteristics are described below:

> "The science consumer is more likely to be a male if we focus on non-medical science, and is more likely to be a woman if we limit our attention to medical news...
>
> "He is an outstanding media consumer, frequently a member of the overlapping audience of all four mass media. However, the balance of his media attention is on the side of the written media. He prefers to receive science and general news via the written media, though, like most people, television is his chief source of entertainment. He tends to be a magazine reader, for magazines are seen as giving substantial information.
>
> "The science consumer is found in no one age bracket, although he is somewhat more likely to be young or middle aged. This ties in with the fact that formal exposure to science courses in high school and college is greater in the younger age groups. The science consumer is likely to have been sensitized to science in school, no matter at what level beyond grade school he terminated his education.
>
> "The science consumer is, generally, an urban dweller, but he is less likely to be found in the center of metropolitan areas, more likely in the suburban areas and large and middle-sized cities...
>
> "He is generally above average in income and education. Along with this, his interest in science is reflected in a high level of science information.
>
> "He is more attuned to the larger world around him; his vista is more cosmopolitan than local. His interests range from the immediate community to the world scene. His concern with the broad picture is reflected in his reasons for reading science: he wants to keep up with the world and he wants to know how science will shape his destiny — and his chances for survival.
>
> "He retains a lot of what he reads

and hears. Content-wise the recalled science stories have an emphasis on the technological aspects of science. Medical stories center around the major diseases. Information that can be applied in everyday life is largely of the medical type. The science consumer is likely to have seen or heard science from more than one source, as would be expected from his general communications behaviour.

"He is eager for more science news. He expresses his feelings about science news in terms of a desire to see science-in-context. It helps him make sense of his world as well as to function in his personal life. He sees science as beneficial, and assesses its impact on society in terms of improving our way of life..."

With the number of events in the sciences rapidly increasing, it is unlikely that interest in science news has waned, but rather that it has grown considerably.

As a result of continuous work by U.S. researchers, the area of science journalism has developed rapidly in the last few decades. After their 1958 and 1959 national science surveys,[2-4] numerous studies were undertaken by a number of researchers, among them, Schramm,[5] Tichenor,[6] Sherburne,[7] Schramm and Wade,[8] Yu,[9] Wade and Schramm,[10] Rubin and Sachs,[11] Funkhouser and Maccoby [12] and Funkhouser.[13]

Several books have also appeared which covered the scope of popular science and science programming. In Britain, Trenaman's text, "Communication and Comprehension",[14] and Wilson's books, "The Communicators and Society"[15] and 'Broadcasting: Vision and Sound'[16] offer numerous suggestions on science reporting. In the U.S., such books as "When Doctors Meet the Press"[17] and "Science and the Mass Media"[18], both by Krieghbaum, and "Writing Science News for the Mass Media"[19] by Burkett have become classics in the field of science journalism, summarizing much of the available data.

Moreover, one entire volume of the periodical "Journalisme"[20] was devoted to the popularization of science, while successive volumes of "Public Opinion Quarterly"[21] have dealt with a presentation of public reaction to issues on the environment and pollution.

American reports on science programming and science reporting have also recently been compiled.[22,23] To some extent, the British Broadcasting Corporation (BBC) coverage of science has been reviewed by Wilson [16] and by Singer.[24,25]

In addition to the above, scores of articles on science and the public have appeared in such periodicals as "Science", "Journalism Communication", "Journalism Quarterly", "Search", "Editor and Publisher", "The Quill", "New Scientist", and numerous other medical, scientific and industrial journals.

Already in 1961, Science Service, a nonprofit U.S. organization for the popularization of science, conducted a conference through a grant from the National Science Foundation on the "Role of Schools of Journalism in the Professional Training of Science Writers" in Washington, D.C.[26] More than fifty experts in this area participated, among them, deans from journalism schools, representative scientists, editors and science writers.

Australian press coverage of science was explored in a 1967 summer school of professional journalism[27,28] and was a major topic of the 44th Australian and New Zealand Association for the Advancement of Science (ANZAAS) Congress in 1972.[29-31] Moreover, two recent surveys of science communication in Australia[32,33] have brought into focus a number of issues involved, many of which will be discussed in a later volume of this report.

Such investigations have done much to examine various aspects of the flow of news from the scientific community, to improve the quality of its presentation and to communicate its meaning and importance to the public in various countries.

Though studies by Canadian researchers are scarce, nonetheless, the role played by the Canadian mass media in keeping Canadians informed in general has been underscored in the Davey Committee Report.[1a] It was noted that almost all

Canadians use more than one medium every day to acquire information. Eight in ten use all of television, newspapers, and radio; one in five uses magazines. Furthermore, the average Canadian spends thirty to forty minutes daily reading a newspaper; two in three watch the news daily on television, and more than nine in ten watch television news at least once a week.

And the Canadian public's interest in some sciences is, indeed, quite high, as indicated by audience ratings for the CBC science series "The Nature of Things". According to statistics,[34] approximately two million Canadians view the show regularly, placing it among the top ten Canadian shows on television. On many occasions its audience size has approached that of the CBC National News.

Moreover, viewers rated their enjoyment value of "The Nature of Things" and similar science specials at more than 80 per cent — a considerably higher enjoyment index than many Canadian shows normally receive.

In addition, the series "Here Come the Seventies", most programmes of which deal specifically with science and technology, has been running for three years on the CTV television network and matches the largest audience of any current-affairs programs on either Canadian network.

A possible indicator of Canadian awareness of science issues is the Gallup Poll which occasionally covers topics of contemporary news in science and technology — such as the Mackenzie Valley Pipeline, pollution etc. A sample of Gallup Poll findings in 1973 has been included at the end of this chapter. However, these polls are sporadic and by no means cover a broad spectrum of science and technology. Beyond such scattered Gallup polls, there is little information available on the deeper questions at the interface between science and Canadian society.

Current trends in Canadian science reporting and broadcasting are described in more detail in later chapters and in a subsequent volume of this report.

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Gallup Poll

Family doctor fine with most

By the Canadian Institute of Public Opinion

Most Canadians want a family doctor who can treat most illnesses but who calls in a specialist when needed. Another important consideration for a large number is his availability on short notice.

A majority of Canadians in all regions but Quebec would choose a general practitioner. In Quebec, the largest proportion would choose their doctor n the basis of availability.

The study was conducted in early May, with a national random sample of 727 adults, 18 years of age and over, in personal, at-home interviews.

The question:

"Which items on this card do you feel are most important when it comes to choosing a doctor for you and your family?"

Selected Items	National	Atlantic	Quebec	Ontario	West
Can treat most illnesses but calls in a specialist when needed	54%	58%	44%	56%	63%
Available on short notice	41	33	47	47	43
Will make house calls	35	32	36	41	27
Knows patient's personal and family circumstances	31	23	23	34	37
Aware of latest medical developments	30	32	20	37	34
Will treat patient regardless of ability to pay	20	14	22	19	23
Interested in preventive care	19	17	13	23	22
Has own good equipment	7	4	5	12	6

Most ignorant about pipeline

By the Canadian Institute of Public Opinion

Most Canadians (53%) have heard or read nothing about the controversy surrounding the proposed Mackenzie Valley pipeline. Less than half (47%) say they know something about it.

Among those men and women who are aware of it, a bare majority (51%) think it would be a good thing for Canada. Asked why they hold this view, they responded with two main beliefs—that it would help the economy, and unemployment, or that it would be a better system than taking supplies down the B.C. coast, incurring the danger of pollution. Most of those who approve do so on the understanding that Canada build, control and manage the pipeline.

Among those who know of the project, about one in five (21%) predict it would be a bad thing for the nation, mainly because they fear that the U.S. would gain too much control. "We would be providing a gas line for the U.S." summarizes their opinion.

The question:

"Do you happen to have heard or read anything about the proposed Mackenzie Valley natural gas pipeline?"

The table below compares national and regional viewpoints.

	Yes	No
National	47%	53%
Maritimes	46	54
Quebec	24	76
Ontario	57	43
West	57	43

Those who had heard of the proposed pipeline were asked:

"Is it your impression that, if built, this pipeline would be a good thing or a bad thing for Canada?"

	National
A good thing	51%
A bad thing	21
Qualified	5
Undecided	23

Because of the smaller number of respondents in some of the subsegments who had heard of the pipeline, a number of them cannot be reported with sufficient accuracy. However in Ontario, 45% said "good" and 24% "bad." In the West the levels were 57 per cent to 17 per cent. In Quebec approval is about three times as high as opposition. In the Maritimes attitudes are divided about evenly.

Younger Canadians, under thirty, are more likely to see the project as a good one (57%) than those over fifty (51%). Women are more undecided on the matter, and less likely to approve it (43%) than men (51%). Labor thinks it will be good (54%) more than executives and professional people (43%).

Pollution

We're fighting it better, Canadians feel

By the Canadian Institute of Public Opinion

While Canadians regard pollution as the main world problem after wars, famine and over-population, more than a third of the adult population cannot asses Canada's performance in combatting it.

Asked whether this country is doing more than other nations to prevent or control pollution, 37 per cent cannot make an estimate.

Among the others there is about a two to one verdict that we are doing more (44 per cent) rather than less (19 per cent).

The question:

"Pollution is considered by many people as one of the world's great problems. Do you think that Canadians as a whole are doing more, or less, than other nations to prevent or control pollution?"

The table below shows how the nation as a whole reacts, compared to those in homes of the main occupational segments.

	More	Less	Undecided
Canada	44%	19%	37%
Executive; professional	42	21	37
Labor	41	22	37
Sales; clerical	43	13	44
Farm; other	49	18	33

Chapter Four

Popularizing Science: The Need for More Research

Having indicated in the preceding chapter that Canadian research into the area of science communication is indeed exceptionally low, we turn now to the need for more research in this direction. This need has been emphasized repeatedly in several recent reports.

Studies of information transfer in Canada, such as the *Special Study on Scientific and Technical Information* for the Science Council of Canada[1] and the *Task Force Report on Government Information*[2] stressed the need for more research in this particular area. The Task Force noted that: "The mass media are the public's most important source of government news, but the federal government has largely ignored media research."

Moreover, the Task Force concurred with the consensus of social scientists from a number of Canadian universities that "Canada must overcome a time lag of more than twenty years in the continually developing field of survey research."

Also, the 1970 Report of the Senate Special Committee on Science Policy under Chairmanship of Senator Maurice Lamontagne,[3] stressed a need for more research in pursuit of a more comprehensive public policy on science and technology. In a section outlining specific objectives and areas of scientific activities, the report stated that cultural enrichment is one of the broad purposes of society. Yet it noted that:

> "Little thought appears to be given to how science can best enrich public culture. It has been remarked that many scientists receive their degree without really knowing much about science itself, at least about the overall nature of science. Is the average student's science education designed to allow him to 'know science' or to have a 'scientific sense?' Science obviously has an important contribution to make to culture, but the means of diffusing it still seem to be virgin territory."

The Report further noted that:

> "It is often said that a special feature of our age is the knowledge or information explosion. It could

equally be said that we are victims of the ignorance explosion, for as the stock of knowledge increases more rapidly, so does a man's potential ignorance. It is asserted that the stock of knowledge is still rising at an exponential rate, doubling every twelve years.

"It is quite impossible for scientists and engineers or even individual agencies to know with any exactness what research and development activities are being done in their fields or in related areas at home and abroad at a given moment. The problem becomes more acute and crucial the closer one comes to technology and innovation; the information is less easily accessible because of commercial secrecy. And yet when the results of these activities become known they are sometimes free goods which need not be rediscovered. For a country like Canada, the rapid diffusion of new scientific and technological developments is more important than for larger nations because we cannot expect to contribute much more than 2 per cent of the world's total R&D effort. For this reason, we must know as much as we can of what goes on abroad. A well-organized national information service is thus essential, not only to research workers and agencies but also to policy makers and administrators in government, industry and universities."

Surely what the Senate Committee refers to as a national information network embraces science communication to the general Canadian public. As a start, it is necessary to provide a baseline for the public's awareness, understanding, knowledge and interest in the activities of Canadian scientists, technologists and engineers. The committee suggested, as we do, that there was no better way to elicit these facts and opinions than by means of a national consumer survey:

"Scientific surveys and data gathering and analysis can help the process of scientific discovery and the assessment of the true nature and magnitude of practical problems. These surveys often involve the use of well established methodologies, including sampling and computer techniques, they are designed to supply specific information and for these reasons it would appear that they should be supported and assisted by data-gathering agencies, such as Statistics Canada, or by mission-oriented government departments, which are in the best position to appraise their technical merit or their practical utility."

The scientific community in Canada has also stressed the need for better communication with the public. For instance a recent background study for the Science Council of Canada on National Engineering, Scientific and Technological Societies[4] argued that: "Societies must take a more active part in informing the non-scientists about the role, contribution and implications to society of science and technology." The study added that societies must make increased efforts to communicate to the public using the mass media, to cooperate more closely with science writers and to support news vehicles such as *Science Forum* which specialize in science policy and topics of social concern.

It urged societies to initiate programs to stimulate public interest in contemporary issues in science and technology.

Through the formation of a Canadian house (centre) of science, engineering and technology, the report indicated, societies could give a more effective public focus to science. Through national organizations such as SCITEC, they could improve their information-providing and information-catalyzing abilities (in both directions) with government, universities, industry and society.

All the above serves to define the problems involved in science communication, yet, while offering some solutions, does not formulate any coordinated plan of action. One reason for this failure is the absence of Canadian research in this area, the prerequisites of which must necessarily be the following: backgrounding in the sciences, or, at least, an appreciation of scientific research and scientific activities; sociological training, with an emphasis on social

surveying techniques; training in journalism or mass communication. To-date, no Canadian institution has been able to generate sufficient interest in such interdisciplinary studies.

At present only four academic programmes exist which could be described as complete courses in journalism: three in Ontario (Carleton University, Ryerson Polytechnical Institute, and the University of Western Ontario) and one in Quebec (Université Laval). Some thirty other universities and colleges across Canada offer either abbreviated courses in practical journalism or programmes usually described as "communication arts."

In Canada, also, mass communications research at the graduate level has yet to be initiated — let alone to have progressed sufficiently to specialize in science reporting.

Commenting on the situation which existed in journalism in 1971 (and which is still prevalent), the Davey Committee Report on Mass Media drew the following conclusion:

> "This is a useful contribution, but pitifully small in relation to the need. It remains that the limited output of a scattered handful of academic courses cannot match the demand for writers, editors, programmers and performers in the thousand-odd newspapers, periodicals, and broadcasting stations of Canada."[5a]

Yet even within this framework, the teaching of science and technical reporting is virtually non-existent. An occasional half-course or full-course in science writing is offered in any year in the journalism departments at Carleton or at the University of Western Ontario. Despite their faculties having highly-qualified people willing to teach such courses, these courses are rarely able to draw the interest of more than a handful of journalism students. Adding to this the fact that only a small fraction of these students have had science degrees — or are taking science courses in addition to their writing courses — it is no wonder that research into the improvement of science writing through an academic environment in Canada has not developed. A more positive attitude from science, engineering and medical faculties, and greater participation of their students in such courses is required if this trend is to be offset.

Yet the academics of science communication are only half the battle. Just as important are the practical day-to-day issues involved in the reporting of science and technology by the mass-media. Here, at least one Canadian organization, the Canadian Science Writers' Association (CSWA) formed in 1970 has concerned itself with this task.[6] Its objectives include the following:

1. To foster dissemination of accurate scientific information and to encourage its use by all news media;
2. To develop improved means of access to scientific information;
3. To foster the training of science writers and prospective science writers;
4. To develop awards and training programs for science writers.

With slightly more than one hundred members, this organization includes in its membership such diverse groups as broadcasters, newspaper reporters, scientific journal editors, producers, freelance writers and people in information services from government, industry and universities.

Through periodic publications such as the CSWA Newsletter, through the organization of scientist-reporter seminars and annual meetings, they have tried to improve the standard of science reporting and broadcasting in Canada.

The first CSWA annual science writing seminar and workshop which took place in 1971 was well received by the science writers and the scientists who participated.[7]

Since then, a number of science writing seminars have been held throughout Canada, demonstrating a desire on the part of both the scientific community and the science writers to devise more effective methods of improving communications.

An excellent summary of the association's activities and of the problems which scientists may encounter in meeting the press — and possible solutions to these problems — are presented in the CSWA handbook, "A Usually Reliable Source"[8].

Science writers themselves have from time to time brought into focus those areas in which they felt a change was needed. To cite an example, we have selected an excerpt from the address of a prominent Canadian science reporter. Speaking at a 1972 annual scientific society symposium for science writers, he described a number of hurdles which he faced regularly. He emphasized the need for more participation by the general public to promote the popularization of scientific research:

> "Obviously somebody out there wants to read about the million dollar dickerings of professional athletes; 'scientific' readership surveys tell us so. And so editors devote immense space, staff and money to covering professional sports — coverage which federal science minister Alastair Gillespie recently characterized as 'blind spot journalism' when viewed against the paltry science efforts in most newspapers.
>
> "Yet somebody out there will also read about science. Montreal's La Presse devotes at least one full page every Saturday to science and medicine — in addition to daily articles. The articles have good readership. If you — as members of the public — want the quantity as well as the quality of science and medical writing increased in your newspapers, you're going to have to take an active role in campaigning for such increases, rather than passively submit to what gets dumped on your doorstep.
>
> "At the same time you had better also tell the editors what you want less of in the finite newspaper pie of space to make room for more science and medicine: less sports, less business news, less social news, fewer comics or no Ann Landers.
>
> "It is this type of audience feedback information which must be gathered — from the general public as well as from the scientific community — before any improvements in science reporting are to occur."

The science writer continued to comment on the reporter-editor situation:

> "Editors are a second tough hurdle in the path ahead. And by editors I'm not restricting myself to those people who look after the editorial page alone or have overall responsibility for the whole newspaper. I'm talking about the men and women who are responsible for the page-by-page design and content of a newspaper — a whole raft of editors from those on the copy rim right up to the managing editor. These editors are all much more at home with economics or politics than they are with science or medicine. They socialize with local lawyers, businessmen and politicians — not with a biomedical researcher from the city's university."

To one degree or another, many science writers have echoed these sentiments. Yet here is another area in obvious need of research: To what extent do editors affect the quantity and quality of science news presented by the mass media in Canada?

Evidence has been accumulating from empirical studies in the U.S. to indicate that, in the case of science reporting, the "mediating" editors are at odds not only with professional scientists, but also with their reporters and their science-reading audience in setting criteria for judging " what constitutes a newsworthy science story."[9-12] Whether this is in fact the case — in light of the changing and increasingly more sophisticated readership of the seventies — will have to be resolved through further empirical research.

In the practical scheme of things, the invitation of various editors to science writing seminars, as is being done several times a year in a recent U.S. study[13] would certainly be one method of improving science communication with the public.

Another major step forward could be taken if newspaper training programs were expanded to cover various aspects of science

and technology reporting. Several programs, such as those offered by the Toronto Star for journalism students and for its reporters and editors, have been described in the Davey Committee report.[5b]

In this aspect of journalism training, Canadians have lagged well behind the U.S. and other countries.

In the U.S. the National Association of Science Writers (NASW), the American counterpart to the CSWA, was established 36 years earlier, in 1934. By the seventies, its membership included more than 950 professional writers from all media. It was unquestionably through the efforts of the NASW that a great deal of the American interest in the dissemination of science news was fostered. To help the association deal with a number of vital issues, the NASW established the American Council for the Advancement of Science Writing (CASW) more than a decade ago — in 1961. Both of these groups have remained active in raising the quantity and quality of the coverage of news about science, medicine and technology in the mass media. For these purposes, they receive grants from numerous American foundations, universities, corporations, associations, institutions and organizations. They also have a growing system of prizes and awards for science writing.[14] There is as yet no counterpart in Canada to the Council for the Advancement of Science Writing.

In the past few years, moreover, a score of programs have arisen under the auspices of the National Science Foundation[15a] which have supplemented much of past U.S. research, while opening up new avenues to future communications research.

The Public Understanding of Science program, initiated in 1960 as part of the National Science Foundation science education program, had, by 1973, a budget of $800,000 which was expected to increase in 1974.

Robert F. Wilcox, Director of the Public Understanding of Science program, summarized present activities and suggested a broad range of areas which he felt warranted support in future.[15b] These areas of NSF support have been listed below because of their direct bearing on many aspects of project *Media Impact* being undertaken here. They include:

1. Providing researchers who carry out major research projects with funds to add a component of public understanding of science or technology, in order to permit the wider dissemination of the social and economic implications of the projects (for instance, in connection with research into social indicators);
2. Increasing and up-dating studies in the area of public attitudes towards science and knowledge of science and technology;
3. Funding projects which deal with communicating information about science and technology through the various mass media, with prime emphasis on television;
4. Assisting multifaceted programs by scientific societies, scientific centres, laboratories, and institutions which cover public understanding of science and technology.
5. Assisting universities and professional schools with efforts on interdisciplinary work. Some areas listed for funding included Schools of Journalism setting up regional centers of science information, organizing meetings of editors and scientists, and training students in science communication and involving schools of public affairs to educate scientists and engineers in the social implications of their work.
6. Urging the private sectors in programs to disseminate information about science and technology: industry — by making businessmen and industrial executives more aware of activities in science and technology, and the impact of these developments on society; organized labor — to increase their efforts in consumer education about the technological impact on the consumers;
7. In adult education, assisting with the creation of science learning centres which would operate in conjunction with the schools but would not be part of the regular academic programs.

In the area of public understanding of science, the American Association for the

Advancement of Science (AAAS) also recently initiated a concrete plan of action through the assistance of grants from the NSF. As part of their communications program, for example, they invite a selection of five or six students several times each year to participate in short courses on topics of science policy. Although the students do not have to be interested in science per se, they must be seriously motivated to a career as professional communicators. Two such one-week programs have already been held. A third was scheduled for January of 1974.

The students, for the most part, graduates in journalism, are given concentrated exposure to science at the policy-making level through briefing sessions with officials at government agencies, Congressional staff members, Congressmen, science writers, etc... All meetings are off-the-record to help ensure a more open and relaxed atmosphere. After the course, the students are expected to submit a 2,500 word critique of their experiences.

The AAAS anticipates that, as a result of such open discussions, developing reporters and broadcasters can benefit from a better working knowledge of reporting on matters of science policy.

Apart from a few sporadic articles or reports, very few programs or projects such as the above have ever gained widespread support from the Canadian scientific community, industry, government agencies or from our educational institutions. Surely many of them are not only feasible and advisable, but are a prerequisite for the development of a a national consciousness for Canadian science and technology.

As sociologist John Porter of Carleton University pointed out:

> "Of all modern nations, Canada is perhaps the most difficult in which to search for a distinct national character...One can only plead again the total absence of data with which to provide profiles of major or minor value patterns."[16]

In summation, we would reiterate the need to analyze how effectively scientific information is being transmitted and being perceived by Canadians.

The present Prime Minister of Canada, the Right Hon. Pierre Elliott Trudeau advocated that such measures be taken to improve our knowledge of Canadian society when he stated that:

> "...It is vitally important in a democracy for people to have the basic data, to know the information, to have the basis both statistical and logical on which governments make their decisions."[17]

Notes and References

1. "Scientific and Technical Information in Canada" by J.P.I. Tyas(1969) Special Study No. 8 prepared for the Science Council of Canada (Queen's Printer, Ottawa) Part II.
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5a. "The Uncertain Mirror: Report of the Special Senate Committee on Mass Media," The Hon. Senator Keith Davey, Chairman (1970) Volume 1, (Queen's Printer) Training of the Job, 124-129.

5b. "Good, Bad, or Simply Inevitable? Research studies for the Special Senate Committee on Mass Media." The Hon. Senator Keith Davey, Chairman (1971) Volume III (Queen's Printer) 'Journalism as a Profession', 192-193.

6. Prior to its establishment as an independent body, the CSWA existed since 1958 as the Canadian chapter of the (U.S.) National Association of Science Writers.
7. See, for instance, transcripts of the First Annual Meeting of the Canadian Science Writers' Association held at the Bell-Northern Research Laboratories, Ottawa, on January 13-15, 1972. A summary of this meeting has been reported by J. Carruthers ("Science, Journalism, and Understanding" in *Content* (1972) 16) and by Dr. O.M. Solandt ("Scientists and the Press: How to Improve Communications" in *Science Forum* (1972) *5*, no. 2, 20-21).
8. "A Usually Reliable Source: A Handbook for

Scientists, Physicians and Public Relations Officers" by D. Phillipson (1973); Also referred to as Canadian Science Writers' Association Handbook, 33 pp.

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10. "Communication of Science Information" by P. Tannenbaum (1963) *Science, 140,* 57B-583.

11. "Science and the Mass Media" by H. Krieghbaum (1967) (New York University Press, New York) 243 pp.

12. "Mass Communication Systems and Communication Accuracy in Science News Reporting" by P.J. Tichenor, C.N. Olien, A. Harrison and G. Donohue (1970) *Journalism Quarterly, 47,* 673-683.

13. "Science : Science in Society" Seminar series on (public) Science for News Editors; Project Director W. Stephenson (1972 & 1973) Mid-America Science Communication Project No. 45, National Science Foundation (School of Journalism, University of Missouri-Columbia).

14. "Writing Science News for the Mass Media" by D.W. Burkett (1973) (Gulf Publishing Company, Houston, Texas) 214 pp. Listed in the appendix are all major multimedia awards for science writing (nearly two dozen available), broadcast awards (three available) and more than a dozen study or training programs and fellowship awards for scientists and science journalists.

15a. "Public Understanding of Science: The Problem and the Players" by R.E. Stephens (1973) Report of Program Manager for the Office of Public Understanding of Science, National Science Foundation. (A list of 20 projects awarded NSF grants in 1972-73, including brief descriptions, grant amounts and duration of each, is appended to the report).

15b. Improving information exchange between scientists and representatives of the communications media: Conference II" by R.H. Grant, K.D. Fisher and H.A. Schneider (1973) Federation of American Societies for Experimental Biology (FASEB) Proceedings, *32,* No. 4. See address by R.F. Wilcox, 1446-1447.

16. Quoted in "To Know and Be Known: The Report of the Task Force on Government Information" (1969) Volume II (Information Canada) 361.

17. Statement by the Right Hon. Pierre Elliott Trudeau, Aurora Town Meeting, Aurora, Ontario, June 22, 1971.

Chapter Five

The Need for an Informed Public

A century ago it may not have been essential for the general public to be informed about science and its implications. Today the situation has so vastly changed that this view no longer holds true.

The twentieth century could rightfully be referred to as the "science-packed era," where science and technology have become one of the most (if not *the* most) dominant forces in our lives. The fact remains that there are now more scientists at work than ever before and it has been estimated that of all the scientists the world has ever known, 95 per cent are alive and at work today.

And from this scientific exploration being conducted in laboratories the world over, an overwhelming amount of information pours forth at the rate of 1,000 books per day and 2,000,000 research papers per year[1].

Yet not only is most of this information unavailable to the general public, but it is also incomprehensible to many. With the intelligent person having an average conversational vocabulary of 3,000 of the commonest words in the English language, the very well-read man a total vocabulary of 10,000 words at his command, and science having produced more than 50,000 specialized technical words, it is no wonder that the average interested citizen is compelled to seek out popularized and digested versions of material from the scientific community.

The public as a whole needs some knowledge of science as a tool in their lives, and this tool is of little value, to say the least, if offered in a way which they cannot comprehend. The minimum should be an awareness of those aspects of science and technology which are vital to the practical applications and immediate concerns of everyday life. On a more aesthetic level, the rewards of this knowledge will be felt in the enrichment and improvement of the quality of life.

Numerous other reasons have been offered as to why society should keep abreast of advancements made in science and technology. For instance, Funkhouser noted

that there was a general concern by communicators in the U.S. on this issue:

> "...the public is out of touch with the culture in which it lives (of which science is a pervasive and important component) due to its lack of understanding of science and technology. Possibly this disharmony has even reached the point of being a disaffection with not only science but with intellectual pursuits in general. More public understanding of science could help correct this and possibly enable more citizens to appreciate the philosophical and aesthetic qualities of the scientific enterprise and their relation to societal, national, and human goals."[2]

Canada's Minister of State for Science and Technology, the Hon. Jeanne Sauvé, emphasized this point in an interview with a Canadian science writer,[3] when she suggested that there was a growing need to combat fears about science that are evident among the public. Noting, for example, the "frightening" findings and prospects of genetics, she explained that this is often the result of scientific findings coming upon the public before scientists and the public have come to grips with the ethical problems. Consider, she continued, the legal and emotional problems of determining who the father is in the case of an artificially-inseminated child; or who would be the mother of a child reared by a rent-a-womb mother.

Canada's first minister of science and technology, the Hon. Alastair Gillespie, had also expressed this viewpoint when he stated that scientists have a responsibility to communicate effectively to the general public the facts and implications of their research:

> "If you have effectively communicated with the specialist and with your own colleagues, but failed to reach the general public, you have failed as miserably as the doctor in the story of the pharoah...
>
> "As the Pharoah said to the doctor, 'Doctor, give me that pink stuff.'
>
> "The doctor said, 'Pharoah, I think the pink stuff is the wrong stuff.'
>
> "The Pharoah said, 'Give me the pink stuff!!!'
>
> "The doctor did.
>
> "They put the living doctor in the tomb with the dead Pharoah'." [4]

The solution to such dilemmas arising from scientific research lies in the provision of better information to the public, especially information about the social consequences of science.

But the public does not exist on a single stratum of society with Orwellian uniformity of thought. Rather, the ideas, attitudes and opinions which people hold towards science and technology are as varied as the environments in which they surround themselves from day to day.

For instance, as citizens, workers, consumers and individuals, the public is constantly being bombarded by the political, economic and social implications of science and technology.

As citizens, they are called upon to aid in the decision-making process by voting, organizing and exercising influence on government, both locally, provincially and federally. They require a certain awareness of scientific activities to make intelligent judgments about the breakdown of their tax dollars. Hence, considering that the Canadian Federal Government is spending about $1 billion annually on scientific activities — an expenditure of some $45 for every man, woman, and child, or approximately $1 for every $15 collected in taxes — a better informed public would be an asset to politicians who must allocate funds to scientific and technological programs.

Funkhouser brought this point home in his discussion of why the public should understand science at all:

> "It is easily demonstrable that in the political sphere, more and more decisions are being made which involve technical considerations, and thus it would be well if the

> general public were better informed, if for no other reason than that our political system places a high value on 'an informed citizenry.' Also, since a significant fraction (about 6%) of the Federal (U.S.) budget is allotted to research and development of one sort or another (a large part of this money appears under defense and space), the public has a right to know in more detail how its money is being spent. Possibly, a public with a better understanding of science *might* be inclined to allocate more of its taxes to scientific research and development towards nationally approved goals."[2]

As part of the labor force, the public is served by an industry highly science and technology-based — where more and more jobs demand technological skills and understanding. Whether they work in factories or are caught up in the advanced whirl of computers and satellites, people are affected by these two forces. As consumers, it is necessary for them to be geared to the practice of buying and using products involving new technologies, whether those products are food or medicine. As individuals, they must contend with and adapt to the increasing demands of modern society — not just the changes which have occurred, but to those which are taking place and which can be expected to occur in the future.

More elaborate descriptions of the extent to which the public should be informed about science and technology have been developed[5,6,7]. Such models elaborate in detail how the various sectors of the public interact at varying times, in different ways, and to varying degrees, depending upon the scientific issues at hand.

These various publics, denoted in studies as the leadership segment (national, provincial and local decision-makers); the communication segment (members of the mass media, educators, information specialists in government, industry, universities etc.); the interested public (primarily the better educated, higher income segment of the population)[8]; the general public (the majority of adults); and the young public (arbitrarily set as persons under 18 years of age) were categorized and described in detail. The involvement of these publics in various social issues, through such stages as the recognition and solution of a problem, the decision-making stage, the implementation stage and the evaluation stage have also been detailed.

Because research in science and technology has propelled society into a rapid and radical revolution in the last few decades, a great deal of the learning and knowledge of the past has had to be modified. As a result, many ideas taught in educational institutions have become outmoded; still others may not have been conceived a decade ago.

This information explosion has compounded difficulties for adults whose formal education has ceased or been temporarily set aside. Despite the expansion of adult education courses or programs, this sector of the public in particular has little recourse but to turn to the mass media of newspapers, magazines, radio and television to "translate" the scientific into the lay language, and, more importantly, to "interpret" the implications of scientific research.

But the mass media are more than information conveyors to the general public. They may also serve as catalysts to specialists by alerting them of new developments in the sciences.[9,10] With more and more scientists and specialists becoming laymen in terms of their awareness of activities outside their immediate disciplines, many must necessarily rely on the mass media to digest news of these activities for them.

As one of the above studies pointed out[9], more than 60 per cent of medical researchers reported that they picked up and used information about new research developments in their own specialties from newspapers or news magazines.

Of 144 respondents, 92 per cent said that they read such information in newspapers, in general magazines such as "Time" or "Newsweek", or in both. Two per cent said they received this information from radio or television. The remaining six per cent said this information came from such sources as books and certain specialized magazines

such as "Scientific American" or "Science".

In most likelihood, medical science stories in magazines and newspapers serve as a kind of "index" to new developments for the busy medical specialists, channelling them to areas where they might derive more detailed journal reading. Such evidence, if generally applicable, is further indication that scientific communication is to a great extent a symbiotic relationship between science and society. Hence, improved communications can only strengthen the reciprocal bond between scientists and the lay public. In defining the role of the scientific and technological community, Bachynsky recently stressed three key responsibilities and challenges. One of these was the need to communicate to the non-scientist the role and contribution of science and technology:

> "In general the non-scientist is exposed by the communications media far more to the negative aspects of science and technology than to their positive contributions. I believe this is primarily the fault of the scientific community, which very often adopts the snobbish attitude that the layman is not able to understand science. This is in reality a technique to hide the fact that the scientist either does not wish to take the time to communicate with the public or will not admit that he is somewhat inept at the process.
>
> "The need to communicate the role and contribution of science and technology to the non-scientist should be self-evident. The politicians set the policies that determine whether the priorities shall be baby bonuses, wheat subsidies or perhaps a program involving science; and the taxpayer, after all, pays much of the bill for science and technology. If these two groups are not kept well-informed, science and technology will have difficulty developing in Canada."[11]

How informed various sectors of Canadian society are about science and technology, and how much use they make of the material presented depends ultimately upon the effectiveness of the mass media in relating this material to them.

Whether it's by identifying issues of concern to researchers or decision-makers, or by continuous emphasis on the risks, relevance and benefits of science and technology to all Canadians, the mass media serve as the surrogate authority in keeping the interested public informed.

In the following chapter, we will examine more closely the network of reporters and broadcasters who perform these surrogate functions.

Notes and References

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6. "Public Understanding of Science: The Data We Have" by G.R. Funkhouser (1972) Prepared for the Workshop on 'The Goals and Methods of Assessing the Public's Understanding of Science', Palo Alto, California, November 29-30, 1972, 39 pp.
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9. "The Information Value of Medical Science News" by D.L. Shaw and P. Van Nevel (1967) *Journalism Quarterly, 44,* no. 3, 548.
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11. "Science Policy in Canada: Study and debate must now be replaced by action" by M.P. Bachynski (1973), *Science Forum, 6,* no. 1, 19-27.

Chapter Six

Science Reporting in Canada: A Few Facts and Figures

There is little doubt that Senator Keith Davey and the Senate Committee on Mass Media intended to include the broad spectrum encompassing science and technology as one which needed more qualified specialists when they wrote:

> "The continuing attitude of skepticism toward academic training, and the lack of generally available training to broadly accepted standards, are among the chief reasons why journalism is not yet a profession. Yet this is an age of professionalism and of increased specialization. Journalism needs more specialists — labour specialists, health specialists, urban planning specialists, political and economic and social specialists. But they must be specialists who are also communicators, and this, in our view, makes a clinching case for an academic discipline which combines the two requirements."[1]

Margaret Brasch, in a recent study for the Journalism Dept. at Carleton University[2] emphasized the omission of any mention of "science specialists" by the Davey Committee. She stated that:

> "Unfortunately, all too frequently, media analysts seem to disregard science and are unaware of its power in the formation of our societal needs and structures."

From statistics available on the number of specialists employed on the 121 Canadian dailies, we have been able to compile a listing of the reporters who handle science and science related topics.

With Matthews' List as a preliminary guide,[3] we have arbitrarily subdivided the dailies into two groupings: those with circulations of more than 25,000 and those with slightly less than 25,000.

In the former group, the list indicates that there are about 70 to 80 people designated as by-line writers, columnists, department editors or specialized reporters assigned specifically to science or science-related beats. (This figure is somewhat imprecise, since during the preliminary phase of our science writers survey (a two month span) we noted that some 10 to 15 percent of the

daily reporters had either changed position, been transferred, or left the media.) These beats include a broad scope of areas from science, medicine, oil/mining, finance/ business, automotive, aviation, marine, food, transportation, and agriculture, either as individual beats or in varying combinations.

In the category of daily newspapers with circulations under 25,000, there are again about half as many reporters and editors assigned to the above mentioned beats. These smaller papers cover primarily agriculture, with some papers employing staff to cover oil and mining or business and finance. Many small dailies usually have reporters assigned to several beats. Most refer to their staff as department editors, although these editors generally do the reporting and editing of the material themselves.

In addition to staff-written material, however, most Canadian dailies supplement their staff-written news with material from several major news services, all of which employ specific reporters to handle assignments dealing with science and science-related issues.

Canadian Press (CP), the co-operative news agency which serves more than a hundred Canadian dailies, is a significant contributor to information originating from coast to coast. A (CP) reporter is assigned full-time to the science and medicine beat. Furthermore, locally-written stories from any point which are of national interest are usually carried by the (CP) news wires to all its member newspapers. These papers have the option of running these articles or not in their papers on any particular day. Since (CP) includes many French-language dailies among its members, it originates a substantial amount of news copy in that language and conducts a translating service. News copy written in English or French may be translated into the other language, and to some extent, science material is fed to member papers in this way.

Another news service, which supplies material to 13 Canadian dailies belonging to the Southam newspaper group, is the Southam News Service. It employs a full-time science writer to cover the science beat.[4]

In addition, nine Canadian dailies, members of the FP Publications group, receive material from their full-time science reporter.

Finally, many dailies have access to the news reports of one or more foreign news services, such as Associated Press (AP), United Press International (UPI), Reuters, as well as purchasing syndicated material from services such as the New York Times News Service. Some also receive science material from such services as the Enterprise Science News. Undeniably, a major portion of science news from such services originates from the U.S.

Yet even this does not give a complete accounting of the daily newspaper presentation of science. Because of the operations of the mass media and the inherent nature of the news process, the Matthews' List (though updated every four months) cannot keep pace with the frequent staff turnover in the mass media.

From a variety of other sources, among them, the list of the Canadian Science Writers' Association, and from an analysis of various news clipping services (in particular, the clipsheets provided by MOSST and the National Research Council (NRC)), we have found that there are about twice as many reporters as the 70 to 80 listed who are involved in the coverage of science news. These additional reporters only occasionally cover science-related topics when assigned by their editors, while others cover science full-time, yet simply have not been listed as science reporters.

In taking note that there are 150 to 200 reporters who deal with science to some degree it must be stressed that *beyond about two dozen full-time science and technology reporters, the majority of reporters write stories containing only scattered amounts of scientific information.* And by no means do they focus their attention exclusively on the science or technology angle. In view of this, unless research is the dominant feature of the article, the science and technology aspect

may be completely overlooked. Or a science and technology-oriented article may not be written at all, or even investigated, because there may be aspects of that story which, in the reporter's or editor's view, provide a better news angle for the article.

This is not to criticize the reporter since he or she is, in fact, called upon to cover *all* those aspects of his (or her) designated beat which fall into the category of "news interest", and certainly not to give particular preference to the scientific phenomenon. It is mentioned only to question the whole arena of science coverage as it exists in the daily press today.

As for the broadcasting scene, the coverage is sporadic. Apart from the few writers and producers who regularly work with science programs such as "Ideas" or "La Science et Vous" (aired on CBC), "The Nature of Things" or "La Flèche du Temps" (televised on CBC), "Here Come the Seventies" or "Target; The Impossible" (televised on CTV), the networks are relatively unpredictable with regards to their science programming.

A certain number of specials, prominent among them being the recent BBC series "The Ascent of Man", are shown on occasion. Most science specials, however, originate from foreign sources.

In addition, local stations and educational networks provide some high-quality programs which deal with science, albeit beamed to a limited audience.

With regard to broadcast news gathering facilities, newsrooms of local stations or networks have similar access to national and international science news (in printed form or in voice tapes) as that which is available to newspapers.

While we have not included weekly newspapers or magazines in the above description of science reporting in the mass media, their usefulness should not be overlooked. From mass media magazines such as "MacLeans" to industrial magazines such as "Telesis", to specialized or business magazines such as "Medical Post", and to government publications such as "Geos", magazines are especially useful to all segments of the public.

In a subsequent volume of this report, we will gather detailed statistics and provide an overview of the situation in the print and electronic media in Canada.

Notes and References

1. "The Uncertain Mirror", Report of the Special Senate Committee on Mass Media, The Hon. Senator Keith Davey, Chairman (1970) Vol. I, 125.
2. "Science Reporting in Canadian Dailies: A Preliminary Report" by Margaret Brasch (1973) Report presented for Journalism course, Carleton University, 36 pp.
3. Matthews' List, Vol. 17, No. 1, (1973) Index to the Mass Media, published by Syd Matthews & Partners, Limited, Meaford, Ontario.
4. At the time of writing, Southam's science writer was transferred abroad, and it was not certain whether his replacement would cover the science beat on a full-time or on a part-time basis.

Chapter Seven

Media Impact: Initial Response

During May and June of this year, a letter introducing project *Media Impact* was sent to more than a thousand key persons in government (federal and provincial), industry, education and the mass media. This letter described our research programme and asked for suggestions regarding areas of research into science communication and for ways in which we could adapt our questionnaire to their respective needs.

Replies to this letter were, for the most part, congratulatory and encouraging. Many who replied also offered suggestions on various issues and topics on science popularization. We appreciate the interest shown by respondents, and are presenting below a selection of those topics which they found to be of particular relevance to project *Media Impact*.

Firstly, it was apparent that there was a strongly-felt need for more research in this area. This was expressed clearly in letters from scientists, government officials, educators, reporters and editors who indicated that such a project was "long overdue", "most timely and interesting", and a "valuable project that could have far-reaching results"... "I think you're getting into a real can of worms — not that it isn't time that it be opened up," wrote one respondent.

These views were perhaps best expressed by a federal government information services director who shared our need for research into the impact of science information on the public:

> "For too long no attention has been paid to the packaging of outgoing information for target audiences or to its interpretation for broader appeal. As an old graduate of a research department I have always felt some of the most fascinating and exciting stories in Canada are buried in the science and research communities. The problem has always been to package or interpret them for the layman who, we know, would often be fascinated if it was presented to him in his kind of media and in his terms."

Of the replies which commented on the

quality of science reporting, the predominant view was that "we're doing a pretty sad job of reporting science" and that "the coverage of science news in Canada is woefully inadequate." On the other hand there was the occasional statement that some of the reporters who specialize in science and medicine "are doing an extremely good job at it."

Supportive reasons for views on communication "stumbling blocks" were attributed to a variety of areas in the communication network from the scientific community to the public.

A university director of public relations and information services suggested that the fault lay with the scientists' negative attitudes towards promoting communications:

> "After 15 years in this job I'm thoroughly persuaded that if there is an information gap it's the fault of the whole g—— - ————d science establishment, its privileged status, lack of public accountability and ivory-towered complex: it will talk when it is damned well ready to, to whom and no sooner. And the rest of society, who pay the shot, should be grateful to have them on the payroll.
>
> "The real question is: just how do we go about budging them? About persuading them that they simply have to justify the relevance of their grants to the country's variegated purposes?
>
> "To gauge the Communicators by what society knows is to ignore the fundamental question: how do you get the researchers to use the communicators, or at least consent to co-operating with them?"

One editor of a university technical publication also emphasized that the scientific community should share the responsibility of seeing their research accurately interpreted to the public:

> "It is a constant battle eliciting layman's terminology from the scientist and producing a comprehensible story which nevertheless contains all the facts to the satisfaction of the researcher. Equally problematical is the task of persuading researchers that publicity is not only beneficial but also the responsibility of a university to its public."

However, this view was not a universal one. Contrasting viewpoints on where communication failure occurs were offered by many persons, for instance, by an assistant director of a university department of information:

> "A 'what's the use' attitude or worse can be developed when the scientist spends considerable time preparing for television coverage of his research only to find it aired at an hour when only the most avid followers would be up to watch. Especially when he agrees to press coverage of his research and gives time to an interview — only to find that it has been handled by a reporter less than competent in the field of science journalism, or sensationalized for popular press use, or embarrassingly edited to the detriment of the research and the amusement of his colleagues."

And from the president of a Canadian scientific society:

> "I would like to comment ... that the experience of (our Society) with newspaper reporters has not been a very happy one. This unhappiness is not caused by the usual complaints of misquotes and sensationalism but rather that the news media, even when particularly requested and invited at considerable effort by the Society to report the activities of its annual meeting and give publicity to the winner of the Society's award to an outstanding Canadian (scientist), has met with indifference and sometimes complete silence."

A dean of engineering remarked that:

> "No amount of well-written Science releases by the Ministry, or from scientists, or from engineers, or technologists, or anybody else will have an effect on the media as long as they are staffed by people who have absolutely no grounding in science and technology. This

observation ... is based on the fact that (in his city) some of the people who are writing in the papers are ... people who had difficulty following a minimum Arts program. There is hardly one ... newspaper man (in that city) who has any scientific background. Without a Scientific background, it is impossible to write intelligently with even well-written news releases because one has no enduring interest in the field of science and technology."

A past president of a Canadian scientific society noted that, although his experience with the broadcasting of information to the public through the mass media was limited, two things happened consistently to him:

"1. A reporter or news person shows interest in some piece of scientific news which has meaning and impact to the lay population, takes copious notes, listens to my explanation concerning the potential value or importance of the news item; that is the last I hear of it. It never sees the light of day.

"2. The same thing happens, and ultimately a news item comes out which is highly distorted, and usually has some sensational concept tied to it which was not implicit in my original statement, and which has no relevance to the matter at hand.

"On the occasions that I have followed up the non-appearance of news, I have been told that there was other more pressing news to publish, or that the material I had presented was not of sufficient public interest to warrant publication. I do not believe that the judgment of the news media on that matter is always correct, particularly in view of the obvious distortion and attempts at sensationalism which have accompanied those news items that have been published. I can sympathize with the need of the news media to 'ginger up' what may appear to be a rather dull and pedantic statement or idea. I have no objection to this if it is done in the right way; the problem is that it is usually done in quite the wrong way, and the sensationalist notion is usually either irrelevant or simply downright silly.

"On each occasion I have insisted on seeing copy before publication; I have never received any. I have no desire to censor the reporting of news as the media see it; I would, however, like to prevent the publication of nonsense which may be attributed, by association, to me... I do know of instances where reasonable and appropriate presentation of scientific news has been made, but I also know of cases where scientists have deliberately misused the news media for their own ends."

One particularly interesting letter came from a science reporter, who made numerous suggestions for project *Media Impact*. On the topic of Canadian newspaper coverage of science news, he wrote:

"In my view the vital linkages occur at two points — the science consumer — what does he really want and what does he know? Useful foci in this regard might be the usage accorded the science comic columns syndicated from the U.S. and run in Canadian newspapers such as the Citizen in Ottawa. It might also be revealing to discover why La Presse (and a few other dailies) can run a science section weekly and daily while other Canadian dailies don't see such a need.

"Obviously the middle-men (editors, etc) really do the deciding ... It would be instructive to pinpoint their own conceptions of what constitutes 'news' from science. Is it largely the fire-engine syndrome or have some converted to the broader view? The small circulation of Science Forum might indicate something about the accuracy of the traditional perception."

He also proposed that we examine the role of the journalism schools and of cable television in science reporting. Moreover, he felt we should look into the reasons why so many highly qualified science reporters have left the field for other employment. Perhaps there was a common motivation

for them to do so, he noted, but did not elaborate. In *Media Impact* we will investigate many of these aspects.

The suggestion for improving those science features presented for the younger generation was also pursued by a newly-elected president of a scientific society. He noted such features as the "Ask Andy" syndicated column which originates in the United States and appears in many Canadian newspapers, including most of those with large circulations:

> "This column purports to provide scientific information to children by answering their questions. Our committee has identified this column as being a frequent source of misinformation, at least in those subjects in which our members feel they are competent to make an assessment.
>
> "The idea of a column offering scientific information in a manner understandable to children is excellent. However, to offer a suitable alternative to "Ask Andy" is beyond the capability of any one scientific society. Perhaps this is something SCITEC could take on."

One city editor of a major Canadian daily, in presenting his own view and the view of his science writer on science news, suggested that it was important not to limit the results of the report by putting too much emphasis on the word "science" and not enough on specific fields of science. He wrote that:

> "Editors and the public are interested in such subjects as environment, oceanography, medicine, health, archeology, behavior and economics, but they don't usually think of them primarily in the broad sense of science.
>
> "Science might be compared with the term 'business'. If you asked someone if he was interested in business, he might just say no. But if you asked him if he was interested in marketing, advertising, economics, career development, corporate planning, oil exploration, or inventions, he might say yes to several of these aspects of 'business'.
>
> "In fact, it might be interesting to find out precisely what the public and the media think about when they use the word science. How broad or limited is their view of science? The answer might be useful to the media."

A news media association president offered a similar opinion on the type of science news presently being carried by Canadian newspapers:

> "As a rule of thumb, science news would be judged by the same criteria used in assessing any news story, the first being general interest in the subject matter. If the subject matter is beyond the comprehension of the news editor,it is probable that the material is not mass media material."

An editor of a business publication summed up the situation as he saw it:

> "My experience with scientists has been rather negative — they are solely interested in communicating with their peer group, perhaps with engineers, but certainly not with the public.
>
> "At the other end of the chain, namely, the mass media, there is complete ignorance of science and technology. The people preparing (editing) material for the mass media have no understanding at all of the scientific principles involved in industry today. They therefore look only for sensational headlines rather than factual reports.
>
> "In between are the science writers/reporters who have to please the editors; and with some very notable exceptions the science writer/reporter tends to be quite ignorant of scientific facts."

Undoubtedly, most respondents expressed a need for corrective action by all sides — more qualified science writers and editors and a more positive "communicative" attitude on the part of Canada's scientists — to produce more effective communication between the scientific community and Canadian society in general.

One business journal editor, however, was

not convinced that there was a role for very much more "science writing" in the mass media, since "a large percentage of the audience cannot relate to the subjects discussed." He noted that:

> "Science stories seldom help them to relate, perhaps the ultimate application of the research is not even clear to the researchers themselves. 'Technology' may be different in this regard. I do believe, however, that Canadians in technical and scientific circles should be more aware of Canada's work in science and technology, and I think that this is where our existing journals let us down badly."

He continued that he knew of very few institutions in either the public or private sectors which sufficiently appreciate the importance of publicizing their activities or achievements:

> "It is virtually impossible ... for science writers to attempt to cover all possible story sources on a regular basis, so it is particularly important that Canadian institutions themselves do a better job of keeping the media informed. MOSST could serve a valuable educational function in this respect."

As a first step, all scientifically-oriented organizations should be encouraged to have on hand reliable information officers. Their usefulness to the scientific community cannot be underestimated, since through their primary function of providing information, they are the ones who can bridge many communication gaps which exist. As an assistant director of an information services department described their role:

> "The information officer, in many instances, is the middleman in this communication flow. He must develop a close relationship with both the scientist and the communicator — ideally based on mutual respect and trust.
>
> "On the one hand, he tries to be on top of the research activity in his own constituency — helping the scientist assess his research in light of public interest, encouraging and assisting him in the interpretation of his work to the public, advising and supporting him in his contact with the media.
>
> "On the other hand, the information officer must develop a good working relationship with the communicator — initiating media interest, supplying accurate supportive material, providing story leads preassessed for interest potential and often suited to the needs of a particular medium, arranging necessary interviews and advising of any special circumstances that might arise.
>
> "The information officer is also conscious of his need to be conversant with government and organizational reports, decisions and policies that affect the science community, as well as being fully aware of the many avenues available locally, regionally and nationally, for the communication of scientific development."

Yet information officers are often in a quandary with respect to scientific material published by the scientific community in their scientific journals. As one major scientific organization pointed out:

> "Only a very small proportion of scholarly writing ever gets to the stage of being treated by an Information Officer or a professional communicator. Much of the material, for instance, published in scholarly journals, is prepared by scholars for scholars. Yet it is frequently important that this material be made more widely available in a more popular form."

Moreover, the information output from various groups can be improved to some degree, as one managing editor of a major Canadian daily cited:

> "...One of the main complaints I have with releases and other information from professional scientific and technology-oriented organizations, is the language used to express new developments. The cry is always: 'Get someone on the

phone who can put this in layman's language.'

"I feel strongly that if you could overcome this hurdle it would break any logjam that may now prevent such scientific information from getting to the public.

"Certainly the interest in developments in this field is great if we can break it down so the reader can understand it without, at the same time, giving the wrong interpretation.

"I might also add, that a mailed press release on an important development is almost useless, because of the erratic mail service. A telexed message would be preferable."

Another major and initial link in the communication chain between the science reporters and the scientific community performing the actual research and development is the scientific journal. One editor of a number of Canadian research journals described his views on the role in science communication played by these journals:

"Articles in science and professional journals cannot be understood by laymen, including scientists in other disciplines and science journalists. These journals do not appear on magazine stands. They report progress on the frontiers of knowledge and/or highly technical descriptions of scientific and technological processes and developments. They contain potential primary information for the general public, but for the public this must come through a secondary source after it has been interpreted for the layman and put into his language. This would ordinarily be accomplished by a science journalist after conference with the author of the scientific paper or someone in the same discipline.

"No layman, including a scientist in another discipline, is qualified to interpret the primary literature. Primary scientific literature is not directed toward the general public, and the information derived from it for presentation to the public must be skilfully extracted and expressed to make its content and significance generally understandable. The public, therefore, does not receive contemporary science news through science and professional journals. Articles on scientific subjects in magazines from newsstands are secondary sources of information and their quality varies widely, depending upon the knowledge and the sense of responsibility of the writers."

He continued to elaborate on a related matter:

"My other point concerns the honesty, scientific capability, and sense of responsibility of people with scientific or professional qualifications who make pronouncements, via the media, that are not scientifically sound and that are usually sensational. Such people usually refute criticism by reputable scientists or professionals by saying that the latter are dogmatic or that they themselves are 'ahead of their time.' These people have a pernicious influence on the public, which tends to think that all people with a doctor's degree can speak with equal authority.

"It is in this context that science journalists have a great opportunity to serve the public and help to keep on the highest possible level the scientific knowledge made available to it. They know something about science, and it should not be difficult for them to discern the possibility of exaggerated or unfounded claims. They must know or know where to find reputable scientists who can give sound judgments on such claims that should be taken into account and given proper weight when the matter is presented to the public; and it is worth pointing out that not all reputable scientists are old and conservative in outlook."

A further step in the information transfer of science news which was commented upon was the need by the public for better quality science news. A director of public relations wrote:

"My basic feeling about this whole communications scheme is that, at the present time, we have far too much communication of a very superficial variety, whereas the public is supposedly becoming better educated and thereby should be able to handle more sophisticated information. It appears to me that, at least in the Canadian printed media, the quality of reportage is not of a particularly high calibre. People are not being given enough information to satisfy the intellectual curiosity we are told they have; at the same time, they are being given too much information of a superficial and misleading kind."

Referring to excellent coverage of documentaries and scientific work by the CBC, he, nevertheless, had one reservation about current trends in science programming:

"I have a feeling that even here, the tendency now, is to go over the same sort of thing time and time again, so that, by sheer reputation, this material is becoming superficial. It seems almost as though there is a certain level of scientific information beyond which the television media at least, seems to feel that it must not go."

He continued that the printed media such as the newspapers and Canadian magazines apparently have not risen even to this level of television production and suggested that:

"One of the greatest strides forward that could be made in newspaper reporting in Canada, would be to have at least the major newspapers recognize the importance of scientific work to assign a properly trained scientist or scientific writer to the task, and indeed to have a science page as a standard part of each newspaper, as a regular feature two or three days a week. The effect of this would be to give people well-written articles, properly researched, in an intellectual format, which, with today's educational opportunities, they ought to be able to accept.

"If this sort of approach is not taken, it is my feeling that scientific reporting in newspapers will remain at the level of political reporting, and have about as much value.

"One question is whether there is enough science news to warrant continuous coverage by science-writing specialists. My answer to this is that if there were decent coverage in the newspapers, there would be more science news than the newspapers could handle. The reason why there isn't more science news in newspapers, is because of the shabby treatment it usually receives."

Some problems which exist in the reporting of science and technology could perhaps be remedied through changes in the traditional educational training of science reporters and broadcasters. As the head of a Communication Arts department in an applied arts and technology college suggested, what might be needed is the incorporation of science reporting into the curriculum of college and university journalism courses.

While the occasional course in science reporting is offered in the journalism departments of Carleton University and the University of Western Ontario, the question arises: Are the demands being adequately met for qualified writers and broadcasters in specialized areas of science communication — whether these writers are employed by industry, government, education or by the mass media?

Furthermore, should there be additional stimuli, such as fellowships and prizes in science writing — for instance, as done in the past by Columbia University in New York for science writers? Only a limited number are currently offered by Canadian organizations.

Certainly several methods will have to be tried before an optimum approach will be realized. An investigation into the educational training of Canadian science writers can only benefit the whole Canadian scientific community, not only in the immediate future, but in the long term.

The creation of a more accurate image of science by the public was also brought up

in the replies. A president of a Canadian society suggested:

> "As a researcher ... I have often regretted the fact that the mass media find it necessary to make a spectacular story of everything they communicate to the public. This may be good journalistic technique, but if a science story does not have the basic elements of a spectacular article, journalists will tend to rectify the deficiency by their own embellishments. I have personally seen instances in which they have weakened the scientific aspects of the report and in some cases this has resulted in a complete misinterpretation of what the scientific communicator was trying to say. I have often asked journalists to let me read their reports of my work prior to publication but in many cases they have not done this.
>
> "I think it is misleading and not in the long term interest of science to create for the public the impression that science is made up entirely of wonder drugs and break-throughs. It might create a more healthy scientific climate if the public were to realize that most of scientific research and investigation is made up of day to day routine work of other segments of society.
>
> "Another matter of considerable concern is the propensity of the press to give widespread publicity to 'scare stories' without placing the issue in a fair and proper prospective which would usually reduce the excitement level of the story ... Of course one is entitled to write to the newspaper and attempt to present the other view, but the original story appears on the front page under a blazing headline and if the rebuttal makes the paper at all it will likely be underneath 'letters to the editor' section and not even be seen, let alone read by 95% of the people who read the newspaper. In their efforts to fill the public need for melodrama type stories with heroes and villains the press is often much too hasty in assigning the role of villain."

Still another scientific society president added fuel to this:

> "I have ... noted the tendency of science writers to talk down to the readers. This, after 50 years of a compulsory education, and the fact that nearly everyone now completes two years of secondary education. This is not done in reporting professional football, hockey or baseball, nor in the bridge columns. Why in science?"

As remarked earlier, one way of achieving more comprehensive coverage on a wide variety of topics would be the presentation of science as regular features in the mass media. As a past president of a scientific society emphasized:

> "I firmly believe that we need regular science features in all news media, preferably presented by capable science writers working in association with scientists. I remember taking part in the T.V. series 'The Nature of Things'. That, it seems to me, is the outstanding example of first class scientific communication with the general public. The public is hungry for news, information, ideas, and background on all sorts of scientific questions."

A producer of a televised science programme also felt that, while there is no science magazine on CBC national television, "the time is about ripe for such a format."

Various topics were mentioned as meriting more concern and coverage by the mass media. Among these topics, a director of public relations for a major Canadian industrial research firm proposed that we look into the methods by which Canada can 'establish itself, to a world scientific community, that we are leaders and experts, in certain areas of science and technology." He suggested that:

> "Although various science studies have indicated that Canada is a greater importer (85%) than exporter (15%) of scientific and technological information, it is the awareness, proper marketing and utilization of that 15% of Canadian

scientific information to other countries that represents a most significant opportunity for our science and technology-based industries.

"Such a world reputation can have immense potential for technology-based industry: 1) having a world community of top scientific talent to recruit and attract from; 2) better markets for Canadian-designed products; 3) higher marketability and increased exchange of technical information and cross-licencing opportunities; to name just a few."

Still other respondents felt that we should survey the scientists as well:

"While your plan indicates surveying communicators and interviewing the Canadian public, there is no suggestion that contact will be made with the scientists themselves. I cannot help but feel that their input would be of benefit to the total picture...

"Basic to all science coverage is the research being conducted by the scientists themselves. Their willingness to report, discuss and interpret their work for the lay public is essential to the field of science journalism in Canada."[1]

A government information services official proposed that *Media Impact* find out if the Canadian public realizes how science policy is "derived" in Canada.

"Many people and indeed groups feel that government scientists decide on what should be looked into and then what use should be made out of the data. In some cases, this type of decision-making makes them feel powerless and thus disinterested. Some are confused by the fact that there are elected representatives who speak on Science Policy. This type of information might be useful in determining a profile of the scientific orientation of the Canadian public."

Yet the scientifically-oriented audience has a vastly different composition across Canada. There exist regional disparities and varied community interests, so that, as a result, important issues of national concern cannot, in many cases, be described from a national viewpoint by a reporter from another city or province. Regional and local angles must be provided to supplement such national news. Frequently, regional stories will help to generate local interest in scientific issues.

One dean of applied science and engineering reiterated this advocation for more local outlets in science writing:

"The environments encountered across this country vary perhaps as much as the individual and communal interests of its people. Thus, what is a very great interest in one area may be totally ignored and recognized as irrelevant in many other areas of this country. A technological breakthrough allowing the development of better mass transport systems will doubtless be haled with great interest in Montreal and Toronto, but will likely be ignored in Prince Albert, Saskatchewan and St. John's, Newfoundland if only the C.P. Wire Service story designed for the consumers of central Canada reaches their newspapers. The information may well be there, but unless it is somehow related to the experience of those people, it is unlikely to be retained.

"A recent, not altogether trivial, example of this phenomenon was the reporting of the Federal Government decision to support STOL aircraft production in this country. All the articles published were datelined Toronto, or Ottawa, and were all rather myopically related in terms of passenger traffic in and around the center of large cities. I am certain the result was that it was ignored in most places in this country, even though the potential usefulness of the aircraft and its total impact might be far greater in many rural areas."

Among the first series of replies came the view that we were imprecise and had underemphasized the terms "engineering" and "technology" in our frequent use of the word "science." This view was shared predominantly by deans of engineering who volunteered several supportive arguments for more sharply focusing on

the engineering and technology aspects in our surveys.

For example, one dean wrote:

> "There is very little in the field of 'science' alone worthy of communication, but there is very much interest on the part of the public as to how science is converted through technology to meet personal and corporate needs and desires."

Another dean:

> "Many aspects of science become known to the public only after they have passed through the engineering process, and I believe it would be well worthwhile to publicize that aspect a bit better. I appreciate that your Ministry is Science and Technology but there is no reason why the publicity portion or the information services portion should not highlight engineering."

An interesting and elaborate reply by the publisher of a western newspaper offered another insight into the various terms of "science":

> "I refer to the term 'science' and by implication at least to the term 'technology.' What does 'science' mean to communicators, to laymen, to scientists and engineers? To most of them it is a catch-all term embracing scientific theory and technology and confusing one with the other. To some of them it means primarily theoretical science or scientific theory or scientific knowledge. To others it means theoretical and applied science with an admixture of technology. Drawing dividing lines between science and technology or between fundamental and applied science is, I know, difficult if not impossible. Defining 'science' and other terms I am using is equally difficult ...
>
> "The single most important question that can be raised about the communication of scientific information is whether the communication is informing people about the nature of science in general, its origins and roots, and its role in modern life, whether, in short, it is helping them to understand the nature and place of 'science.' By the term 'science' I do not mean technology; and when I talk about 'the nature of science' I refer more to fundamental than to applied science. In most statements I mean to refer to the structure of theory that forms the framework of the building. This is the vital part of the building, apart from the very foundation. It is therefore the component which laymen and women most need to understand — the key to the nature of the whole building. Yet it is the aspect about which laymen and women generally know the least. Most of them are confused about it and afraid of it. Moreover, some scientists share their misconceptions."

Referring to "the great body of opinion which would give a great deal more emphasis to the applications of science, and to the encouragement of the innovation that our Canadian industry so badly needs," one dean of engineering suggested:

> "We should bear in mind that for many thousands of students in Canadian high schools, their contact at the academic level is almost solely with teachers who profess science, and whose university background has been in General Science or Honours Science. Very few teachers in the high school have had any training in Engineering. I might add here that vocational teachers are in a position to advocate or counsel in the Engineering area. The result is that counselling in the high schools is weighted very heavily in favour of pure science and that Engineering is almost entirely neglected."

Finally, a director of public relations for a technical college in the Maritimes felt that:

> "The general news media coverage of engineering projects and works all too often comes when a new bridge is built. I think there is a vast area of improvement needed here and I would be most interested in having this considered in your study."

The director then went on to say that an

Engineering Public Information Committee had carried out a small survey which indicated that science writers virtually ignored the engineering aspect of research and technology in favour of pure science.

It was also strongly urged by an officer of a Canadian crown corporation that we consider the inclusion of science and information centres in our study:

> "I would like to point out that in restricting the study to the print and electronic media you are missing an important source of dissemination of science information to the public — science centres and information centres.
>
> "I am sure your national consumer poll would indicate that many members of the public have first been exposed to scientific information through a visit to such a centre, and it seems to me that your survey would be incomplete without taking this factor into account."[2]

In addition to the suggestion that we include the engineering and technology aspect in our survey, some letters from various individuals expressed the desire to see agricultural, environmental and other fields emphasized.[3]

It appears fitting that we end our Initial Responses chapter with an excerpt which deals with the topic of science communication, in this instance, from a government research scientist:

> "There once was a time — back in the days of Archimedes, and maybe Galileo — when their words could be safely used, because science was a small bundle of tricks with which a single man — often an amateur — could be quite familiar.
>
> "This is scarcely so today.
>
> "A physicist, capable enough in his own field, may have an extremely unscientific attitude toward psychology or economics. There is a widespread tendency for a 'scientist' to be trapped by the word and so consider himself an authority on everything labelled with the word 'science' — although he may be no better informed on much of the field than the average 'layman.'
>
> "This word is part of the trap.
>
> "To the 'scientist' the layman is someone not familiar with his specialty — so he uses it for specialists in other disciplines, although he doesn't apply the same criteria to himself.
>
> "'Scientists' themselves often being unaware of this situation, they are innocent victims rather than villains.
>
> "The same is true of a high percentage of writers, who simply compound the confusion. What chance then has the person whose only conscious contact with science is through the word, written or accompanied by visuals?
>
> "This is a basic problem, not only in regard to public information but in connection with science generally. Among the most rewarding research we could do would be to seek what is needed to clarify communication of scientific information and what is needed to help people straighten out our thinking about this or any other subject."

Notes and References

1. We felt that a survey of the scientific and technological communities, while of definite benefit to our study, was an enormous undertaking and an entire study in itself. It would, however, remain a possibility to be considered as a future project.
2. Although this suggestion is quite valid, our feeling is that *Media Impact* should remain confined to the mass media of radio, television, newspapers and magazines. A detailed study on science centres and information centres could be a nucleus for a future project on science dissemination.
3. We assure these and the many other correspondents that our program outline covers *all* the broad areas of science. In our definition of "science" we include such areas as agriculture, energy and resources, engineering, medicine, aviation, the social sciences, the environment and even business — which often involves some science and technology. We will also incorporate into our consumer poll many of the specific suggestions offered on various topics.

Chapter Eight

Objectives and Methodology of Project *Media Impact*

Research from countries such as the U.S. on present state of knowledge of public and the mass media cannot really be extrapolated to the Canadian situation. Firstly, Canada, with its official bilingual policy and its heterogeneity of nationalities, has innate idiosyncrasies — demographic as well as geographic. These differences distinguish it from the U.S. in terms of news coverage of scientific and technological activities.

Secondly, Canada has few writers or broadcasters as established in science reporting as Walter Sullivan of the New York Times, Victor Cohn from the Washington Post or Earl Ubell of the CBS television network.

Not entirely independent of this is the fact that much of the frontier work in science and technology is overwhelmingly foreign, and primarily American. Many Canadian media outlets have fallen victim to the syndrome of relying heavily on science news from foreign sources, because the acquisition of such news is cheaper than staff-written news. Rather than hire qualified reporters to cover specialized news from Canadian sciences or technology, they tend to supplement their science news with copy from Canadian Press (CP), from their publication group's news service, or from foreign news services such as Associated Press (AP) or Reuters. Some also subscribe to foreign science news syndicates such as Enterprise Science News.

As a result, Canadian scientific and technological activities suffer in the long run.

Many Canadians, for instance, are unaware of Canada's numerous achievements in science and technology because they are under-reported, or simply filed away to collect dust in the quagmire of scientific publications reaching the communicators. Yet sooner or later Canadian achievements *are* taken up by American or other foreign researchers, who upstage what should have been recognized as a valuable "Canadian" contribution to society.[1]

Finally, as we mentioned in Chapter Three, the U.S. is decades ahead of Canada in terms of research done on popularizing science and in the fostering of organizations of all kinds in government, industry

and universities which stimulate the growth of public interaction with the scientific community.

These factors — and they are by no means all the factors — underline the need for a thorough analysis of the manner in which science news reaches the public.

In planning a strategy for project *Media Impact*, we have kept in mind, in particular, issues unique to Canadians. Together with the research needs and priorities in science communication, we have designed a program to touch as many bases as feasible. What follows is a description of the methodology we are employing.

It was decided that *Media Impact* would consist of two parts in both official languages.

Part (A)

A series of surveys investigating communicators — These surveys were to examine the flow of scientific information to the public, and thus be instrumental in assessing the contribution of each kind of scientific communicator to the final information output received by the Canadian public.

Part (B)

A national consumer poll — A Canadian survey research firm will be engaged to undertake a national survey involving direct interviews with a random cross-section of up to 2,000 Canadians. The interviewers will question respondents for about 45 minutes about their understanding, attitudes, awareness and comprehension of the science news presented to them via the mass media. As the first such major survey in Canada, it should provide a measure of the scientific orientation of the Canadian public.

It was planned to integrate this study with those of the National Science Foundation, various U.S. university research groups and a number of interested Canadian organizations.

More precisely, part A entailed the use of mailed questionnaires developed specifically for each type of communicator, such as the science writer and broadcaster, editor and producer, etc.

These questionnaires included such issues as:

* Is the science communicator satisfied with the way science information is being made available to him? How does he rate the various sources, such as press releases, copy from scientific meetings, or copy from the news wires? Are the reporters and broadcasters satisfied with the way their science stories are edited, produced and published?
* What suggestions would the communicator give toward improving the science information transfer within his particular area of communication?
* Is there enough science news (of both national and international origin) in newspapers to warrant:

a) continuous coverage and publication by science writing specialists?

b) regular science features, indexed and defined under "Science and the Environment", "Science and Technology", or "Medicine and Health"?

Findings from such questions were to provide recommendations to help achieve maximum benefits and maximum coverage of the sciences, particularly *Canada's work in the sciences.* They were to outline in detail the "gatekeeping" and "feedback" processes in the communication network, and to show how each group of science communicator influences the public's awareness of scientific issues which affect their daily lives.

By comparing these surveys, putting them into context with each other and with the public opinion poll, we hoped to provide an overview of science communication in Canada.

In part B, our consumer survey, a cross-section of the Canadian population was to help us specify the size, composition, and approximate distribution of the science audience.

By subdividing the study into geographical regions and subgroups of the population, (eg. age, sex, education, nationality) differences between science consumers across Canada could be analyzed.

In a subsequent volume we planned to outline these and other demographic characteristics of science consumers within the general public. By asking such attitude and recall questions as the following, we concluded it was possible to create a profile of the public's major 'shopping market' for science information:

* What is the consumer's understanding and awareness of science?
* What are his demands and are these demands being adequately met by the media?
* Is the average Canadian well-informed about various issues and priorities of Canada's science policies for the seventies?
* If people aren't interested in science, then why not? What turns the reader on or off? Are the articles well-written or does he feel that the material is above his head?
* How would he prefer to have science in newspapers communicated to him? For instance, would he show more enthusiasm toward science news if it was neatly packaged in a 'Science and the Environment' and 'Medicine and Health' section — or scattered throughout the paper along with other non-specialized news? (To pursue this point further, science stories warranting front page coverage should necessarily be featured on page one. Yet, perhaps through continuation in designated sections, newspapers could draw the attention of interested readers to science columns, interpretative pieces and other features and photos on science and technology — meanwhile building up a regular audience for this type of news.)
* Does the reader prefer the short news-note approach about many sciences, or the well-documented and backgrounded review article on major scientific findings, as done in Time magazine?
* Has he discontinued reading some science news because it is reported so irregularly? Could it also be that single-shot efforts are too easily forgotten, and, instead, the reader is led to select extensively covered areas, such as sports? How does he rank science alongside other topics in the paper?
* Does he recall any science programs on radio or on television? If so, what are his reactions to them?
* Are there preferential differences for science material between the sexes, as found in the U.S. mass communication surveys, which showed that females preferred medical and health news, while males leaned toward the non-medical news?[2,3]
* Does he feel there are differences — either qualitative or quantitative — between English coverage of science news and coverage by French science communicators? Between coverage of Canadian science and science from outside Canada?
* How does the general public view science and the scientific community? Do people necessarily believe everything they read about science?

The results of the consumer survey, in conjunction with the surveys of attitudes and characteristics of the science communicators, were intended to demonstrate clearly whether there exist any areas where information may be lost or misinterpreted and, if any such areas are present, how they may be minimized.

Although we had available the questionnaires devised for past U.S. studies, all our *Media Impact* surveys were tailored toward Canadian needs as manifested through the issues and suggestions brought up from the communicators and from respondents to our introductory letter.

Uses of the project results are multifold. The findings should assist in improving the handling of scientific information by:

* government departments and agencies;
* the media;
* industrial and university research and information branches;
* professional scientific and technology-oriented organizations;
* science divisions at libraries;
* all establishments dealing with science

education through their various educators, such as high school science teachers and journalism instructors at universities and technical schools.

The findings also should direct the attention of the media specialists to weaknesses in the science reporting network. In effect, the study should provide a baseline for developing the broad field of science journalism in Canada.

Notes and References

1. "Ideas in Exile: 'A History of Canadian Invention'" by J.J. Brown (1967) (The Canadian Publishers McClelland and Stewart Ltd., Toronto)
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3. "Communication and Knowledge of Science in the Adult Population in the U.S." by P.J. Tichenor (1965) (Ph.D. thesis, Stanford University, California) 221 pp.