

NATIONAL CONFERENCE ON PSYCHOLOGY AS A SCIENCE

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Canadian Psychological Association

and

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Canadian Council of Professional Psychology Programmes
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Canadian Psychological Association
Canadian Society of Brain, Behaviour, and Cognitive Sciences
Council of Provincial Associations of Psychologists
Council of Canadian Departments of Psychology
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Social Sciences and Humanities Research Council of Canada*

Final Report

Edited by

Janel G. Gauthier and Anthony G. Phillips

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We sincerely thank all those who contributed to making the Aylmer Conference an important and successful undertaking for Psychology as a science.

Janel G. Gauthier and Anthony G. Phillips, Co-Chairs
May, 1998

Executive Summary

Canadian society is confronted with a wide range of health, social, and economic problems. The cost of these problems in lost productivity alone amounts to billions of dollars a year. The cost in lives disrupted and families shattered is greater still. The nation is hard-pressed to address all of the human needs of its people, yet our prosperity in the next century - and our sense of well-being as members of a community - demands we try.

To develop effective plans to improve our society, we must know more about ourselves. We need to know in scientific terms how people interact with their environment and each other - how we learn, remember, and express ourselves as individuals and in groups - and we need to know the factors that influence and modify these behaviours. This knowledge comes from research in psychology.

This report is the result of a National Conference on Psychology as a Science held in Aylmer in the spring of 1997. It speaks on behalf of the science of psychology in all of its branches and on behalf of the people. This report is intended to portray research in psychology for a wide variety of audiences: to inform those within the behavioural and social sciences about developments in areas related to their own research; to educate researchers and others outside of psychology about new scientific perspectives on issues of common concern; to provide guidance to policymakers who are planning and funding research programmes, and to enhance the scientific literacy of the general public.

Psychology as a discipline

The first part of this report shows how basic and applied psychological research have contributed to a great many discoveries and a large number practical applications that benefit our society. The complexity of the phenomena under study, ranging from basic sensory processes to complex brain processes to social behaviour has led to the development of a complex body of mathematical, statistical, and computational techniques that play an important role in contemporary scientific psychology. As psychological research has become increasingly sophisticated, education and training in psychological research has come to require a breadth and depth of knowledge which is achieved only through doctoral study.

Psychology and Society

This second part of the report describes advances that have been achieved in studying and understanding various psychological and behavioural phenomena. They are organized into seven broad themes:

- C Health and Well-Being
- C Human Development and Aging
- C Education
- C Workplace and the Economy
- C Canada's Multicultural Society
- C Environment and its Management
- C Human Relations and Societal Issues

The topics discussed here represent just a few of the areas of study that constitute basic and applied psychological science. These topics are presented not as a comprehensive record of all that is taking place in the field, but as a sampler from which it is hoped the reader will gain a sense not just of the progress in these individual areas, but of the breadth and depth of the theoretical work going on in the field as a whole.

In describing the various areas of research, the emphasis is on identifying within each field: areas where sufficient recent advances have been made; and research questions that are still underdeveloped but have considerable potential for spinoff implications and for solving problems of human potential if given sufficient investment.

In addition to describing advances in psychological science, this section of the report addresses future directions of research in the field, pointing to new areas of research that build on the understanding and knowledge produced through previous research.

Enabling Factors

The third part of the report describes what is needed to facilitate the discovery of new scientific principles and innovative strategies for understanding and manipulating the range of processes that constitute human emotion, cognition and behaviour. It is essential to promote environments conducive to «investigator-initiated» research, driven solely by the creative thoughts of basic scientists. There is a need to create facilities and programs that will promote flexible collaboration among researchers.

To take advantage of the research opportunities described in this report, it is essential to build information and world-class communication networks. We also need to increase awareness among the public of the exciting contributions of scientific psychology to increase the sense of responsibility among the general public for the importance of psychological research for the benefit of society.

It is critical to Canada's future prosperity that federal granting agencies be provided both with appropriate (i.e., increased) levels of operating funds, and with a long-term commitment for steady increases so that these agencies can do their jobs, i.e., plan and sponsor the internationally recognized researchers doing university-based research that will represent Canada's future assets.

Conclusion

The scientific knowledge base can provide the information to determine how we can get individuals to live longer, be more self-sustaining, enjoy a broader span of productive life, and enjoy their own maximum potential functioning socially, economically, and creatively. People are our most important natural resource. As Canadians, our prosperity in the next century depend on our commitment to support research in psychology, both basic and applied.

VISION STATEMENT

The goal of psychology,
the study of mind, brain, and behaviour,
is to create knowledge through research
that is inherently valuable and essential for the benefit
of the individual and our changing society.

INTRODUCTION

These are not «normal times,» and the enormity and the complexity of the nation's problems demand an innovative approach.

BACKGROUND TO THE CONFERENCE

Origins of the National Conference on Psychology as a Science

As a scientific discipline, Psychology is being confronted with new realities that demand a national review if performance and standards of excellence are to be maintained and new challenges surmounted. There has been a tremendous erosion of funding for research and training in psychology. Policies and parameters relating to funding for scientific activities have drastically changed. Yet despite the relative lack of fiscal resources, demands for better scholars and better science are reaching record heights. Pressure to align research and training with pressing social, economic, and environmental goals is enormous.

All of the above changes are taking place at a time when the discipline of psychology is undergoing major expansion and is being called upon to assume a greater responsibility in helping to address health and social problems. The problems facing the country are substantial, not to say overwhelming. Be it productivity in the workplace, schooling and literacy, the aging society, drug and alcohol abuse, mental and physical health, HIV/AIDS, or violence in society, each presents, at its base, problems of human *behaviour*. Each involves questions that will require both *basic* and *applied* research and development.

When psychologists face such problems, applied research directed at the specific problem is sometimes the best approach. For example, if we need better predictors of job performance, we might focus our attention on making better tests. In other instances, though, the chance of long-range success is greater when the problem is attacked by studying the underlying basic psychological processes. For example, designing the optimal way to teach reading requires us first to discover how the child gains skills, how the reading process builds on spoken language, how to assess the child's awareness of language, how memory and attention work, how peer groups and families influence learning, and even how the eyes move during reading. Or, to take another example, discovering the processes underlying memory and problem-solving has important implications for such practical matters as how best to learn to fly planes or repair them.

There is enormous value in supporting basic and applied psychological science. A great many discoveries have been made already, and a large number have found practical applications. For example, we can now assess infants' sensory capabilities with surprising accuracy. It is thus possible to determine very early whether and to what extent babies have abnormal hearing. This

permits earlier and more effective intervention. Indications are that certain intellectual abilities also can be assessed at a very early age. Findings from the laboratory have led to other, cost-effective applications in places as varied as the factory floor, the ophthalmologist's office, the airplane cockpit, and the homes of victims of panic attacks. Principles devised in laboratories by psychologists have influenced how X-rays are read and how astronauts and air crews are trained. There is, in fact, a long list of success stories, many of which involve «lives saved» as well as «dollars saved»; and, as is often the case, many of the practical applications were not anticipated when the basic research and theorizing first occurred. A famous social psychologist, Kurt Lewin, once observed, "There is nothing as practical as a good theory."

Policy makers legitimately differ on how to tackle the many problems facing Canadian families and individuals today. Each year brings another round in the great social debates about productivity, education, child and elder care, mental illness, dropout prevention, drug-abuse prevention, literacy, crime, group conflict, health care, cognitive function and dysfunction, and other serious issues. These debates typically focus on who will pay for programs, what role the federal government should play, local versus national control, and so on. But such questions, while important, deflect attention from a crucial point frequently ignored: even if we had considerably greater resources to devote to them (which we do not), *all too often we simply do not know how best to deal with these challenges*. Here, psychological science can be of immense value because nearly every issue mentioned above is, in large part, a problem of how people develop, of how they think, of how to train and motivate them, or of how people relate to one another. These problems all fall into the province of psychology.

To develop effective plans to improve our society, we must know more about ourselves. Such knowledge comes from serious research relevant to the most important problems of contemporary society, including basic research that may eventually help remedy many of them. Research in psychology, whether it involves studying brain mechanisms underlying behaviour or finding better ways to deal with group conflict, builds the needed knowledge base. With appropriate knowledge, issues can be not just addressed, but addressed *wisely*.

Because people are our most important natural resource, we must aim for a sustained, national research effort to enhance understanding of human development and behaviour. Research alone will not solve the nation's problems, but we can be certain that they will not be solved without systematic inquiry and painstaking analysis on a far larger scale than ever before. The time is right for basic and applied psychological research and development that strengthens Canada's *human capital*.

Canada benefits greatly from supporting psychological science. However, this is not always apparent as the spinoffs of psychological research are not so much in new products but in new ways of helping people. In other words, they are applications that contribute to the better use of our human resources. Thus, an increased investment in psychological research across the basic-to-applied spectrum will benefit our society enormously. Psychological science is, relatively speaking, inexpensive science. The price of supporting research in psychological science is small; the cost of not doing so is huge.

Considering all of the issues discussed above, the Board of Directors of the Canadian Psychological Association approved in principle in 1995 the convening of a National Conference on Psychology as a Science. This Conference, the first of its kind in Canada, was to focus on the development of explicit action plans to advance and strengthen the role of psychology in health, social, and basic biobehavioural science in Canada for the benefit of all Canadians.

Goal of the National Conference

Essentially, the goal of the National Conference was two-fold: to develop a vision of research and training in psychology that is appropriate for these changing times, and to identify how Psychology as a discipline could make a meaningful contribution to the national research agenda within the context of the recommendations made by the National Advisory Board on Science and Technology in a recent report submitted to the Prime Minister of Canada and entitled *Healthy, Wealthy and Wise: A Framework for an Integrated Federal Science and Technology Strategy* and the government's policy response as set out in the document entitled *Science and Technology for the New Century: A Federal Strategy*. In other words, the aim of the Conference was to determine how psychology as a science could best adapt to the new realities of research and training in Canada and how best to respond to the new demands that research and training be aligned with pressing social, economic, and environmental goals.

Being a discipline that spans the cognitive sciences, neurosciences, health sciences, and social sciences, Psychology is uniquely positioned to examine the full continuum of human behaviour and the areas of confluence, and to generate systematic knowledge and information that will bear on the health and well-being of Canadians and the country's ability to create sustainable employment and economic growth.

The conference was to be seen as the first step in what is intended to become a continuing process of bringing systematic research to bear on problems of national concerns.

Conference Planning

Co-Chairs

The National Conference on Psychology as a Science was chaired by Dr. Janel G. Gauthier in collaboration with Dr. Anthony G. Phillips. Dr. Gauthier is the President the Canadian Psychological Association and Dr. Phillips is the Head of the Department of Psychology at the University of British Columbia and a member of the Canadian Council of Departments of Psychology, a major partner in the National Conference. Furthermore, Dr. Gauthier is a scientist-practitioner from Laval University with long-standing research and practice interests in health and social sciences, whereas Dr. Phillips is a neuroscientist who has distinguished himself through outstanding research in basic biobehavioural science.

Conference Content

A Delphi polling procedure (Linstone & Turoff, 1989) was used to identify the areas of paramount importance for the discipline and to identify, within each area, the critical issues and questions to be addressed during the Conference. A description of the polling procedure and a summary of the data can be found in Appendix A. Essentially, following a preliminary survey, 297 psychology experts from across Canada responded to a questionnaire distributed in English and French at the end of 1995. The Delphi poll revealed that the most highly endorsed topics for the conference centered on: a) Psychology as a science (i.e., its place in science and its relationship to other disciplines); b) Funding for research/training; c) Education and training for research; and d) Advocacy/lobbying for psychology as a science.

Based on the responses, and given the fact that they were so unequivocal, the delegates invited to the Conference were given the task to address funding, training, and advocacy. Beforehand, however, they were asked to address Psychology as a science.

Sponsors

All the major national organizations of psychology in Canada, regardless of whether they were mainly practice or research-oriented, received letters informing them of the plan for a National Conference on Psychology as a Science and inviting their sponsorship of the Conference. At the same time, requests for financial support of the Conference were submitted to the federal research granting councils. Ultimately, the Association of State and Provincial Psychology Boards, the Canadian Council of Professional Psychology Programs, the Canadian Register of Health Service Providers in Psychology, the Canadian Society of Brain, Behaviour, and Cognitive Sciences, the Council of Canadian Departments of Psychology, and the Council of Provincial Associations of Psychologists, joined the Canadian Psychological Association as co-sponsors of the Conference. As well, the Medical Research Council, the Natural Sciences and Engineering Research Council, and the Social Sciences and Humanities Research Council provided generous support to the Conference. All organizations who were invited to participate expressed support for convening the Conference despite budget considerations that precluded their sponsorship.

Delegates

All the sponsoring national organizations of psychology in Canada were invited to nominate delegates to the Conference to provide a core of expertise in research, training and funding policy, as well as to reflect the interests of the principal stakeholder groups in psychology as a science. A preliminary list of delegates was selected from all the nominations received. The list was later expanded as more funding became guaranteed. At all times, every effort was made to establish a balance of core expertise, geographical representation, years of experience, gender, language, etc. As well, three Canadian graduate students were invited by peer nomination to provide input from the next generation of researchers into the decision-making processes of the National Conference. This was particularly important when it came to decisions on how their own needs were to be met in the future. To ensure a balance between needs for representation and concerns for working group processes, the total number of delegates was set at 45. A list of the delegates who attended the conference appears in Appendix B.

The delegates were assigned, based on their area of core expertise, to one of three working groups: health, social, and basic biobehavioural sciences. There were 15 delegates per group. The coordinators of the working groups were selected among the delegates. In selecting the working group coordinators, once again every effort was made to establish a balance between core expertise, geographical representation, years of experience, gender, language, etc. Experience at leading working groups was a fundamental selection criterion. Prior to the Conference, leaders received a briefing and a specific set of instructions to guide them in their job as group coordinators.

Observers

Each of the sponsoring research granting councils was invited to send a representative as an observer at the Conference. Dr. Mary-Ann Linseman from MRC, Ms. Denise Ross-Siegel from NSERC, and Mrs. Sheena Lee from SSHRC served as observers for the councils. Each representative was assigned to the working group corresponding to her area of interests.

Programme

The National Conference on Psychology as a Science convened at the Château Cartier Sheraton Hotel in Aylmer, Québec, on May 8, 1997. It continued over two full days until May 11.

An initial plenary session oriented delegates to the tasks of the Conference, after which delegates retired to their respective working groups. Each working group had a Leader whose task was to facilitate the discussion and decision making of the group and a Recorder who tracked the proceedings of the group.

Appendix C presents the schedule for the conference. On the first day, working group activities focused on articulating a new, unifying, forward-looking vision for Psychology as a science. Each working group reported in plenary session on the vision statement that it had developed. The full group debated, modified, and ultimately voted approval of the vision statement of the three groups. In all instances in the plenary sessions, under the special rules in place for these proceedings, votes to amend or approve working group documents required a two-thirds majority for passage. In the afternoon, each working group developed a series of goals to support the vision. To be approved, a goal had to be specific, measurable, attainable, and relevant to the vision. The goals were then submitted to the full group meeting in plenary session, where they were again debated, modified, and voted upon.

On the second day, each working group identified examples of achievements (i.e., issues to which psychology has contributed a great deal) and challenges (i.e., issues about which psychology has the potential to contribute a great deal as well) that would help politicians and decision makers in the public and private sector to understand better that there is a two-way path from basic research to significant human issues. The examples were then submitted to the full group meeting in plenary session for approval. At the end of the day, the working group activities focused on relapse prevention (i.e., on anticipating obstacles to meeting the challenges and working out solutions to ensure success). Again, these came to the full assembly for discussion, debate, and approval.

During the Conference, important concerns were voiced and openly discussed. This allowed delegates to learn a great deal from one another. As a result, mutual respect and understanding between the sub-disciplines were greatly enhanced. The Conference also helped to foster a co-operative spirit within the discipline. At the end, delegates were thinking more collectively. They had realized that we can be cohesive and unified in our diversity, and that we can build bridges and consensus without losing our sub-disciplinary identity.

Proceedings

The proceedings for the Working Groups can be found in Appendix D. As to the Working Notes of the Conference, they have been edited into a document entitled the «Integrated Notes of the Aylmer Conference on Psychology as a Science.» They are available upon request from the CPA Head Office in Ottawa (1-888-472-0657 or cpa@cpa.ca).

Final Report

The final report is written in a format that captures the essential recommendations that emerged during the Aylmer Conference and presents this information in a way that should make it readily accessible to a broad audience, including the Granting Councils, senior University Administrators and most importantly our colleagues in the field of Psychology throughout Canada. The decision to adopt the present format was taken after extensive consultation by those charged with the task of editing the proceedings, and it was seen as the most rational approach to an otherwise daunting task.

Like the National Conference itself, this document is to be seen as just one part of a very important process, one that brings wide-scale collaboration among psychologists across Canada to bear on issues of common concern. The next step will be for each psychology organization to discuss the report and endorse it to provide the discipline with strong, unified, and unequivocal support.

A briefer and snappier version of this document will try to capture the vision, goals, achievements, challenges, and needs of psychology as a science to fulfil its mission in the 21st Century. It will be widely disseminated outside the discipline to increase the awareness among the public of the exciting intellectual contributions of scientific psychology, to increase the sense of concern among the general public for the importance of an empirical basis of these findings, and to dispel widespread misconceptions about the workings of the human mind and human behaviour in social contexts.

Chapter I

PSYCHOLOGY AS A DISCIPLINE

The first part of this report shows how basic and applied psychological research have contributed to a great many discoveries and a large number practical applications that benefit our society. The complexity of the phenomena under study, ranging from basic sensory processes to complex brain processes to social behaviour has led to the development of a complex body of mathematical, statistical, and computational techniques that play an important role in contemporary scientific psychology. Psychological research has become increasingly sophisticated and now more than ever, appropriate training and education for new scientists in this field requires completion of a doctoral program.

BASIC AND APPLIED RESEARCH

Our abilities to perceive the world, to reason, to choose and evaluate, to learn from experience, and to communicate with others are often taken for granted. The magnificent cerebral machine that makes these abilities possible does its job so well as to draw little attention to itself. Although reflections on the nature of mind figured heavily in the writings of the great philosophers, an independent scientific discipline did not emerge to study the mind until the latter part of the nineteenth century. This discipline has developed into what we now know as Psychology, which is the scientific analysis of behaviour, as well as cognitive, affective and social processes.

Modern psychology approaches the analysis of behaviour in several ways. One approach focuses upon an analysis of the fundamental processes of perception, cognition, movement, learning, motivation, and emotion, as well as the application of this knowledge to many fundamental problems facing individuals and society. A second approach emphasizes the study of abnormalities of behaviour, such as in neurological and psychiatric disorders, and the potential treatments of such disorders. A third approach focuses upon the social nature of human behaviour and the study of factors affecting the processes involved in human social behaviour. Within this field, some psychologists are using methods such as surveys, interviews, and participant observation, to increase our understanding of human behaviour and subjectivity. Recently, with the development of social constructionist ideas, they have begun to assess the role of language in the social creation of psychological phenomena.

Many experimental psychologists are investigating a range of problems that can be broadly divided into the sub-disciplines of behavioural neuroscience and cognitive science. Topics of study in the first category include: (1) basic processes of learning and memory; (2) brain and behavioural development; (3) drug actions on brain and behaviour; (4) animal behaviour; (5) sensory and perceptual systems; (6) motivational and emotional systems; (7) brain and behavioural plasticity; and (8) neuropsychology. The techniques of behavioural neuroscience are multidisciplinary and include: (1) various methods of behavioural analysis including those of ethology and kinematics (computer-assisted measures of movement), as well as more traditional

psychological approaches involving defined tasks to assess learning, perception and motor performance; (2) neurophysiological techniques (brain stimulation, recording of neural activity); (3) neuroanatomical techniques (e.g., basic neurohistological procedures, immunohistochemistry, neuroimaging, electron microscopy); (4) neurochemical analyses (e.g., high performance liquid chromatography, voltammetry, neurodialysis); and (5) other molecular biological and biochemical techniques (e.g., *in situ* hybridization, gene sequencing).

Cognitive science encompasses an equally broad range of interests including the study of: (1) basic processes of sensation and perception; (2) attention; (3) memory; (4) reasoning, problem solving, and decision making; (5) language production and comprehension; (6) artificial intelligence and computer simulation (including connectionism); and (7) human information processing. Most of this work involves the use of computer controlled displays or computer simulations. The study of cognitive processes with newly developed neuroimaging techniques (functional MRI, Magnetoencephalography, PET, and multi-electrode Event Related Potentials) is revolutionizing many aspects of cognitive science and will have a significant impact not only on the nature of the work in cognitive science but also on the cost of research.

The research of many experimental psychologists is focused primarily on the basic issues described above, but the knowledge generated is of fundamental importance to the solution of applied problems. As we move from a resource-based economy to one based on knowledge, the study of learning, perception, and cognition, and their underlying neural mechanisms is sure to play an increasingly important role in economic development. Experimental psychology will make a particularly significant contribution to the revolutionary changes underway in computing and communications as well as to the continuing education and training that a knowledge-based economy demands. Research on perception, cognition and psycholinguistics has obvious implications for artificial intelligence, robotics, and the development of man-machine interfaces. Understanding the nature of learning and its evolution over the lifespan is essential to developing better methods for educating both normal populations and those with special needs. Such methods have the potential for delivering immense returns in a society where learning disabilities exact such a high social cost, where a highly educated workforce is so crucial, and where the need for effective job retraining at all career stages has grown so rapidly. Many aspects of research in psychological science are also crucial to the development of knowledge-based industries such as communications, aeronautics, robotics, and biotechnology. Canadian psychologists have played both direct and indirect roles in technology transfer, patenting, and development in such industries. In addition, other research in psychology has provided a foundation for developing treatments for important medical disorders and remedies for serious social problems.

The man-machine interface is a crucial component of products created from our communications and aeronautic industries. To build an interface between a machine and human, the capacities of human perceptual systems must be well understood; algorithms used by the human brain can serve as models for implementing human perceptual and cognitive capacities in silicon. Psychological research also contributes to the very structure of "intelligent" machines. The best computer any of us owns is the one between our ears. It can be argued that algorithms used by the brain to solve practical problems may provide a sound basis for designing machines to solve similar problems.

Disturbance of brain function presents a major health problem that psychologists are well placed to deal with. Stroke is a leading cause of death and behavioural dysfunction in Canada. Closed head injury is a silent epidemic affecting somewhere on the order of 100,000 Canadians annually. Schizophrenia and depression are major psychiatric disorders that have enormous social and economic costs. Although direct studies of these disorders fall under the purview of neurology and psychiatry, studies of basic principles of brain and behaviour related to these disorders fall clearly into the domain of scientific psychology. It is essential that research in the area of mental health be built on a sound scientific foundation of knowledge about psychology and brain-behaviour relationships, with psychologists playing a key role in building and extending this foundation. Such studies range from the development of instruments to measure specific perceptual, cognitive, and motor functions to the development of animal models to study brain function and drug action.

Drug abuse, including alcoholism, is a major social problem that affects many Canadian families. The personal and financial costs are staggering. In the case of alcoholism, 30% of all traffic fatalities, 33% of all drowning deaths, and 3% of total deaths are alcohol related. In North America, the total costs of alcohol and drug abuse approach \$150 billion, making it one of society's costliest problems. A common denominator of all addictive substances is their profound effect on the brain. Here again, Canadian psychologists have made major contributions towards identifying the neural systems underlying addiction and describing the role played by learning and environmental factors in its development and maintenance. Furthermore, a better understanding of the relevant group dynamics and cultural forces at work can help to decrease the incidence of drug abuse, and to design effective educational strategies to deal with this problem.

Most productive work requires cooperative efforts. A better understanding of group dynamics can help managers improve workers' productivity as well as their sense of well being. We also need research on ways to dissolve stereotypes and the prejudices they engender, to promote intergroup understanding, and to integrate workers from different backgrounds and cultures. Further research is required to study the relation between productivity, job satisfaction, and organizational climate and structure. The results of such research will help resolve disputes, improve bargaining and negotiations, and smooth labor-management relations. We also should learn more about how to introduce new technology, how to reduce resistance to change, and how to redesign work groups.

With the average age of Canadians steadily increasing, more and more families will face problems related to aging parents and grandparents. Although considerable research now shows that not all negative consequences of aging are inevitable and that some changes have adaptive significance, the aging population does have special needs. These needs guide us to special research topics that must be addressed if we are to provide our aging citizens and their families with the highest quality of life. The elderly suffer more than their share of psychological impairments. Depression, loneliness, and despair are brought on not only by illness and by depletion of financial resources, but also by increasing social isolation, which, in turn, decreases the capacity to be productive and independent. The vicious circle can be broken only by our understanding the effects of isolation and how to overcome them.

Psychologists have discovered that the quality of individuals' social support systems contributes significantly to their treatment, recovery, and relapse from physical or mental disease. Now, we are also learning that the quality of an individual's relationships and social support system may influence susceptibility to certain disease in the first place. Social psychology can analyze exactly how these variables have their effects.

Despite the tremendous range of issues addressed by contemporary scientific psychology, two basic premises tie much of this work together. First, basic research on biological, developmental and cognitive aspects of behavior go hand in hand with applied research on issues such as domestic violence, the behaviour of criminal psychopaths, and the treatment of learning disorders or uncontrollable compulsive behaviours. A second insight is that psychosocial factors relating the influence of the social environment on individual behaviour are just as important as biological factors to the scientific understanding of normal and pathological behaviour. In this context, all research in basic and applied psychology can be seen as playing an essential role in addressing many of the most serious challenges facing the nation, our communities and our families, including literacy, productivity, health, aging, addiction, and violence.

METHODOLOGY

Formal models and associated statistical and computational techniques play an important role in contemporary scientific psychology, in large part due to the complexity of the phenomena under study, ranging from sensory processes to brain processes to social behaviour. Such complex processes cannot be adequately understood and described by verbal theories. This has led in this century to the development of a complex body of mathematical, statistical, and computational psychology (behavioural science), and associated professional and research organizations.

Statistics and Methodology

Psychologists rank with economists as one of the heaviest users of statistical technology. Most psychology departments have among their faculty statistical experts who devote at least part of their research and teaching time to statistical problems. Many departments go beyond this, and provide positions for colleagues who are effectively full-time statisticians. This close link between statistics and psychology is due to the often subtle nature of the effects studied, combined with inevitably high noise or error levels in psychological data. Whether psychologists use response times, scores on scales and tests, counts of errors, or demographic data, the relationships that concern us are often hidden among a wide variety of other contributions to variation. Moreover, studying people and other animals can be quite expensive, both in time and money. Consequently, to ensure that their research is sound, psychological researchers and practitioners need to develop and use the best statistical techniques. Two examples, to mention only those, illustrate these points.

The first involves a method called *structural equation modeling*, which is used to study relationships among rather large sets of quantitative measures. In many current psychology journals, it is hardly possible to publish a paper on multivariate data without using this tool. Structural equation modeling is extremely powerful and flexible, but the price to be paid is the

need to learn a variety of relatively advanced statistical and mathematical ideas. Students need at least three semesters of statistical courses as a prerequisite to the study of this technique.

A second example relates to the plethora of new tests or scales that are developed each year in North America to respond to the need for psychological measurement in many areas (e.g., the impact of cognitive aging). Ideally, both the discipline and the public should be given clear evidence that these tests provide accurate assessments of what they supposedly measure. Assessing the effectiveness of a new or existing scale requires the use of sophisticated psychometric methods. The need for better preparation in the statistics of scale assessment has been cited frequently by appraisers of the current state of clinical, social, and other areas of psychology where heavy use is made of scales.

Finally, statistical science is passing through one of the most creative and innovative periods in its history, particularly in research making use of modern computing technology. Hardly any of this has as yet penetrated statistics courses offered by psychology departments. There is a great need for textbooks, academic renewal, and new appointments of statistical specialists, so that the next generation of psychologists can be adequately trained in these areas.

Modeling and Computation

Perhaps the simplest way to illustrate the uses of modeling and computation is to briefly describe their relevance to exciting new developments in *virtual reality environments*. We recognize objects in the world (people, other animals, physical objects) and navigate amongst them under a variety of circumstances. Recognition and action are normally effortless, leading the non-expert to underestimate both their complexity and the complexity of the theory and experiment required to understand them. Until recently, it has been difficult to perform the complex experiments and develop the associated theoretical work required to understand such abilities. Recent advances in computer graphics technology and human-computer interfaces make possible complex and persuasive *virtual realities*. Such virtual realities involve human sensorimotor interaction (using, say, goggles and gloves) with artificial environments; participants develop a sense of 'presence' in the best of such environments. *Sensorimotor processing* is a major research theme that can be effectively studied through these techniques. For instance, we know that wearers of eye-glasses adapt to distortions of the visual field caused by lenses and frames, but we do not have a detailed understanding of such adaptations; similar adaptations occur in virtual reality environments, which can be manipulated in a much more controlled fashion. Likewise, players of computer games adapt to the impoverished interface to such an extent that they produce 'reflexive' avoidance responses when, say, an object looms in front of them. Learning in such environments is becoming increasingly important as they become more common in medical and other applications. Virtual reality can also be effectively used in areas such as the recognition of facially expressed emotions, and in therapeutic techniques such as the reduction of acrophobia (the fear of heights).

Now, let us return to the modeling and computation theme of this section. The development, study and use of virtual reality systems, and the theory needed to explain the complex human behaviour demonstrated and studied in them, requires a sophisticated knowledge of many areas of mathematics and computation: linear algebra, Fourier analysis, stochastic

processes, computer vision, and robotics. There are excellent programmes based in Canadian Psychology departments that are training students in these areas, although such programmes are challenging, given the frequently inadequate mathematical and statistical training of undergraduate students entering programmes in Psychology. Given the interdisciplinary nature of many of these programmes, it is essential that students acquire both the computational skills and the appropriate psychological methodology required for research in these fascinating new areas of study.

Although much of this theoretical work has focused on foundations, there have nonetheless been important social applications, and the potential for many more such applications is enormous. For instance, work on how the brain ‘infers’ the organization of the visual world from incomplete data is of importance in computer applications; research on how knowledge is organized in the brain is important for the continuing development of expert tutoring systems; theoretical and empirical work on decision-making is important to inform the decisions made by professionals and consumers.

EDUCATION AND TRAINING

The goal of all college and university-based undergraduate and graduate programs in Psychology is to train and educate future researchers and consumers in the psychological principles, methodology, and analytical framework of psychology.

Psychology, as a discipline, developed largely in the 20th century. Its growth has been rapid and impressive, in terms of research output and the numbers of students taught. Moreover, psychology has attracted great interest from the general public. Today, psychology is one of the largest departments in most universities, and teaches students from many disciplines as well as producing large numbers of students with majors in psychology. Yet the discipline, and particularly its scientific basis and methodological approach, is poorly understood. Some of its critics are even university graduates who probably took at least one undergraduate psychology course. Psychology needs to change the opinions of its own students, as well as other members of society.

The strength and relative success of Psychology as a discipline lies in the progress it has made in understanding behaviour, which has been based upon the application of sophisticated and stringent scientific methods. As a result, psychology graduates at all levels are sought not only for their unique expertise in the behavioural factors of human adaptation and health, but also for their advanced training in research methods. The latter allows them to pursue, as professionals, the advancement of knowledge and to be responsive to challenges in multidisciplinary contexts.

Appropriate training for psychologists requires a breadth and depth of knowledge which is achieved only through doctoral study. The needs of society and the interest of students in psychology are well demonstrated by the fact that there are many times more applicants for graduate study in psychology than we are able to accept, and that psychology programmes in Canada produce more doctoral degrees than almost any other discipline. The original research demonstrated in the doctoral dissertation is an essential component of such a programme. Training

at lower levels must require rigorous training in research methods and maintain a heavy emphasis on critical thinking.

Psychological research has become increasingly sophisticated with respect to the design of studies, the statistical techniques utilized, knowledge of computers and software, and the use of technology. Graduate programmes need to maintain and even expand this edge in the increasingly competitive educational system to ensure that our graduates are knowledgeable in the appropriate use of the techniques, to enhance their training, and thus to improve the external validity of psychological research. The curriculum at both the undergraduate and graduate levels needs to be examined to ensure that it provides students with up-to-date skills.

Psychology can improve its leadership in interdisciplinary enterprises but only if its teaching programmes emphasize both basic training in psychological theory and methodology and bridge gaps with other disciplines. This means, for example, bridging the gap with the biomedical disciplines in psychobiology, with sociology and political science in social psychology, with management and technology programs in industrial psychology, with computer science, mathematics, and statistics in computational neuroscience, and with psychiatry in clinical psychology. Our challenge is to build into the curriculum of psychology programmes appropriate interdisciplinary training, while still maintaining the strong, traditional basis of Psychology.

In addition to interdisciplinary training, there is a need to better equip future researchers for the job market outside university settings as there has been a marked reduction in new university faculty positions during the last years. At a meeting of the Canadian Association for Graduate Studies (CAGS) in November 1997, specific remedies to this problem were discussed. Although these suggestions were directed at problems affecting graduate programmes in general, they certainly merit careful consideration by Graduate Departments of Psychology. The following quote by Dr. Robert Kavanagh captures the essential message:

«The graduate education process should be broadened such that the graduates are better suited to a range of potential occupations. Aspects for greater emphasis include: presentation skills to general, as well as to specialized, audiences; departmental seminars on the job market; opportunities to participate in technology transfer activities; better language skills; and more awareness of the international dimension in their discipline.

Universities must provide doctoral training which produces more versatile graduates. They must establish partnerships with professionals from the non-academic sectors and involve them on advisory committees, in departmental seminars, and as co-advisors. Departments should offer better career guidance to graduate students. Universities must acknowledge and celebrate the non-academic, as well as academic, career successes of their graduates. In certain disciplines departments should consider the establishment of enrollment quotas.

Supervisors must accept that they are not training clones of themselves. They must assume greater responsibility as mentors. They should

refrain from encouraging students to believe that their primary or only goal is to become academics. A role of the supervisor is to help establish bridges between the graduate program and professional employment. Students must take more responsibility to be better informed about employment opportunities: they must be more versatile; they must be willing to consider a broader range of employment possibilities; they should get involved in activities outside their specialized studies; they should become more entrepreneurial and consider creating their own jobs.» (CAGS, Special Newsletter, January 1998)

Chapter II

PSYCHOLOGY AND SOCIETY

Over the years, psychological research has contributed greatly to finding solutions to many important social and behavioural problems, and in this time of rapid social and technological change, researchers in all fields of psychological science are even more committed to research that will ensure a secure future for all Canadians. In the following section, we provide examples of issues to which Psychology has already contributed a great deal, as well as examples of new research initiatives which, with appropriate investment, will yield knowledge of immediate relevance to the solution of the many problems facing Canadian families and individuals today. These examples were selected specifically because they relate to the Canadian context, and as such do not represent the whole spectrum of psychology's contribution to knowledge and practice. For some of the examples, the issue of resources was addressed in order to identify specific resources that will be required to generate new discoveries.

HEALTH AND WELL-BEING

Goal

There is no doubt that one of the most significant issues preoccupying Canadians is their health care system. Recent surveys suggest that most Canadians believe that the quality of health care in Canada has declined recently, and they are most concerned about this state of affairs. Psychology has adopted the goals of better understanding the biopsychosocial factors responsible for health and illness and proposing effective interventions in order to promote the psychological well-being of all individuals in our society. Research on the origins of mental disorders, coupled with a better description of the psychosocial factors responsible for both increased susceptibility and resistance to mental illness, is also important as it will lay the foundation for treatment and prevention strategies that will reduce mental disorders in the near future.

Background

Psychology has been actively involved in improving our understanding of the biopsychosocial determinants of health and illness. This understanding has been advanced by both basic and applied research in a large number of health areas. Brenda Milner and her associates at the Montreal Neurological Institute have been responsible for much of the seminal work on the temporal and frontal lobes in humans, and have laid a psychobiological foundation for much of our current understanding of the neuropsychology of memory functioning and disorders. This work, coupled with advanced research on cognitive functioning and neuroscience has placed Canadian investigators at the forefront of international research on the neural bases of both normal and abnormal brain functioning. Given the statistics about the number of closed head injuries in Canada, increased knowledge about brain function is important, both to document the types and severity of injuries, but increasingly also to plan effective treatments for people with such injuries. Similar biobehavioural strategies have been used to study other

accidents and illnesses including stroke, motor movement disorders, cancer, dementia, and mental disorders.

Many of the major health problems facing Canadians have a recognized basis in problems with behaviour. For example, substance abuse disorders, compulsive gambling, obesity, clearly have a behavioural component that needs to be understood to develop better treatment and prevention strategies. Further, disorders that have traditionally been considered more purely physical in nature are increasingly understood as biobehavioral in nature. For example, poor exercise and diet, both of which have large behavioral components, have been recognized as significant factors in the development of coronary heart disease. As our understanding of the complex relationships between behavior and health are extended, research on the psychology of behavior will be recognized as having a large role to play in the conceptualization of health and illness.

A particularly disturbing statistic is emerging from the epidemiology of mental disorders: It is now estimated that 32 percent of adults will fall victim to some form of psychosis, major anxiety, mood disorder or substance abuse during their lives, with 20 percent exhibiting debilitating symptoms in any given year.

Mental health and mental illness are the product of complex interactions among biological/genetic factors and the unique environmental and experiential factors that constitute an individual's life history. There is growing awareness that brain functions contribute to mental disorders, but that they do so in the context of behavioural functions that are also controlled by the brain. Research in this field requires a biobehavioural perspective that recognizes the capacity of environmental and psychosocial factors to mould the structure and function of the brain, for better or worse.

In addition to the above contributions to the understanding of various health problems, Canadian psychology continues to work at various levels of the health care system. Psychologists provide direct care for many forms of illness, are engaged in health promotion activities, and are also directly involved in the planning and administration of health care systems. Some psychologists have taken an active role in health care policy. The Canadian Psychological Association, through its national linkages, and in collaboration with its provincial/territorial counterparts and the Canadian Register of Health Service Providers in Psychology, has been an active player in providing consultation to the federal government's policies and financing of the health system in Canada. Psychology remains committed to the ideals of adequate health care for all Canadians and pursues this commitment through both basic and applied research. In the sections that follow, illustrative examples of Psychology's achievements are provided, along with examples of continuing challenges in these domains.

Biopsychosocial Determinants of Health and Illness

Achievements

As noted above, psychologists have been involved in discovering the many factors that are responsible for illness, as well as the determinants of health. This research is very broad in scope, addressing many different types of disorders and different conceptual models (genetic, biological, behavioural, cognitive, affective, social, etc.). Canadian psychology has produced many examples of internationally recognized work at both the basic and applied levels. Some examples of basic science include the preeminent role played by Canadian neuropsychologists at various centres including the Montreal Neurological Institute, the Rotman Institute, the Universities of Western Ontario, Lethbridge and Victoria, in revealing the complex functions of the cortical systems of the human brain. Other researchers at McGill and Concordia, the Clarke Institute and Addiction Research Centre of the University of Toronto along with colleagues at UBC have made major contributions to understanding the functions of subcortical networks, in particular those responsible for motivation and the addictive properties of drugs of abuse. Research on the factors that underlie normal eating behaviour and eating disorders such as anorexia nervosa and bulimia, has identified psychological and social factors that may precipitate eating disorders, and the role of specific neurotransmitters. This research has already contributed to appropriate clinical interventions such as cognitive behaviour therapy, along with pharmacological treatment with antidepressant medication. Canadian psychologists in Ottawa, Montreal, Toronto and Halifax also have pioneered research on sleep cycles and their relation to a number of clinical disorders including mood disorders.

Psychologists working in clinical programmes in universities and hospitals across Canada also have gained international recognition for their work on the predictors of various forms of illness. For example, researchers at Dalhousie, McGill and UBC have pioneered the study of pain experience and pain treatment in children and adults. Other colleagues have focused on the role of stress as precipitating factors in a variety of illnesses ranging from coronary heart disease to substance abuse or the major psychoses of schizophrenia and depression. Canadian psychologists also have contributed in many important ways to the understanding and treatment of anxiety disorders.

Challenges

For all the different illnesses discussed above, there is an immediate need for further research on their origins, including the genetic, environmental and social factors that influence the vulnerability of individuals to these disorders. One important question is whether there are critical developmental periods for specific risk factors. Many questions remain to be answered with respect to the biological consequences of psychosocial stress, including: how does exposure to stress alter the human immune system and brain neurochemistry? Can programmes designed to improve the use of coping strategies reduce the effects of stress? Optimal strategies for addressing questions related to the biopsychosocial determinants of illness and health, will undoubtedly involve collaborative multi-center research programmes and a commitment to the funding of appropriate longitudinal studies. This essential research will not proceed without the appropriate infrastructure support for collaboration, including the appropriate means of transmitting large data bases securely between investigators, the exchange of scientific personnel, and regular meetings amongst members of specific network to interpret the latest data and to refine the next phase of the research.

Another challenge for future researchers examining health will be the changing demographics of Canadian society. As the population ages, there will be a concomitant increase in disorders of the elderly, including depression, dementia, Alzheimer's disease, coronary disorders, cancer and social disruption. Although Canadian psychology has a strong tradition in areas of basic research pertinent to problems associated with aging, the number of such researchers is considered insufficient to meet the increasing need to understand aging disorders and phenomena. Increased resources for training and research need to be directed into these domains, to meet both the research and service needs created by this population shift.

Health Promotion

Achievements

There is a long-standing recognition, as reflected in a number of public health policies, that increased efforts need to be made in the area of health promotion. While high quality tertiary care is a clear public expectation and will remain a core feature of Canada's health care system, the tradition of spending health care dollars only after disorders have developed (and especially in the latter part of a person's life) is poor utilization of health care dollars. Increased health promotion, in the context of understanding the biopsychosocial determinants of health and illness, has the potential not only to maintain quality of life for people who might otherwise suffer illness but also to lower overall health costs.

Despite the logic and appeal of research on health promotion and prevention in the area of health psychology, one can point to only a few notable achievements. These include the Better Beginnings project currently funded in Ontario, and the school-based prevention of depression research being conducted at the University of Calgary.

With additional financial support, similar research could be developed in a number of other areas. Examples of such possible prevention areas include: working with the children of parents with developmental and mental disabilities; domains where the risk factors are fairly well identified, such as anxiety and eating disorders; and physical disorders with a strong behavioural basis, such as coronary heart disease, obesity, smoking, drug abuse, and sexually transmitted diseases. Psychologists can also be involved in the evaluation of delivery of these programmes because they have the knowledge of design and statistics.

Challenges

As can be inferred from the above, despite the compelling nature of the logic behind preventive research and interventions to date, most of the health care dollars in Canada are devoted to the assessment and treatment of existing disorders. To the extent that funds are not directly targeted to true prevention research, or at least early assessment and secondary prevention research, it is likely that Canadian health care will have limited impact on health and well-being.

Another challenge for prevention research is the fact that it is neither short-term nor inexpensive. For prevention work to be effective, protocols must be established and maintained

for years, if not decades. The pattern of support for current research is an impediment to such work. First, most operating grants have a relatively short duration which is incompatible with the time frame needed for significant epidemiological and/or prevention work. This problem is further compounded by the fact that most universities reward publication productivity, which may bias university investigators towards shorter-term, outcome-oriented investigations. For prevention research to succeed, both the duration of awards and amount of funding, and the reward structure for university faculty need to be considered.

Developing Treatments

Achievements

Notwithstanding the arguments made above for prevention research, the fact remains that most psychologists engaged in the health care system work with people with existing disorders, and their research examines such issues as the correlates of those disorders, or effective treatment methods. Some of the treatment research is focused on theoretical models of intervention (i.e., which model of treatment works best with people suffering from different disorders), or models of change. Other research is more pragmatic and is essentially focused on the question of what is the most effective set of strategies to remediate presenting disorders.

Canadian researchers have actively participated in the development and promotion of psychological treatments. Examples of such work can be found in Québec, Ontario, British Columbia, Alberta and other provinces. They include: the treatment of compulsive gambling, the development of emotion-focused couples therapy for distressed couples, the development of cognitive-behavioral treatments for obsessive-compulsive disorders, the refinement of exposure-based therapies for anxiety disorders, and the research on methods of change and outcomes of cognitive therapy for depression, as well as the co-operative efforts such as the Task Force on Empirically Validated Therapies sponsored by the Section on Clinical Psychology of the Canadian Psychological Association

Challenges

Although Canadian psychologists have made and will continue to make strides in the biopsychosocial treatment of various health problems, there are a number of significant challenges to this work. These obstacles include poor funding and long-term research strategies. To conduct a well- designed treatment study with a sufficient number of research participants to draw meaningful conclusions, and with a reasonable follow-up period in order to investigate long-term effects and/or relapse, typically requires a minimum of 4-5 years of funding. Few Canadian granting agencies offer this type of support, although granting agencies such as the National Institutes of Health (NIH) and National Institute for Mental Health (NIMH) in the United States have for some time recognized the need for longer-term, investigator-based funding.

Further complicating the problem with inadequate funding is the fact that, whereas pharmacotherapy is typically industry-sponsored, there is no comparable proprietary interest in developing psychological interventions. Thus, the financial incentive that drives so much drug research in Canada is not present for psychosocial treatments. Unfortunately, the lack of equal

funding sources makes it more difficult to substantiate those treatments that may, in some cases, be more effective and even more cost-efficient than drug therapy. It is well known, for example, that the single most effective treatment for obsessive-compulsive disorder is not drug therapy, but exposure plus response prevention. It is also well-established that cognitive therapy for mild and to moderate depression is as effective as drug therapy. These findings, however, have taken many years to establish due to the inherent bias against the funding of research on psychosocial treatments.

Another challenge for the development and contribution of innovative psychosocial treatment research to health care is the need to determine societal and personal factors that impeded access to services for many who are in need, as well as the need to develop methods for ensuring that existing validated treatments and truly innovative ones for specific forms of mental or physical disability are brought into the mainstream of the health care system. Canadian studies have shown that appropriate psychosocial and pharmacological treatments are delivered in specialized clinics or research centres. Despite this, up to 80% of the population still fail to receive the best available treatment in hospitals or mental health clinics.

Decision-Making in Health Care

Achievements

Psychologists have also taken a limited but important role, in the area of decision making in health care. Our particular contribution, in addition to whatever specific knowledge about disability and disorder a particular psychologist may bring to a given health care area, is expertise about research design and methods. It is a historical fact that training programs for clinical/health psychologists are located almost exclusively in departments of psychology in Canadian universities. Canadian clinical and health psychology doctoral programs uniformly espouse a "scientist-practitioner" model of training, by which is meant that the graduate must be trained in both the science and practice of health care. One of the major achievements of Canadian psychology has been the development of national accreditation standards for such programs by which most Canadian programs in clinical/health psychology have been accredited.

One important consequence of the nature of training for many clinical psychologists is their ability to participate in a meaningful manner in the development of health care policy. Most typically, such participants bring a strong emphasis on evidence-based practice and policy, and they try to bring about convergence of research and practice wherever possible. Examples of such work can be found in the area of suicidology in Ontario, Québec and Alberta, where psychologists have been active in the development of programmes and policy, or recent revisions to the Young Offender Act recommended by the Family Court Clinic, London, Ontario. Our perception is that psychological research has much to offer policy and law makers, if given the opportunity.

Challenges

Notwithstanding the strong data bases that already exist in some areas, and the potential for new research in others, the implementation of psychological research into health care policy is not at the level it should be. One of the main impediments to increasing the level of

implementation is that the work of translating scientific findings into policy and practical implications is not rewarded. Thus, university faculty do not see it as a necessary part of their mission to ensure that the results of studies with clear policy implications get into the hands of policy makers. Indeed, in many instances academics do not have the knowledge about how to make such translations, even if they wished to do so. Recent funding policies which encourage the dissemination of research results beyond the traditional journal publication and conference presentation will no doubt help to ensure that «policy-relevant» research is more likely to be utilized, but we question whether the current policies are enough. It may be that innovative funds and mechanisms for policy dissemination need to be found. In Alberta, for example, the Alberta Heritage Foundation for Medical Research is considering the creation of a specific dissemination fund by which dissemination would be funded as a special "add-on" incentive to research grants. Alternatively, funding may be provided for an in-house writer to ensure that appropriate research results are written in a user friendly manner for policy makers. Such initiatives, particularly the idea of a writer funded by the granting agency, may help to circumvent the problem that arises when a researcher wishes his/her results to be disseminated, but factors such as time, expertise and university incentives thwart these intentions.

Basic and applied research in the area of the contributions of Psychology to the health and well-being of individuals can best be served by an interdisciplinary approach that brings together psychologists with interests in basic and clinical research. In this manner, basic research will be informed by clinical problems and clinical practice will benefit from the insights arising from the latest research in cognition, developmental, social and biobehavioural sciences. With respect to the training of professionals in clinical and neuropsychology, it is essential that trainees have a strong background in the biological, cognitive, affective and social bases of behaviour and a commitment to the rigorous assessment of all treatment programmes to ensure that they provide meaningful benefit to individuals and their families.

HUMAN DEVELOPMENT AND AGING

Goal

To develop a better understanding of the factors affecting human development from birth to old age, and to apply this knowledge to education, training and re-training, health, family, and social relations across the lifespan.

Background

Developmental psychologists have traditionally studied the social and intellectual growth of children from infancy to young adulthood, describing and analyzing the factors that lead either to a healthy, balanced individual, or to development that is less than optimal. More recent work has extended this traditional base in two distinct ways. First, researchers have argued that development continues past adolescence through the adult years to old age, and the fields of social gerontology and cognitive aging are now flourishing. Second, in current research, there is less emphasis on description and more emphasis on possible mechanisms - again, in the realms of both social and cognitive development.

Child Development

Achievements

In the area of child development, specific achievements that have considerable Canadian content include attachment theory, work on the acquisition of values, and a topic referred to as theory of mind. Attachment theory deals with the emotional bond forged between infants and their caretakers. Successful bonding has profound implications for personality development, for the person's later ability to form lasting relationships, and for social competence in general. One of the early pioneers of this work was Mary Ainsworth, then at the University of Toronto. Also in the area of social learning, Canadian psychologists have studied compliance in child-parent interactions, and how such interactions lead to the acquisition of values, to a concern for others, and for society in general. Theory of mind also involves a number of Canadian researchers; this approach to cognitive development stresses the gradual differentiation of the child's self image from the rest of reality - the ability to see that other minds may hold different beliefs from one's own, and that realities may change from past to present.

Challenges

Topics that would benefit from a concentrated research effort at present include the many issues surrounding the problem of child poverty, learning disabilities at various ages, and the effects of early experience on later ability to cope with stress. These topics are interrelated to some extent. Poverty may be associated with malnutrition, with parental stress and consequent maltreatment of children. How do these factors affect learning, school performance, and social relations? What role do genetic factors play, and how do social and emotional interactions affect the development of brain mechanisms? Are learning disabilities innate or acquired? Are they linked to perceptual problems? The new techniques of neuroimaging may provide important clues here. The area of neuropsychology has always been strong in Canada, and this expertise should be brought to bear on problems of child and adult development. The abilities to learn, to form relationships, and to cope with stress are central ones for modern society.

Adult Development and Aging

As life expectancy increases, problems associated with an aging society have become equally central. These are not simply issues of humanitarian concern - costs associated with maintaining an elderly population present a major (and growing) economic challenge to governments at every level. How can psychologists help?

Achievements

Studies of aging have grown exponentially over the last 50 years, and Canadian psychologists have been prominent in both social and cognitive gerontology. We now understand (in outline at least) how memory and learning abilities change over the lifespan, what types of memory decline, and what types hold up. Memory and learning do not exist in isolation from other cognitive factors, and researchers have explored their relations to attention and concentration, to sensory problems, and to decision-making and judgment. Research on age-

related changes in learning, memory and problem-solving is the focus of several research groups across Canada, with one of the strongest being the Rotman Research Institute in Toronto. The primary focus of this Institute is on memory and the executive functions of the brain, both in normal aging and in the presence of diseases and conditions which affect the brain, such as Alzheimer's disease and strokes.

On the social side, we have some appreciation of how social and family interactions contribute to successful aging, of problems relating to work and retirement, and of issues relating to living arrangements. One particular problem that has received attention recently is that of the so-called "sandwich generation", i.e., middle-aged people (women, for the most part) who are attempting to cope with the triple burdens of child rearing, their own jobs, and caring for elderly parents.

Challenges

The challenges in this area are many and obvious. We urgently need to know more about the factors conducive to achieving a satisfying and productive old age, and how these factors can be built into Canadian society at a reasonable cost. How can we design better housing, for example, to enable seniors to live independently, yet with help nearby if needed? We have a century of fundamental research on memory and learning. How can we take this work out of the lab and apply it to the design of optimal learning and rehabilitation methods? Also in the area of memory, can we design tests that will distinguish the relatively benign effects associated with normal aging from those associated with early Alzheimer's Disease? Sensory problems connected with failing vision and hearing present difficulties to the elderly; we need to know more, not only about age-related changes in the senses and how they can be mitigated, but also about how sensory impairments have an impact on cognitive and social functioning.

How do older people cope with daily stresses, and can these stresses be lessened with adequate supports from family, friends, and living arrangements? Many other areas would profit from good research at present: aging and health, for example (problems of depression, maintaining a medication regime, falls, mobility), also aging and employment (appropriate retirement age, job satisfaction through the lifespan, re-training methods).

Ressources

The problems associated with development and aging are ones that all industrialized societies are now facing. Psychologists are well placed to help with these problems, given their focus on the whole person, coupled with their knowledge both about brain mechanisms associated with healthy and impaired functioning, and about interactions between people. As we have highlighted in the preceding examples, it has become increasingly obvious that various specialists must collaborate to find adequate solutions. As just one example, learning in both children and the elderly depends on brain mechanisms, instructional methods, and a rewarding social context. The development of optimal methods necessarily depends on interdisciplinary collaboration between neuroscientists and neuropsychologists on the one hand, and educational and social psychologists on the other. In this and many other instances, governments could help by providing funds to tackle specified problems; but psychologists themselves must also help by laying out these

problems in clear ways, and by showing both how current research findings can be applied to the problems, and where the gaps are in our fundamental knowledge. That is, the application of existing knowledge and the creation of new knowledge must proceed in parallel.

EDUCATION

Goal

To understand the process of learning as it takes place across the lifespan in both formal and informal settings and to use this knowledge to create learning environments that are accessible, supportive, and effective.

Background

The notion of what is entailed by education has expanded greatly in recent years. Traditionally, education was a formal experience that took place in schools; today, education is a protean and continual enterprise by which we adapt to changing circumstances, master new technologies, and deal with increasing volumes of information. Defined this way, education is a dynamic process, not confined to a place or time, and essential to success in the modern world.

We need to modify our models and research paradigms, making them appropriate to address this enlarged view so we can begin to understand how education takes place in its various guises and how it can be made more effective. These models need to be based on current research in both child and lifespan development, including cognitive changes with aging, social theories of interaction and instruction, approaches to mentorship and the cultural dimensions of knowledge transmission, and psycho-social aspects of development in young children, including gender identity and ethnicity. At the same time we need to recognize the importance of all the constituencies in the education process. Psychologists need to communicate with such specialists as teachers, programme developers, curriculum consultants, textbook writers, job counsellors, and students to set agendas and identify issues. The artificial barriers that have traditionally segregated these groups need to be breached for the common good.

Language and Literacy

Children's early foundations in literacy are fundamental to academic success during the school years, but they also prepare children for the skills needed to be successful adults in a complex technological society. Recognition of this fact was one of the significant factors in the establishment of early education programmes in the past several decades, most famous among these being Project Headstart in the United States. Canada has contributed to this research and programme development in important ways.

Achievements

Recent research in language acquisition and reading development substantiates the notion that there is important continuity from children's early experiences with spoken language to later proficiency in language, literacy, and other academic subjects. The strong interactive relations

between language and literacy skills have now been well documented. Canadian researchers have contributed important insights into the body of evidence that shows the effects of social context and parental involvement in language development to the acquisition of literacy and the course of literacy in the early years. For example, children's early success in reading is linked to their metalinguistic control over spoken language, especially in terms of its phonological structure. We also know that talking to children, reading stories to them, and playing word games contribute to children's mastery of the literate form and their facility in using it.

Another research priority emerges from the recognition that a large number of children in Canada (by some estimates, almost half the children in major urban centres) now enter school without speaking English or French as a native language or at least know a language in addition to English or French. Canadian researchers have been in the vanguard of studies of bilingualism and second language acquisition. In international forums, Canadian studies on these issues are considered to be the leading work in the area. As one example, language immersion programmes in elementary schools are heralded as a significant educational achievement and are recognized as a uniquely Canadian. We have also made tremendous progress in understanding the experience of children who are raised in bilingual families, the process of learning a second language in both formal and informal environments, and the relation between language competence and the acquisition of literacy in one or two languages.

Challenges

The contribution of Canadian research to issues in language and literacy can be pursued by facing a number of challenges. For example, developing more reliable instructional methods for equipping young children with high level language skills should be a priority. At the same time, we need to enhance our research initiatives in the area of language disability, dyslexia, and other language impairments to determine with greater precision the nature of the disability and to develop methods for compensation that will give these children the opportunity to develop their skills to the highest level possible. These studies may benefit from methodologies that combine neuroimaging with more traditional behavioural measures.

Studies need to pursue the issues surrounding bilingualism in school children to determine how these linguistic configurations alter and influence children's experiences in school and their progress in mastering literacy, as well as other academic subjects. What does it mean for children to learn a spoken language and to learn to read in that language at the same time? Does it make any difference if children have early literacy experiences in some other language? Does knowing two languages affect how children learn the formal structure of one of them? To what extent are children limited by linguistic skills in their efforts to learn subject matter in other academic areas?

The problem of language and literacy training for non-native speakers is also critical in adult education. Recent immigration has profoundly changed the face of Canada and presented new educational challenges. In many cases, the new immigrants are well-educated and literate but know no English or French. Their demands for language programmes are quite different from those that served the immigrant population a generation ago. Accordingly, we need to develop adult literacy programmes for people who have diverse and specialized backgrounds. How does one teach high levels of language skills to adults? A view that has prevailed as common wisdom

for some time is that childhood is a privileged time for language learning, a «critical period» in which optimal learning takes place. New evidence has challenged some of these claims, but the main conclusion from this research is that the situation is more complex than we imagined. Although it is undeniable that adults experience more difficulty than children in learning another language, it is not clear that they are prevented from achieving high levels of success because of neurological limitations; indeed, many adult learners reach native-like levels of proficiency. We need to examine the cognitive, social, neurological, and pedagogical aspects of language learning across the lifespan so that those factors that are modifiable can be amended to produce more conducive learning contexts.

Critical Thinking

Education is more than transmitting knowledge: it is instilling in the individual the ability to analyse information, to evaluate arguments, and to make decisions. In educational jargon, these skills have come to be part of the goal called «critical thinking.»

Achievements

Research in various fields in psychology has contributed to our understanding of critical thinking and our approaches to developing it in children. For example, recent conceptualizations of intelligence have changed the definition of what we consider to be intelligent behaviour. For some theorists, intelligence includes a broad range of abilities encompassing social and motoric performance as well as cognitive abilities. If these skills are indeed part of intelligence, then education needs to recognize alternate forms of expressing thoughts and creating ideas. Following the logic of critical thinking, there is a need for a greater legitimacy in areas that have previously been peripheral to formal education. Another example is the insight gained from cognitive research into the conditions that lead to transfer of learning. These turn out to be more complex than previous models predicted and require consideration of situation, task, and individual characteristics. If education aims to provide children with skills and knowledge that can generalize beyond the immediate situation, then these factors need to be investigated and incorporated into pedagogical policy and practice.

Challenges

The role that this objective plays in educational practice and policy is often left to forces beyond the education community. For example, in certain provinces, political decisions have recently been taken to develop standardized testing, focus curricula on basic skills, and restrict the range of optional subjects available. These acts reflect a commitment to a different vision of education, one that is possibly inconsistent with the development of critical thinking. Because of the enormous impact of such decisions, they need to be informed by research that assesses long-term outcomes from various educational alternatives, monitors on-line progress as children acquire these skills, and evaluates the effects on children's intellectual development. Without adequate controlled research, policy becomes vulnerable to the vagaries of fads rather than to the strictures of evidence.

One area of research that may provide a model for considering how critical thinking is expressed in formal education is the research that has followed from the early studies by Kohlberg on moral development. In this research, people were asked to find a solution to specific moral dilemmas that were presented as short stories. Although the claim was that there were no correct answers, responses were scored for the level of moral reasoning they presumably reflected. More recent research has shown the biases in this research that were based on gender, ethnicity, culture, and various contextual factors of the testing situation. Developing critical thinking means going beyond these biases and recognizing the structure of arguments and appreciating the alternative perspectives that can be introduced. Research is needed to determine what the logical structure of reasoning is and how it can be recognized and encouraged in educational settings that routinely must deal with immense diversity. In part, all of this must be achieved through an understanding of the distinctiveness and the interrelationships among linguistic, cognitive, social, and emotional development. This will lead to a better understanding of the educational experience for students and the development of programmes more responsive to their needs.

Resources

There is a new interdisciplinary spirit in psychology that is well-suited to the pursuit of complex issues like these. Psychologists now consider themselves to be connected to researchers in such fields as philosophy, linguistics, sociology, and biology through their shared interest in the human condition and human intelligence. Collaborations among these and other disciplines will be the basis for finding new solutions to these long-standing problems in education. One important aspect of these collaborations is the incorporation of methods from different traditions that will provide information that could not have been introduced by a single approach. If solving the problems of education seems to be intractable, the problems that will appear in the next generation, if these issues are not dealt with now, are potentially far more serious and insoluble. From this perspective, the priority that must be placed on educational research is self-evident.

WORKPLACE AND THE ECONOMY

Goal

To discover ways of increasing the quality of worklife in organizational settings with emphasis on ways of increasing employee productivity and job satisfaction. Research shows that increasing an employee's productivity will directly affect an employee's satisfaction with the job rather than the reverse. People are frustrated by that which they perform poorly; they like what they can do well.

Background

Canada's competitiveness in a global society is dependent directly upon discovering ways to maximize the knowledge, skills, and abilities of its human resources. Advances in technology, low wages paid to employees in underdeveloped countries, and the flooding of products from these countries to Canada have contributed to the perceived need by organizational decision makers in Canada to re-structure the ways that work is completed. This has led to major reductions in many organizations' workforce. Consequently, many Canadians are unable to secure

meaningful work. An additional concern is that the attraction of Canada as one of the most desirable countries in the world in which to live has led to a demographically diverse workforce where employment discrimination frequently occurs on the basis of an individual's race, sex, religion, and national origin.

Achievements

Canada's industrial-organizational psychologists are recognized internationally for their applied research that is published in top tier journals.

Theory and methodology have been advanced for training people in leadership. Specifically, psychologists have shown the necessity for leaders to develop a vision that inspires and galvanizes a workforce and to set specific difficult goals to move the vision from rhetoric to concrete action steps.

A primary role of leadership is selection. Canadian psychologists have been at the forefront in developing job analysis techniques that identify the knowledge, skills, and abilities critical for performing a job well, and developing selection techniques that minimize employer biases. The statistical correlations between how people perform on these selection procedures and how they perform on the job have been impressive.

A second role of leaders is to coach and develop employees after they have been hired. Canadian psychologists have pioneered ways of developing appraisal instruments for measuring an employee's performance, increasing the objectivity of the observers who use the instrument, and bringing about a positive behavioural change on the part of employees on the basis of performance feedback and setting goals based on this feedback.

In the process of conducting an appraisal, a leader may discover that an employee has the desire but not the skill to perform the job well. Canadian psychologists have written extensively on the subject of training. Empirical research has been conducted on ways to improve the skills of leaders themselves as well as the people who report to them. In the process of an appraisal, a leader may also discover that the person has the skill but has lost the desire to perform the job well. Canadian psychologists are extremely well known for their theories of motivation and organizational commitment, and for the empirical research that support these theories. The three dominant theories of employee motivation used world-wide were developed by Canadians (expectancy theory; goal-setting theory, social-cognitive theory).

Finally, leaders must find ways to design organizations that foster an environment conducive to high employee productivity and high job satisfaction. Canadian researchers are well known for their ability to create socio-technical systems that lead to an optimum balance between the technical aspects of a job and the social needs of the individual.

Challenges

Emerging research findings suggest that immediate attention needs to be given to the following areas:

- C To attract and retain high performers, organizations must show that they respect work/family balance. What is a proper balance? How can it be implemented effectively? Organizational citizenship is defined as doing things for the organization without receiving formal or informal rewards. How can this phenomenon be encouraged in an era of employee downsizing and massive layoffs?
- C Downsizing and massive layoffs have led to the development of the theory of organizational justice. Empirical research on this theory shows that in addition to an organization acting fairly on behalf of its employees, it must, in addition, be perceived by them as doing so. How can Canadian organizations demonstrate the principles of organizational justice? This theory may prove to be especially helpful in increasing ways that organizational leaders and their union counterparts can work together effectively.
- C Because of massive restructuring in Canadian organizations, many employees have shifted their commitment from their organization to their profession or occupation. This can be seen readily in professional sports where a player is loyal to hockey rather than to the organization that momentarily employs him. How will leaders in the 21st century attract, motivate, and retain employees who have rejected the very notion of organizational commitment?
- C Intriguing research on self-efficacy, the conviction on the part of the individual that «I can cause, bring about, make happen» suggests that people with high self-efficacy view obstacles as challenges to be overcome; people with low self-efficacy view these same challenges as a rationale for abandoning the task. A recent Canadian study on training on ways of increasing self-efficacy led to the re-employment of displaced managers who had previously given up their search for work. To what extent can training based on social cognitive theory, of which self-efficacy is a central variable, be used to create a resilient work force?

CANADA'S MULTICULTURAL SOCIETY

Goal

To understand the impact of Canada's multicultural diversity upon individuals and society, and how newcomers to Canada can integrate effectively and happily into Canadian society.

Background

Ethnic and national diversity has always been a defining feature of Canada's population. Over time, this diversity has been greatly enriched by newcomers to Canada from many other countries around the world. On a per capita basis, Canada receives more immigrants than any other country.

As a result of these historical and contemporary processes, Canada is one of the most ethnically and culturally diverse countries in the world. Social and cross-cultural psychologists in

Canada have responded to these demographic and ethnocultural realities with research enriching our understanding of ethnicity and multiculturalism, the acculturation of immigrants to Canada, and second language learning of «charter» and heritage languages.

Multiculturalism and Ethnic Diversity

Canada's federal multiculturalism policy was developed to encourage individuals living in Canada to participate fully in the mainstream of national life, while still retaining their ethnocultural heritage(s). Yet how do Canadians construe multiculturalism? How does multiculturalism affect Canadians' sense of national identity?

Achievements

With funding from the Federal Government, psychologists have surveyed the attitudes of Canadians toward multiculturalism and ethnic relations, most recently in the early 1990s. These surveys are important achievements in that they have «felt the pulse» of Canadians as regards their feelings toward multiculturalism and ethnic diversity, their sense of ethnic identity, and their views of other ethnic groups. For example, the 1991 survey found that Canada's ethnic diversity affects the very fabric of individuals' interpersonal relations. More than 75% of Canadians live in neighbourhoods with persons of different ethnic and national origins and count them as friends. Nearly two thirds of all Canadians work with people from different ethnocultural backgrounds and feel our ethnic diversity enables Canada to tackle national and international problems more effectively than would be the case in a more homogeneous society. A substantial majority of Canadians view the Federal policy on multiculturalism positively and believe that its positive impact includes enhancing cultural life in Canada, fostering equality of opportunity, and strengthening a feeling of belongingness to Canada. Ninety-five percent of Canadians are simultaneously proud of being Canadian as well as proud of their ethnic ancestry.

Challenges

Yet challenges remain for multiculturalism policies and research in Canada. Twenty-five percent of Canadians are unaware of Canada's federal multiculturalism policy, while another 25 percent oppose it. A majority of Canadians also agree that prejudice and discrimination remain serious problems for certain ethnic groups, such as «visible» racial minorities. The issue of how to increase ethnic and inter-group tolerance, on one hand, as well as how to help those affected to confront and cope with prejudice and discrimination, on the other hand, remain important goals for social psychologists (and other social scientists) conducting research on multiculturalism and ethnic relations in Canada.

Acculturation: Welcoming Newcomers to Canada

Acculturation refers to changes and consequences for individuals and societies that arise when coming into continuous contact with another culture. Acculturation, of course, inevitably arises whenever an immigrant, refugee, or sojourner migrates to another country for temporary or permanent habitation. The process of acculturation is key to understanding immigration.

Achievements

Canadian social and cross-cultural psychologists are world leaders in research on acculturation and immigration. By contrast to an earlier view of acculturation as simply a process of assimilation to the dominant culture, Canadian researchers have proposed and verified «multiple option» perspectives, showing that immigrants and ethnic group members have several different orientations or choices regarding heritage culture maintenance and involvement with the mainstream culture, respectively. In addition to «assimilation» (i.e., favouring the host culture over one's heritage culture), these choices include the «multicultural» option of combining both the heritage and the host culture (called «integration»), as well as «separation» (favouring heritage culture and disavowing the host culture) and «marginalisation» (feeling alienated from both the host and heritage cultures). Attitudes of assimilation and integration are associated with a stronger sense of subjective well-being and psychological adjustment than are attitudes of separation or marginalisation.

Another achievement by Canadian psychologists to understanding acculturation is the notion of acculturative stress – i.e., the different stresses that may be encountered by a refugee, immigrant, or sojourner in the process of relocating to another country or culture, as well as by aboriginals and ethnic group members in a given society. For example, individuals voluntarily exposing themselves to cultural change, such as immigrants, suffer less acculturative stress than those doing so involuntarily or under duress, such as refugees. At the national level, countries with an explicit multicultural policy, such as Canada, provoke less acculturative stress among immigrants and refugees than do those with a strong assimilationist ethic for incorporating newcomers. On the other hand, factors such as prejudice and discrimination towards immigrants and refugees and lack of sufficient employment opportunities heighten acculturative stress and represent considerable costs to the individual and society.

Challenges

Psychologists have shown that the newcomer's motivations and attitudes have a considerable impact on their short-term adaptation and acculturation to Canadian society, but the long-term consequences of different acculturation attitudes are much less clearly known. Another challenge is to assess through comparative research how Canada compares to other immigrant-receiving countries in incorporating newcomers into the fabric of its national life. Studies comparing the relative success of incorporating immigrants among principal immigrant-receiving countries such as Canada, Australia, and the United States are especially important. Canada is arguably one of the most open and generous countries for receiving immigrants and refugees in the world. Yet is this generosity and openness apparent to the newcomers themselves and also when Canada is compared to, say, the United States or Australia?

Language Learning

Theories and findings from the social psychology of language have important implications for second language learning by members of Canada's two charter groups learning the other official language, as well as for immigrants learning either of the two charter languages.

Achievements

Reflecting Canada's bilingual heritage and its federal policy of two official languages, social and cognitive psychologists in Canada are also world leaders in theory and research on bilingualism. Social and cognitive psychological research on English-French bilingualism has demonstrated that acquisition of the second «official» language depends on motivational factors as well as ability, whether for Canadian Anglophones learning French or Canadian Francophones learning English. Three independent factors have been repeatedly found as being relevant to second language acquisition: (1) language aptitude, (2) an «integrative motive» consisting of a positive attitude toward acquiring the second language and a positive attitude towards the target language group and, (3) in communities where the second language group is present, linguistic self-confidence corresponding to a lack of anxiety and a positive self-evaluation of competence in the second language. For Canadian Francophones, self-confidence in English is an additional motivational factor facilitating language acquisition.

Challenges

Recently, Canadian social psychologists investigating bilingualism have begun to consider immigrants and ethnolinguistic groups whose members are not native-born and whose first language is neither English nor French. Proficiency in one or both of Canada's official languages is essential for newcomers to Canada to adapt successfully and to become useful, contributing members of Canadian society. Acquiring proficiency in an official language enhances an immigrant's effectiveness and sense of well-being. Indeed, newcomers to Canada with proficiency in an official language suffer less acculturative stress than do those lacking such proficiency.

There is considerable debate and controversy, however, as to the relative merits of immersion in one of the official languages versus bilingual education (i.e., combined use of the heritage language and one of the host culture's official languages) for immigrant children whose first language is neither English nor French. Advocates of total immersion argue that deficits in the official language contribute to poorer academic performance of immigrant children and those from linguistic minorities. Devotees of bilingual education contend that children cannot learn in a language they do not understand and suggest that the best approach is to instruct linguistic minority students in their first language so that they do not fall behind academically while acquiring proficiency in one of Canada's official languages. For adult immigrants whose education is completed but who lack proficiency in an official language, English or French immersion may be best. The question of which type of language acquisition programme is best suited for children and adult newcomers, then, is a challenge for bilingualism researchers in Canada.

Resources

In exploring broad, societal issues such as multiculturalism and ethnic relations, acculturation of immigrants, and bilingualism, psychologists have often collaborated with investigators from many other social sciences and disciplines: for example, sociology, linguistics, geography, anthropology, social work, psychiatry, nursing, medicine and other health sciences. The recent collaboration between Citizenship and Immigration Canada and the Social Sciences

and Humanities Research Council of Canada in establishing Centres of Excellence for exploring immigration in Canada represents a highly laudable and important innovation for establishing research collaboration among diverse social scientists on a social issue of considerable national importance to Canada. Yet, the funding of these Centres of Excellence as well as of social science research in Canada generally is relatively modest compared to funding levels for other domains of psychology or science. Providing better funding for investigator-initiated research in the social sphere (viz., SSHRC) is a crucial «enabling factor». Likewise, establishing an institute for Canadian research on social issues comparable to the Montreal Neurological Institute or the Rotman Research Institute in Toronto, or research centres such as McGill's or York University's vision research units, would constitute another important factor enabling Canadian researchers to remain world leaders on topics such as immigration, bilingualism, and intergroup relations. The rest of the world looks to Canada in these realms, and these social issues are among the most challenging issues confronting society. The knowledge created by Canadian social psychologists provides a crucial basis for informed policy making by governmental officials and departments. We need to create **sustained** funding of research and research centres in the social sphere to insure that we generate valid knowledge about Canadian society and Canadian social issues.

ENVIRONMENT AND ITS MANAGEMENT

Goal

To promote research on how environmental factors affect human beings, and on policies and design approaches that may maximize beneficial and minimize adverse interactions between people and their environment.

Background

Throughout much of this century, psychologists have gathered and applied knowledge of how aspects of the physical environment affect human learning, thinking, perception, development, personality, and social relations, and how human behaviour in turn affects the environment. Among the major topics of early researchers has been the nature of life in urban communities: issues such as residential density, neighbourhood cohesiveness, the proper design of dwellings and workplaces as well as of communities, environmental aesthetics, the stressful effects of noise, traffic, environmental design to deter crime, etc. More recently, two other important issues are being addressed. One is the actual and potential human consequences of such world-wide changes as pollution, ozone depletion, and global warming; the other, which in many ways is also related to global change, is adaptation to isolated, challenging environments such as the circumpolar regions.

These aspects of the person-environment interaction are of pressing importance to Canadians (including psychologists) because of (a) the growth of urban communities and transportation, (b) an increasing interest among the public and the government in the life of both aboriginal and other Canadians living in the North, and (c) a high level of concern among

Canadians everywhere about adverse changes in climate, air and water quality, the supply of natural resources, and the general quality of the environment.

Urban Environments

Achievements/Challenges

Researchers have found that even deteriorating low-density neighbourhoods may be more beneficial to individual development and social life than high-density, high-rise housing; with revived suggestions for such design in social housing, more research is needed on optimal residential density and on characteristics that counteract the known negative effects. Improved quality of urban life and reduced environmental mischief (e.g., littering and graffiti), can be brought about by such factors as territorial markings, a system of possible rewards for appropriate behaviour, and social modeling; actual and perceived crime rates may be reduced by attention to building scale, personalization, and the feeling of control over access to vulnerable areas. The increase in immigration from non-European sources indicates the need for research on the housing and workplace needs of today's new Canadians; for example, the scientific study of *feng shui* principles of architectural and interior design. Last, urban growth and sprawl lead to increased traffic flow, delays, and noise. Research is needed to develop practical ways to control these problems and to reduce their adverse psychological effects (e.g., «road rage», the known negative impact of noise on learning and communication).

School and Workplace Conditions

Achievements/Challenges

As the Canadian economy becomes increasingly reliant on knowledge-based and service workers, preventing and ameliorating indoor environment problems become more pressing challenges. Complaints about indoor air quality and «sick building syndrome» symptoms, diagnoses of Multiple Chemical Sensitivity, and anecdotal suggestions about mitigating factors, receive regular attention in the Canadian media. Canadians suspect that these conditions arise in part from efforts to reduce air infiltration, to increase insulation, and to reduce the operating costs of building ventilation systems. Environmental psychologists have studied these and other conditions in workplaces and have found that physical conditions do not, in general, predict symptom reports. Individual and organizational characteristics, both alone and in interaction with physical conditions, provide a better guide to understanding these problems. Canadian research in this area is in its infancy, but new multi-disciplinary teams are beginning to address these topics and are receiving international recognition for their work.

Another area of growing interest is the move toward «home worksites»: the use of electronic communications that enable the worker to fulfill job responsibilities without leaving home. This trend has advantages for both employers and employees (and the families of the latter); yet drawbacks both for the individual and for the family are also beginning to be recognized. Our knowledge of both the positive and the negative consequences is incomplete, and the topic requires further investigation.

The Canadian North

Achievements/Challenges

In spite of the fact that it comprises much of the nation's land mass, the North is unknown and strange to most Canadians. Even aboriginal peoples, whose history has led them to know and adapt to life in the region, find conditions often harsh and sometimes extremely stressful; such occasions, as in the case of the Innu and Inuit relocations, can give rise to personal and community tragedies that resound throughout Canada and elsewhere. Destructive patterns, such as depression, suicide, and substance abuse, may emerge from a combination of stressful environmental and sociocultural factors. At times, negative effects have been met with well-intentioned but inept attempts to help, as in the costly erection in Resolute Bay, NWT, of apartment-type housing completely unsuited to Inuit family life and consequently never utilized. Another byproduct of the Arctic and sub-Arctic environment is the difficulty of attracting, and the even greater difficulty of retaining, needed specialists from other parts of Canada. Although research has begun on environmental factors relevant to satisfactory adjustment to such environments, considerably more knowledge is needed on how to make conditions more attractive to both natives and non-natives. Canada is one of the few nations that has both the need for such research and the body of psychological researchers to carry it out.

Global Environmental Change

Achievements/Challenges

Increased pollution of land, air and water; the depletion of the ozone layer over both polar regions; possible global warming and related natural disasters such as the flooding and storms that devastated large areas of Canada in the wake of the El Niño; conservation of endangered species and wilderness areas; proper levels of exploitation and preservation of such resources as lumber and fish; these and similar issues have aroused considerable political, economic, ideological, and aesthetic controversy within Canada in recent years. Perhaps more than many nations, Canadians find these topics interesting and important. International protocols for preserving the environment must eventually succeed or fail to the extent that human values and behaviours support changed habits and lifestyles. Psychologists have studied people's motives and attitudes toward the environment, as well as how these can be changed in the direction of more conscious attention to such actions as conserving energy, reducing waste, limiting the use of environmentally damaging products, etc. Research has also addressed sustainable uses of the environment: priorities between conservation and exploitation of natural resources and the trade-off between short- and long-term outcomes.

Resources

Environmental psychology has no clear supporting structure in Canada. None of the federal granting agencies has an explicit mandate to fund research in this field; unlike in the U.S. and Europe, there are no major undergraduate or graduate programs to educate any substantial number of specialists. Many environmental problems require the cooperation of experts from different fields, and there has been progress in developing this. But schools of architecture,

engineering, and urban planning and even interdisciplinary programs in environmental education still tend to emphasize the natural, physical, and applied sciences, economics, and/or policy analysis and to neglect the psychological component on which any problem resolution eventually must rest. Research in the North is further hampered by cost, administrative complexity, and--again--a lack of emphasis by funding agencies.

Canada does have a small but active and widely recognized corps of environmental psychologists who have done significant work in all four areas of immediate concern. We also have many students who are interested in both the environment and psychology and who, with better opportunities for training and research support, could contribute to the understanding and solution of the problems that we are facing. Canada also has many specialists and programs in environmental studies, providing an opportunity for crucial interdisciplinary collaboration.

The increasing attention paid to psychosocial factors by international agencies and research groups concerned with the global environment provides an opportunity for international collaboration. For example, the International Union of Psychological Science has a project on "Psychological Aspects of Global Environmental Change" (PAGEC), and the Inter-American Institute for Global Change Research (IAI) has the human sciences as one of its major research concerns. Canada has the expertise and interest to take a prominent part in a collaborative research agenda to address these important issues. The challenge is to obtain appropriate funding and official support that would enable Canadian psychologists to develop international links with these and other organizations (e.g., UNESCO) and with individual researchers around the world.

HUMAN RELATIONS AND SOCIETAL ISSUES

Goal

To identify social issues of immediate and potentially future concern to Canadian society, to study the human and individual factors contributing to such social dilemmas, and to develop and evaluate strategies for addressing these concerns in society.

Background

Societal problems are basically problems of human interaction and conflict or individual maladaptation to conditions within society. Such problems can be ameliorated by increased understanding of the underlying dynamics of these issues through focused programs of research and practice. Most of these problems are newsworthy and obvious to all (e.g., violence and aggression and the breakdown of the family and its traditional values). Other issues may have been unanticipated only years before, emerging suddenly with other changes that have been introduced into society. A good example of this latter issue is compulsive gambling. Although it is new, Canadian psychologists have begun to study this behavioural disorder, and will soon be contributing considerable new knowledge to this problem of the 1990s. Meanwhile, other Canadian psychologists have developed special expertise and continue to address ongoing societal issues, such as aggression and violence, and the changing family.

Aggression and Violence

A major contemporary concern is the increasing level of violence and aggression in Canadian society. Although it may not be at the level of other countries, Canadians are concerned about this issue. Violence permeates the news, and fear of aggression is foremost in the minds of many Canadians. Homicide, spousal abuse, parental abuse of children, and abuse of the aged are regularly reported in the media. Violence in television, movies and video games, and in professional sport impact upon impressionable children, conveying a false sense that violence and aggression are accepted values within society.

Achievements

There have been multiple Canadian studies on the effects of TV violence on subsequent aggressive behavior of children, and more sophisticated studies of recently developed rating schemes and technological "censorship" of selected video programs are required to evaluate society's response to increasing concerns and fears. Aggressive behaviour toward others is the subject of much research: research into the dynamics and effects of child abuse and into proper methods for treating and ameliorating the effects on children who have grown up in abusive relationships. Some of this research has focused on the reporting and evaluation of claims of sexual abuse, and on the characteristics of perpetrators of spousal abuse and family violence.

Challenges

Remaining challenges are emerging concerns that have only just hit the headlines of Canadian papers. These include: Gang violence, home invasions, increasing aggression and violence by young women, hate crimes, and road rage.

Forensic and Correctional Psychology

Psychologists in Canada have developed special expertise in forensic and correctional psychology: the diagnosis, conviction, incarceration and treatment of persons convicted of sexual disorders and other crimes against society. Much of this research has been achieved with the assistance, and in collaboration with, the office of the Solicitor General of Canada.

Achievements

Among research accomplished, the selection of juries and factors influencing eyewitness testimony and the identification of the offending criminal have been the focus of considerable Canadian research. Robert Hare's pioneering research at UBC on diagnosing psychopathy is internationally recognized. Considerable research has been devoted to defining and assessing competency to stand trial.

Challenges

Although we have made substantial progress, many challenges remain. Correctional rehabilitation, both within and outside the penitentiary, with particular attention to sexual offenders, continues to be a research focus and concern. Predicting the recidivism of sexual

offenders is a special challenge that is being researched. A good deal has been accomplished but much remains to be done in predicting dangerousness of offenders. Programmes designed for diversion of adults and young offenders from lives of crime and to reduce sexual offender recidivism have helped to reduce the costs of the criminal justice system within Canada, but more needs to be done, especially toward the diagnosis and treatment of mentally ill offenders.

The Changing Family in Contemporary Canada

There is no doubt that the family as we knew it in the 1950s and 1960s is undergoing enormous change. One reason the changing family is so important is that it is the principal socializing institution for social mores and behaviour, and a breakdown at this level will be reflected throughout society's later problems. This factor is viewed as a serious contributor to many of Canada's other social ills, but is a societal concern in its own right.

Achievements

Canadian psychologists have contributed to our understanding of new issues and pressures on the family structure and the social upbringing of children: Research on parenting styles, how to discipline and interact with the child, moral and values education. Special focus has been placed on the form of parent-child interaction within 1- and 2-parent families, sexual identification of boys reared in fatherless homes, and special problems of child-rearing associated with maternal employment, day-care upbringing, and early childhood education. Closely related is extensive social psychological research on close relationships: on intimate relationships across the lifespan, on sibling relationships, as well as on couple relations within marriage or cohabitation. Some of the earliest world-class research on the process of social learning by children was undertaken at the University of Waterloo.

Challenges

Increasing marriage breakdown and divorce, leading to single-parent families, and such changes in family structure as two-income families, parenting at a much later age, and different styles of cohabitation remain issues for further research. These are examples of changes whose effects remain to be investigated and fully understood.

Resources

The large cadre of Canadian social and clinical psychologists interested in these forensic issues, and support of government departments, such as the Solicitor General's Office for basic and applied research into the questions, are strengths on which to build the capacity to address these issues. Enhanced linkages between these departments and the SSHRC would further our capacity to respond to these issues.

The ability of psychologists as observers of human behaviour to conceptualize these problems as research questions, to formulate testable hypotheses, and to operationalize precise measurements of relevant behaviours, is the greatest strength we have for addressing both current and future concerns. Their work will be enhanced by continued support for the centres of

excellence and research networks, and the provision of infrastructure support for this type of research.

Canada is fortunate to have a large contingent of psychologists with social- and cognitive-developmental research interests and expertise. These are also topics which have attracted quality students who may be put to the task of researching these issues over the next decade. Given adequate support and resources, these psychologists will make significant progress in enhancing our understanding these issues, and in defining ways in which we can better cope with change.

Chapter III

ENABLING FACTORS

This section of the report deals with the future of psychological research in Canada, and in particular with identifying the investments, in terms of both fiscal and human capital, that will be required to maximize research opportunities in all aspects of Psychology, so that Canada will maintain its leadership role in this exciting field of science.

FACILITATION OF PSYCHOLOGICAL RESEARCH

At a time of increasing emphasis on «targeted» research aimed at achieving tangible objectives in the near term, it is essential that we also **promote environments conducive to «investigator-initiated» research, driven solely by the creative thoughts of basic and applied scientists**. Such a strategy is essential for the discovery of new scientific principles and innovative strategies for understanding and manipulating the range of processes that constitute human emotion, cognition and behaviour.

There are several practical steps that can be taken to promote this point of view. First, this message must be included in all lobbying efforts, along with concrete examples that can bring the issue alive. Here reference can be made to the fact that many of the major drugs used to treat schizophrenia, depression and anxiety disorders were discovered by serendipity. In a similar vein, the tremendous growth in our knowledge of neuroplasticity - how memory may be encoded in brain function - can be traced directly to the chance observation that high frequency stimulation of neural pathways gave rise to long-lasting potentiation of target cells in the temporal lobe of the brain. Second, opportunities must be found to educate other scientists, university administrators, granting agencies and public opinion leaders about the important discoveries that have been made in the psychological sciences in the past two decades. Many may be unaware that our understanding of decision making has re-written the standard model of human rationality which had prevailed for the past two millennia; that the cognitive abilities of infants far exceed our previous estimates; or that learning involves the active creation of predictions about what may happen next and is not the product of simple stimulus-response associations. These examples and many more can be found in a report entitled *Basic Behavioral Science Research for Mental Health: A National Investment* prepared for the U.S. National Institute of Mental Health.

By citing examples such as these, it should be possible to convince granting agencies to support vigorous programmes of basic research in behavioural, cognitive, emotional, motivational and socio-cultural processes. Our colleagues in the United States are finding a receptive audience for these arguments in the corridors of power, as witnessed by major increases in behavioural sciences funding occurring very recently. Hopefully their success can be repeated in Canada.

A second theme that would facilitate psychological research is the **provision of facilities and programs that will promote flexible collaboration among researchers**. Given the benefits of interdisciplinary approaches to many of the most challenging scientific issues in psychology, there is a very real need to create Centres that bring together colleagues with a wide range of

expertise to address specific research themes. Excellent examples include the Montreal Neurological Institute and the Rotman Research Institute, whose primary focus is on memory and the executive functions of the brain, both in normal aging and in the presence of diseases and conditions which affect the brain, such as Alzheimer's disease and stroke. Canadian researchers excel in several areas of visual psychophysics (e.g., colour, motion, persistence) and auditory perception and psychophysics. Two universities have particularly important vision groups : the McGill Vision Research Unit and the York University Centre for Vision Research. The research carried out at these centres combines efforts in visual psychophysics with research in anatomy and physiology to achieve significant progress in our understanding of the human visual system.

Centres such as these are ideal settings for expensive infrastructure facilities such as brain imaging equipment, sophisticated computer systems, and the molecular biology laboratories required to study the genetic and neurochemical correlates of behaviour, in humans and experimental animals. Individuals affiliated with such Centres studying various aspects of cognitive, neural and behavioural sciences, can have the flexibility to participate in several research teams, depending on their interests and expertise. This in turn will make it much easier to reconfigure these interdisciplinary teams as the nature of the discipline changes and new research questions come to the fore. Clearly, the establishment of Research Centres at which basic behavioural science researchers collaborate with clinicians who focus on defined psychological or medical disorders would enable scientists to communicate more effectively with one another. Without such structures, disciplinary boundaries, limited access to patient populations, and physical distance between basic behavioural science departments and clinical facilities often inhibit interdisciplinary exchange. Centres, which can include shared administrative, methodological, technological, and subject/patient resources, would greatly facilitate the close working relationships needed for meaningful basic/clinical research collaborations. This model of research centres could be extended to several other themes including learning disabilities, criminal behaviour and so on.

COMMUNICATION

Building Information and Communication Networks

In the second part of this report, we have attempted to highlight the fact that psychologists are well placed to help with the problems that all industrialized societies are now facing. However, it is quite obvious that world-class communication will be needed to take advantage of the research opportunities described in this report.

Information drives knowledge. The ability to generate high quality, timely information and to make it available to potential users for application is essential to the growth of psychological knowledge. The pace of technological change and the relentless rate at which new technologies and products are brought to market is a major challenge for the research community. Meeting this challenge requires an infrastructure that provides researchers with the right information at the right time.

Sharing Data and Analyses

The acquisition and transfer of knowledge, and the sharing of scientific information and data all play key roles in the development of knowledge. Accordingly, researchers in psychology require easy access to the information highway (i.e., the network of telephone and cable TV infrastructures and communications satellites). Electronic-mail, faxes, teleconferences and video conferences will enable researchers to participate in international projects and programs. Support for international linkages among researchers will provide comprehensive, intelligent, timely information, thereby allowing wider Canadian participation in international initiatives. The development of a world-class communication infrastructure providing psychologists with access to the new multimedia communications services will give Canadian researchers an important edge by providing an information infrastructure second to none and information content that is critical to doing research in an increasingly competitive world.

Outlets for information

Outlets for the dissemination of psychological knowledge in Canada used to be second to none. However in recent years there has been a disturbing trend in the underfunding of libraries which has led to inability to maintain a broad cross-section of journals essential to the many sub-disciplines of psychology. Solution to this problem may lie in the fact that we are moving into an era of electronic publishing and there is a revolution under way that will have ramifications as large as those which occurred when printing first appeared during the Middle Ages. For example, the American Psychological Association (APA) is now selling electronic access to all of its psychological journals for a nominal annual fee (APA has about 30 scientific journals), beginning in early 1998. APA has already announced to the Canadian Psychological Association that their goal is to provide access to 50 world-recognized scientific journals in psychology by year 2000 and to a total of 100 by year 2003. As well, publishers such as Academic Press are now selling site licenses to their electronic journals to universities. Clearly, this initiative from the U.S. will determine how information is disseminated within the discipline of psychology and beyond in the near future. Research publications will be requested, reviewed and ordered on-line. To strengthen the dissemination and use of knowledge generated by Canadian researchers in psychology, the Canadian Psychological Association has decided to join in the electronic revolution and will make its journals available through this new network that will become the largest source of psychological knowledge in the world.

In addition to furthering our international links via the information highway, Canadian psychologists must continue to play a prominent role on the editorial boards of the major journals in the psychological sciences and related fields of neuroscience and cognitive science. It also will be important to continue our use of these journals to disseminate the results of our research. As a group, Canadian psychologists publish more papers relative to the budget for research and development in their country than do psychologists in any other G-7 country. In fact, the productivity of Canadian researchers in psychology is outstanding and is achieved with very high quality and high impact factor (ISI, National Indicators Database).

Notwithstanding the electronic revolution, periodic international congresses will continue to provide an optimal forum for direct exchange among leading scientists, particularly for the development of new cutting edge research and its scrutiny. Canada recently hosted the XXVIth

International Congress of Psychology (1996), the largest and most prestigious international conference of psychological science encompassing all components of the discipline. The high quality of Canadian psychological research was underscored at this meeting.

Advocacy and Public Policy

Few questions fascinate people as much as those pertaining to how we perceive, think, reason, make decisions, learn, and create, or why some of these skills and processes sometimes go awry due to injury or other natural processes. We need to increase awareness among the public of the exciting intellectual contributions of scientific psychology, to increase the sense of responsibility among the general public for the importance of the empirical basis of these findings, and to dispel widespread misconceptions about the workings of the human mind and human behaviour in social contexts.

Psychologists themselves must also help by laying out these problems in clear ways, and by showing both how current research findings can be applied to the problems, and where the gaps are in our fundamental knowledge. Psychologists also must ensure that the results of their research are made available to policy makers, educators, and those responsible for funding research and who decide what social or health programs will be abandoned, created and implemented.

Clearly, understanding in detail how biological, psychological, and social-environmental factors interact to produce behaviour is a fundamental task for psychology as a science. This knowledge is essential to understand the roots of normal behaviour and to reduce the enormous emotional, social, and economic burden of poor health and social problems in Canada. Communicating this knowledge and making it available to society, will help to secure the funds necessary to pursue the development of knowledge that will increase Canadian productivity and enhance the welfare of Canadians. To this end, psychologists must report and explain research to the scientific community, granting agencies, politicians, and the public at large by using scientific journals and conferences, mass media (television, radio, newspapers), public lectures, and high schools. We need to forge better links with media to communicate exciting new discoveries and to promote the benefits of research. In the final analysis, psychologists must make more evident to the potential consumers of research the usefulness of psychological research by collecting examples and creating materials, developing rosters of psychologists who can «talk to the press.» Within the academic community, steps must be taken to value public advocacy by ensuring departmental recognition of such activities.

FUNDING

As this report makes clear, financial investments made by national and provincial governments in psychological science and biobehavioural technologies and training over the next decade will play critical roles in furthering the health and well-being of Canadians, in enhancing their ability to acquire the kind of knowledge and skills essential to succeed, as well as in creating and evaluating the physical, social, and psychological environments in which they will work and live. It must be emphasized that these investments are urgently needed for Canada to maximize

the country's future knowledge-intensive employment prospects, to sustain economic growth, and to remain competitive with other advanced economies.

One key ingredient in our country's ability to compete internationally will be the development of the public policy and funding necessary to establish and maintain a state-of-the-art, high speed Information Technology networking infrastructure. This network infrastructure will need to link local (university-based), regional, national and international sites if we are to have the kind of dynamic interdisciplinary, inter-university and industry partnerships that are critical to the country's future. In this regard, we applaud the federal government's funding commitments to the Canada Foundation for Innovation, and to established and new inter-university Networks of Excellence. Parenthetically, the Canadian Psychological Association very much supports the policy change regarding future Networks of Excellence proposals which will now require a social science component.

One point consistently made by virtually all thoughtful observers on research funding is worth repeating: It is critical to Canada's future prosperity that federal granting agencies such as MRC, NSERC, and SSHRC be provided both with appropriate (i.e., increased) levels of operating funds, and with a long-term commitment for steady increases so that these agencies can do their jobs (i.e., plan and sponsor the internationally recognized researchers doing basic, university-based research that will represent the country's future assets). Cutbacks in federal basic research funding (in real dollars) over the last few years have resulted in an asset depletion which may be bearable for a short period, but which cannot continue over the long term without serious consequences. Provincial government funding of basic research also needs to be expanded and coordinated with federal initiatives. Less than 5% of all the funds spent on Research and Development (R&D) in Canada is spent on basic research, and our country spends less on R&D and less on basic research than does any other industrialized country in the world (as a % of GNP). For these reasons, the upward shifts recently begun in the 1998 federal budget must continue.

Several additional points can be made with respect to funding. At the core, the mission of these federal agencies is to provide grants-in-aid to individual researchers (Operating Grants Programme) in support of their scholarly efforts. While the funding of large scale, interdisciplinary groups, project-oriented research activities should be an important feature of our current and future strategy, the funding of individual researchers' operating grants will continue to play an essential role in any future scientific and technological success. The laboratories of psychology-based researchers have been and will continue to be an important source for new innovative methodologies and techniques, as well as sites for the training of highly qualified personnel. Moreover, the overall research enterprise will need to have a pool of highly qualified personnel to draw upon if it is to create cost effective, interdisciplinary networks or groups of *proven* and highly trained researchers who will work on difficult, complex problems of national significance.

Because the funds available to support our investigations have been modest, psychology-based researchers have consistently established informal, dynamic networks of researchers across our country and in other countries to make the outstanding progress they have achieved to date. For example, in the first NSERC reallocation exercise, the work of those funded through the Grant-Selection Committee No 12 (Psychology) was judged to be the best, most internationally visible of all of the Operating Grants Programmes. Because the work done in psychology is, by its

nature, broad in scope, we have created, borrowed, and modified methodologies relevant to many other disciplines, involving sophisticated text and data analysis, computer simulation, anatomical, physiological, molecular biological techniques, etc. While it is important for MRC, NSERC and SSHRC to monitor the fact that psychologists can apply to all three major agencies for funding, this should be seen as a very positive indication of the centrality and breadth of the research activities in the fields of psychology, and in the adaptiveness and applicability of the skills of our scientists.

Human resource training

Twenty years ago, federal funding agencies recognized the fact that there were to be very few openings for university faculty for a period of time, and, with great foresight, created funds to provide for the salaries of this generation of young researchers (through the University Research Fellowship programmes). Hence, we did not lose the continuity, the energy, and intellectual contributions of this cohort. In the next 10 years, more than half of all the country's university faculty will retire. Canada will need to have a pool of highly qualified personnel to provide replacements. To help these efforts, Federal agencies have an important role to play in providing a high level of pre- and post- doctoral fellowship funding during this period. These young «emerging» researchers will also need the funds to establish and maintain international contacts (e.g., for travel and sponsorships of international conferences), and to set up their laboratories. Obviously, if we are to continue to provide this group of trainees with the up-to-date, world class training required for their success, their supervisors also will need to upgrade their own infrastructure and equipment (which has eroded with the budget cuts of the last several years).

Imaging Technology and Regional Centres

The growth of new non invasive brain imaging techniques (PET, MEG, functional MRI, etc.) provides enormous potential with respect to improving the understanding and treatment of cognitive, affective and other biopsychological disorders, effecting functional recovery after brain injury, etc. Psychologists, with their strong quantitative expertise, excel in dealing with noisy, dynamic data. With their demonstrated success in analyzing behavioural/cognitive/affective processes and in creating models about how the brain is likely to work, they are in a unique position to take advantage of these new evolving and expensive technologies. Now is the time for interdisciplinary partnerships and, given the initial capital costs, operating costs, and rapid developments in technology, we would argue that the most cost effective solution involves establishing and maintaining half a dozen interdisciplinary regional centres.

Biobehavioural Neuroscience Centres

Similar arguments can be made for funding of regional neuroscience centres to which biopsychologists can contribute effectively. Molecular biological and other neurobiological

methods, as well as behavioural analysis itself all are now very costly but they continue to evolve and also have high maintenance/infrastructure costs. While we believe such an interdisciplinary regional centre approach is the best strategy for making effective use of such methodologies, its success will also depend on providing the kind of connectivity and availability to ensure that all of the talented, skilled researchers in a given region can effectively participate. This model of research centres could and should be extended to several other specific problem or issue (e.g., multiculturalism, learning disabilities, criminal behaviour).

Science-based psychological services

A sound resource base is necessary for the conduct of basic research and is also needed for applied research. Although it is true that some applied research conducted by psychologists can be co-sponsored by industry and thereby take advantage of programmes such as the MRC strategic grants- industry program, relatively little psychological research generates immediately marketable goods. Instead, much of our applied research utility lies in the service sector (e.g., hospitals, correctional services, the organization of industrial systems). Research in these areas is generally aimed at questions related to optimal treatment strategies or maximizing efficiency in some area of behavioural functioning (whether it be functioning of patients, inmates, or company employees). Some of this research is co-funded by the «users» of those findings (for example, the Correctional Services of Canada is actively involved in evaluating the effectiveness of treatment programs for sex offenders, a topic of high societal interest and importance to Canadians). Some of this work is not of immediate application, however, and requires a continuing health and applied psychology focus. In this regard, the funding available from agencies such as NHRDP is an important benefit. However, these grants often have small budgets, or come with specific mandates. As a consequence, a good deal of the innovative research that could be conducted in Canada is simply not being done. A review of the research potential in these domains clearly suggests significant shortfall in the assets needed to optimize future research.

CONCLUSION

The contents of this report make it abundantly clear that the discipline of Psychology as a Science, in all of its various manifestations, is thriving throughout Canada. When assessed recently against all of the other scientific fields funded by NSERC, using rigorous objective criteria and a panel of distinguished international scientists, Psychology was judged to be first in international stature. This achievement is made all the more remarkable by the fact that funding for research in Psychology in Canada is pitifully small when compared to the funds available in many of the other G-7 countries.

Throughout the meeting of the National Conference and in the broad consultation that provided further information for this final report, it became evident that there are many areas of strength in university and hospital settings that are continuously working at the leading edge of this discipline. In addition to such famous institutions as the Montreal Neurological Institute, centres of excellence are to be found in every province and together they serve as a resource for training and research that can be used to address many of our society's most urgent social, developmental, educational and medical problems. All that is lacking to optimize the use of this tremendous national resource, is adequate funding, in line with that provided by our major economic competitors to scientists in their countries.

There is a growing realization in the United States that human capital is one of our most valuable, yet least understood resources; one that is most worthy of increased financial support from funding agencies. It is also becoming clear that the research currently pursued by behavioural, social and neural scientists will have a more direct impact on our lives than almost any other branch of science. At present, funding for the social, behavioural and economic sciences by the National Science Foundation is more than US \$130 million and is scheduled for a further 15% increase to US \$150 million in the 1999 fiscal year. The situation is just as rosy in the National Institutes of Health whose budget for 1999 is projected to be US \$14.8 billion, with the National Institute for Drug Abuse alone receiving over US \$575 million. In the current fiscal climate, politicians in the US Congress are promising to *double* the funds available for biomedical research.

The challenge for psychologists in partnership with our fellow scientists throughout this country, is to communicate more effectively with both members of the public and politicians alike, so that we can convince them that funding of scientific research is an investment and not simply an irretrievable expenditure. The time for passive reflection and self-congratulation is over. As psychologists we are well aware of the excellence and innovation that characterizes our discipline, but now is the time to take a more active stand and to publicize our achievements and our potential to affect real change for the benefit of all Canadians. On behalf of all the participants of the National Conference on Psychology as a Science and the professional societies that supported this initiative, we urge you to take up the challenge of making psychological science accessible, understandable and inspirational to those who stand to gain most from supporting our endeavours; the people of Canada.

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Appendix A

DELPHI POLL

A Delphi polling procedure (Linstone & Turoff, 1989) was used to identify the areas of paramount importance for the discipline and to identify, within each area, the critical issues and questions to be addressed during the Conference. In this section, we review the polling procedure and the data gathered.

In the first phase of the procedure, 45 experts in basic and applied psychology research in Canada were identified in consultation with national organizations of psychologists and from the inspection of lists of editorial board members of *Canadian Journal of Behavioural Science* and *Canadian Journal of Experimental Psychology*. In generating the list of experts, care was taken to address representation of gender, language, region and research areas (e.g., health sciences, neurosciences, cognitive sciences, social sciences). The experts received a test survey in September 1995 outlining the nature of the conference and inviting them to rate the importance of potential conference topics offered to them. The survey was structured so as to give an opportunity for experts to provide their own suggestions about the issues they thought most needed to be addressed at the conference.

Thirty-four (75.5%) of the distributed surveys were completed and returned. The data were not analyzed, as the purpose of the exercise was to test the survey and identify additional topics of potential importance for the conference. The answers to the survey and the suggestions made by the experts provided some useful information to improve the survey. The most important changes involved splitting some of the questions in two to make them easier to answer. Some others involved adding new topics. Psychology as a Science (its role and place in the world) figured as the most important suggested additional topic to be considered for the proposed conference and, consequently, it was added to the list. The new list of potential conference topics included funding, advocacy/lobbying, education/training, marketing, and Psychology as a Science (its role and place in the world).

At the end of 1995, 1000 copies of the revised survey were sent to the Chairs of Department of Psychology in Canada for distribution to Faculty and psychology researchers working in centres affiliated with their university. The survey was available in both official languages. Again, participants were invited to rate the importance they attached to the potential conference topics offered to them and they were given the opportunity to provide their own suggestions about what they believed most required attention at the conference.

A total of 297 (29.7%) surveys were completed and returned. Average ranks for each of the five general topics were computed and a rank order of topics was generated. A summary of the data is presented in Table 1.

Table 1. Average ranks and standard deviations for each of the general topics, rank order of general topics, and list of most highly endorsed specific topics under each general topic. (N = 297)

General topics	Rank ^a	Mean	SD	Most highly endorsed specific topics ^b
Psychology as a science	1	2.23	1.37	C Its place in science; C Its relationship to other disciplines;
Funding	2	2.29	1.32	C Maintaining federal and provincial funding for psychological research/training; C Expanding lobbying activities for legislative - change in governments; C Expanding funding of research in basic psychology;
Education	3	2.74	1.15	C Education/Training students in psychological research; C Education/Training students for specialization in psychological research;
Advocacy	4	3.34	1.11	C Demonstrating the usefulness/importance of psychology as a science
Marketing	5	4.34	1.09	C Communicating with the public and the media

Note. ^a The rank order begins with the most important at the top.

^b Only the specific topics that obtained an average score above 5 on a scale from 1 (low importance) to 7 (high importance) are presented here.

As shown in Table 1, the topics of Psychology as a Science, funding, and education/training obviously figured as the most important for the proposed conference. None of the topics suggested by respondents in the survey was perceived anywhere as important as those already offered for consideration.

For each general focus topic, respondents also rated on a scale from «1» (low) to «7» (high) the importance of specific topics that might be included in the proposed conference. The most highly endorsed specific topics (i.e., the topics that obtained an average score higher than 5), are presented in Table 1. Respondents rated for importance a total of 31 specific topics.

Appendix B

DELEGATES

Table 1. List of National Conference Delegates

<p>Janel G. Gauthier, Co-Chair Anthony G. Phillips, Co-Chair</p>		
<p>Neuro/Bio/Behavioural Sciences</p>	<p>Social Sciences</p>	<p>Health Sciences</p>
<p>Fergus I.M. Craik, Leader</p>	<p>Patricia M. Rowe, Leader</p>	<p>Keith S. Dobson, Leader</p>
<p>Lorraine G. Allan Richard Brown Vince Di Lollo Jos J. Eggermont Frank Elgar Chris Herdman Colin M. MacLeod Tony Marley Zenon Pylyshyn Clare Porac Michèle Robert Sid Segalowitz Jane Stewart Richard Tees</p>	<p>John Adair Lynn Alden Ellen Bialystok Ann Cameron Richard Clément Ken Dion Robert Gardner Mathieu Jodoin Michael Matthews Daniel Pelletier Abraham Ross Clive Seligman Peter Suedfeld Robert Vallerand</p>	<p>Gordon Butler Joseph De Koninck David Dozois Norman Endler Lise Fillion Melvin Goodale Donald Kline Bryan Kolb Eugene Lechelt Patrick McGrath Charles M. Morin Michael Murray Isabelle Peretz Pierre Ritchie</p>
<p>Gary Latham, Facilitator John C. Service, Advisor</p>		

Table 2. Delegates' Primary Work Settings

University Psychology Department	38
Other University Department	3
Hospital/Health Setting	1
Administration	3
Graduate Student in Psychology	3
Retired	1

Table 3. Delegates' Geographical Representation

Atlantic Provinces	7
Québec	9
Ontario	19
Prairie Provinces	7
British Columbia	6
Other	1

Table 4. Delegates' Gender Representation

Female	11
Male	38

Appendix C

CONFERENCE SCHEDULE

Thursday, May 8th

10:00 am Co-chairs, Group Leaders, Facilitators/Advisors meet

12:00 pm Lunch: Meeting continues

2:00 pm Recorders join meeting

4:00 pm Meeting adjourns

1:00 pm Delegate Registration

5:30 pm Reception

6:15 pm Opening Ceremony

7:00 pm Dinner

8:30 pm Working Groups meet

10:00 pm Adjournment

Friday, May 9th

8:00 am Continental Breakfast

8:30 am Orientation (Plenary Group)

9:00 am Working Groups meet: Development of a new vision

10:45 am Break

11:00 am Plenary Session: Reports, Discussion

12:00 am Photographs

12:45 pm Lunch

12:45 pm Co-Chairs, Group Leaders, Facilitator/Advisors and Recorders meet

1:30 pm Plenary Session: Discussion/Voting

2:00 pm Working Groups meet: Development of «smart» goals

3:30 pm Break

4:00 pm Plenary Session: Present Working Group consensus positions

4:30 pm Plenary Session: Discussion/Voting

5:30 pm Adjournment

7:00 pm Dinner

8:30 pm Co-Chairs, Group Leaders, Facilitator/Advisors, and Recorders meet

CONFERENCE SCHEDULE (CONTINUED)

Saturday, May 10th

8:00 am Continental Breakfast
8:30 am Plenary Group meets: Review of vision and goals
9:00 am Working Groups meet: Development of Research Agenda
10:30 am Break
10:45 am Working Groups reconvene
12:00 pm Lunch
12:30 pm Co-Chairs, Group Leaders, Facilitator/Advisors, and Recorders meet
1:30 pm Plenary Session: Working Groups present consensus items
2:00 pm Plenary Session: Discussion/Voting
3:00 pm Break
3:15 pm Working Groups meet: Relapse Prevention
4:30 pm Plenary Session: Reports, Discussion/Voting
5:30 pm Adjournment
7:00 pm Banquet
9:00 pm Co-Chairs, Group Leaders, Facilitator/Advisors, and Recorders meet

Sunday, May 11th

8:00 am Closing Breakfast
10:30 am Adjournment
11:00 am Co-Chairs, Group Leaders and Recorders meet
12:00 pm Lunch: Meeting continues
2:00 pm Meeting adjourns

Appendix D

PROCEEDINGS

Health Sciences Working Group

As was true for all participants of the National Conference, the members of the Working Group came together several times during the conference, to address issues that were put to them in the plenary sessions, to generate new ideas that would feed into the plenary sessions, and generally to try to articulate the concerns of health scientists within the overall psychological community.

Our first meeting occurred in the evening of the first day, when we were asked by Dr. Gary Latham, the conference facilitator, to spend time getting to know each other, and to speak about both our greatest joys and frustrations. Although there was initial reluctance to engage in this task, primarily from the concern about the usefulness of the exercise in the context of the overall conference, in fact we were able to discuss at length these issues.

There was general consensus that the major "stimulants" for members of this working group were the abilities to engage in science, to contribute to a dialogue on theories and methods of research, to have research collaboration and establish research links, to train the next generation of health scientists, and to generally have "fun" doing research that benefits society.

Frustrations for members of this working group can be generally described, as was quipped by one of our members, as "anything that gets in the way of the above." Specific issues included: bureaucratic issues that impair research; division within the discipline of psychology that sometimes impedes recognition and support for our work; limited understanding and acknowledgement from the public about the work we do and its value; needing to justify the value of our research either by highlighting social relevance or more direct societal profitability and/or commercial utility; limited incentives for quality research, as opposed to quantity of research outputs; and funding limitations in the current climate of deficit reduction/elimination.

On Saturday morning, we set about trying to define a mission statement for the discipline of psychology that potentially could be adopted by the plenary session. We spent a brief time talking about some of the criteria that were suggested to us for the vision statement (specific, measurable, attainable, relevant to vision, and time frame), and then a member proposed a draft statement. Subsequently, we spent our time refining the statement and debating specific issues that were either embedded in the statement, or were absent from the statement but perhaps should have been included. In the end, the group appeared to feel good about the submission, and went to the plenary session ready to both defend their submission as well as listen to other perspectives.

In the afternoon session, we took the revised vision statement that had been adopted, and with our mandate to examine different goals or possible implementations of vision in our area, we started the process of identifying possible goals. As part of this process, we also tried to delineate what the implementation plan might look like, who would be responsible, what measures of outcome would be appropriate, and what time line might be reasonable. The ensuing discussion led to a total of 20 potential

goals being identified. As this list was too long for complete discussion, the group prioritized the list and focused on four goals for more complete discussion. These goals were brought to the plenary session for further discussion and possible approval.

Keith S. Dobson, Ph.D.
Leader

Neuro/Bio/Behavioural Sciences Working Group

The members of the Neuro/Bio/Behavioral Sciences group are all committed researchers working in a variety of areas from neurochemistry, through neuropsychology, cognitive psychology and developmental issues to human factors, computational models and artificial intelligence. Despite this range of interests, the group found that it shared many interests--both in terms of approaches to science and in terms of science politics and implications for society.

In the first plenary session, we were charged with listing our joys and frustrations as psychological researchers. In our first meeting as a group there was some initial reluctance to discourse at such a general and 'touchy-feely' level, but the debate started to flow once members of the group asked questions such as 'Why has psychology not advanced as a cumulative science faster than it has?' and 'How do we communicate what we do more adequately to other scientists, funding agencies, and the public at large?' The resulting list of "joys" included the pleasures of intellectual debate and achieving results, the satisfaction derived from providing a sound education and training to students, and the challenges of mastering new techniques. The (rather longer) list of "frustrations" was topped by the inadequacy of current funding levels, and also included difficulties of communication, complaints that our discipline is too driven by current fashions, questions about the unity or otherwise of the field, the difficulties associated with very large classes, and worries that our science was very vulnerable to distortions caused by outside pressures--for example, the need to show short-term relevance to society's needs and the constraints imposed by ethics boards.

On Friday May 9th, the group debated the ingredients of an adequate vision statement for scientific psychology. This proved to be a difficult task, but we focused on various ingredients such as the need to provide a satisfactory scientific account of mind, brain, and behaviour, and the relations among them; to communicate the results of our analyses to other scientists and to society at large; to dispel popular misconceptions about psychology; and, importantly, to ensure that our insights and findings are put to use constructively to address societal problems in health, education, the workplace, and other areas. The group was eventually satisfied with a draft statement that stressed both the inherent value of scientific knowledge and also the benefits that such knowledge will confer on individuals and society at large.

In later sessions, the group split into smaller working groups of 3-4 people to address a set of focused goals relating to the overarching vision statement. The specific suggestions of these sub-groups were then debated and refined by the group as a whole before presenting the various points, in the form of "claims" (or achievements) and related goals to further these claims, to the overall Conference in the plenary sessions.

Each subgroup focused on a set of problems relating to their own research interests. The process worked to the extent that the subgroups identified various research topics, focal points of current research in these topics, and areas of application or potential application of the topics, although the resulting list of

claims and goals was somewhat bland-- perhaps necessarily so, given the level of abstraction at which we were working. Thus a typical claim—goal combination came out a bit like "Major progress is being made in the understanding of X which is fundamental to the human ability Y; in turn this understanding has implications for certain aspects of health, education, and technology in Canadian society." Nonetheless, the process did highlight the interactions and connections between different areas of psychological research, the common problems faced by researchers in rather different areas, and the fact that much of our research work is relevant to important general problems. This aspect of the Conference was thus quite effective in promoting interactions among Canadian researchers who do not normally meet each other, in highlighting the common problems that we face, and in emphasizing the need for united action if we are to address these problems effectively. The topics analysed by the subgroups were as follows: Basic cognitive processes (e.g., perception, attention, memory and language); higher cognitive processes (e.g., reasoning, judgement and decision-making); brain mechanisms and brain-behaviour links; fundamental studies of neuroanatomy, neurochemistry, and their psychological correlates.

When our goals and suggestions for achieving them were fed back into the plenary session, there were some obvious discrepancies between our perspectives and those of the other groups. Whereas the Neuro/Bio/Behavioural group generally liked the idea of promoting centres and institutes for researching defined topics, the centre concept was resisted by some other delegates. Still all groups agreed that individual operating grants must remain paramount. The difference of opinion about the value of centres probably reflects different ways of working, and perhaps the extent to which different parts of our field can benefit from the skills of neighbouring specialists. In cognitive neuroscience, for example, interactions among cognitive psychologists, neuroscientists, and neuropsychologists are really necessary for progress to be made.

In the final plenary sessions, the Neuro/Bio/Behavioural group participated fully and contributed substantially to the final accord that was reached. Some goals of the Conference were clearly met; a broad range of psychologists from a variety of sub-disciplines met, interacted, and communicated with each other; we realized more completely that we face many common problems and that we must present a united front if we are to find and achieve solutions to these problems. One key concept is obviously communication. We must do a much better job of explaining to other scientists, university and granting council administrators, and the public at large what we actually do, why it is important, and the benefits that our work can provide for Canadian society.

Fergus I.M. Craik, Ph.D.
Leader

Social Sciences Working Group

Like the other two groups, the Social Sciences group wrestled with the tasks of developing a vision statement, specifying goals for our discipline and how we could achieve them, what factors would better enable us to accomplish our goals, and how we could prevent relapses as we work towards those goals.

One of the first issues we encountered as a group was that we had very different interests in the broad domain of social psychology, and that "social sciences" was a poor descriptor for many of us. Probably the common thread for all, or almost all, of the group was that we were currently, or had been in the past, SSHRC grant holders. As subsequent discussion demonstrated, this mutual interest was not a

minor issue, but influenced the views of the whole group, and contributed to the particular goals and enabling factors proposed by the group.

A brief comment about the Social Science and Humanities Research Council (SSHRC) would be appropriate before going any further. SSHRC is responsible for funding what is probably a more disparate set of disciplines, ranging from classical studies to experimental, albeit social, psychology, than either of the other two national granting agencies. This diversity of disciplines requires a broader range of policies and procedures, some of which may not always appropriately fit our discipline. In addition, SSHRC must deal with more politically sensitive issues, such as culture, language, ethnicity, and gender and is, therefore, more politicized and more vulnerable to criticism and/or interference from politicians and the general public. Finally, it is badly underfunded and provides a lower level of grant support to scholars in its disciplines than is provided by the other granting agencies. As a consequence of these factors, there is a lesser identification by SSHRC-funded psychologists with their granting agency and a desire for change of some of SSHRC's policies. For example, SSHRC requires that all of its grants committee members be bilingual, which is praiseworthy in Canada and a valuable political statement. But in a discipline like psychology whose greatest growth and development is in the United States and other English-speaking countries, such a requirement excludes large numbers of our colleagues who would make valuable contributions to the grant review committee. Furthermore, because of its shortage of funds, SSHRC is unable to provide adequate support to launch the scholarly careers of new applicants nor even for researchers of international stature. Given this common background, the social science working group held somewhat different views on the goals and enabling factors than did the other two groups.

The first task for the group was to develop a vision statement for the discipline. As a first step we discussed what our purpose was as scientists. The answers revolved around our need to increase understanding of behaviour as a whole and our responsibility to communicate that knowledge, both good and bad, to our colleagues, students, and the general public. Regarding stakeholders, there was general agreement that every person is a stakeholder, but that psychologists should not be dictated to, or held accountable by, stakeholders with respect to research topics. The question of who would miss us was more difficult to answer, at least in a concrete way, but it was felt that the knowledge would be missed by all people. The vision statement developed after this discussion was as follows: "Knowledge is better than ignorance: psychological research is essential for understanding the human condition." While this statement was not adopted by the participants in the plenary session, elements of its breadth and commitment to research can be seen in the final vision statement: "The goal of psychology, the study of mind, brain, and behaviour, is to create knowledge through research that is inherently valuable and essential for the benefit of the individual and our changing society."

Most of the remaining sessions were devoted to the development of goals. In the initial working group session we tried to set goals that were closely related to the group vision statement. Goal setting was also expected to be S.M.A.R.T.; that is, specific, measurable, attainable, relevant to the vision, and with a time frame included. The group developed four goals, with some suggestions for implementation. The first goal was to promote an environment conducive to investigator-initiated research. Implementation would be through educating and lobbying the granting agencies and politicians, as well as our own faculty members and the university administration. The second goal was to report and explain our research to the scientific community, granting agencies, and the public at large, which would be implemented through scientific journals and conferences, the mass media, public lectures and presentations including the high school level. The third goal was to educate future researchers, consumers of psychological knowledge, and the general university community in the principles, methodology, and analytical framework of psychology. It would be implemented by having departments adopt the goal and advocate the role of psychological knowledge and

inquiry as a contribution to a liberal education, and by incorporating the goal into our principles for graduate training. The last goal was to make more evident the usefulness of psychological research. Some of the ways in which this goal could be implemented are by being proactive in disseminating results, creating rosters of psychologists who can talk to the press, and ensuring that there is recognition of this kind of work by departments and grants committees. In general, all of the goals would be the responsibility of each of us individually, and our departments and organizations (e.g., CPA) collectively. Timelines and measures were fairly general and open-ended.

When these goals were presented to the whole group, comments were made that suggested that the group should consider more specifically what social science is, and what it can contribute to society. In the next working group session, specific goals more closely linked to the social sciences were discussed and examples of the contributions psychology had made were included. The goals were expressed by the group more as areas where psychology has much to contribute than as formal goals. These areas, and a few examples of relevant research, were as follows:

- C Canada's multicultural society (bilingualism, ethnic relations, prejudice, acculturation)
- C The environment and its management (living in the North, environmental change, urban planning)
- C Work, organization, and the economy (human rights in the workplace, ergonomics, impact of restructuring)
- C Lifestyle and health (addictive behaviours, lifestyle, leisure, and fitness)
- C Human development and education across the lifespan (language learning and literacy, school dropouts, parent-child relations)
- C Social problems (aggression and violence, unemployment, social change)
- C Social and political thinking (social cognition in everyday life, attitudes, gender issues, international relations)
- C Methodology and other scientific issues (models and theories, integration of quantitative and qualitative research)

The last session was devoted to a consideration of the obstacles that would prevent the achievement of our goals, and possible solutions to the problems these obstacles produce. The major obstacle from the perspective of the group was SSHRC and its lack of funding. A number of solutions were proposed, including better liaison between CPA and SSHRC perhaps through the establishment of a CPA committee, the preparation of a document similar to the one done by psychologists for NSERC which would demonstrate the contribution of SSHRC funded psychologists, and more general lobbying of politicians regarding the need to increase SSHRC funds. Beyond these steps, however, it would seem worthwhile to establish a stronger network of SSHRC eligible psychologists in Canada.

Patricia M. Rowe, Ph.D.
Leader

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