

SIMON FRASER UNIVERSITY
Senate Committee on University Priorities

S.02-53

Memorandum

TO: Senate

FROM: John Waterhouse
Chair, SCUP
Vice President, Academic

RE: Cognitive Science Program
External Review

DATE: June 17, 2002

The Senate Committee on University Priorities (SCUP) has reviewed the External Review Report prepared on the Cognitive Science Program in May, 2001 together with the response from the Program Coordinator and comments from the Dean of Arts.

Motion:

That Senate concurs with the recommendations from the Senate Committee on University Priorities concerning advice to the Cognitive Science Program on priority items resulting from the external review as outlined in S.02-53

The report of the External Review Committee for the Cognitive Science Program was submitted on May 8, 2001 following the review site visit March 27, 2001. The response of the Coordinator of Cognitive Science was received on August 1, 2001 followed by that of the Dean of the Faculty of Arts on January 16, 2002.

SCUP recommends to Senate that the Cognitive Science Program and the Dean of Arts be advised to pursue the following as priority items:

1. Continuance of Program

In accordance with the three year plans of the VP Academic and the Dean of Arts and the recommendations put forward by the External Review Report, the Dean of Arts and the Cognitive Science Steering Committee are advised to actively explore the ways and means of developing a broadly based, high quality program that would attract increased FTE enrollments and provide excellent learning and career opportunities for its students. Critical to the success of this endeavor would be the development of an ongoing, sustainable base of support for the Cognitive Science Program.

2. Administrative Structure

Specific elements that would be critical to the further development of the program would include the acquisition/identification of ongoing fiscal, physical and human resources, (specifically, a faculty complement and secretarial/administrative assistance dedicated to the program. An optimum timeframe for this initiative would be to begin the revision and enhancement of the program immediately with the expectation that the

work would be completed by the 2004/05 academic year.

3. Graduate Program

Recognizing the importance of graduate students to the development of any academic program, it is recommended that over the longer term a graduate offering be developed in the Cognitive Science area. However, in the immediate future, given the focus that needs to be given to the undergraduate program, faculty are advised to continue to work with graduate students in their respective Departments.

4. Recruitment of Faculty

Given the amount of work that will need to be directed towards the Program in the near future, the Steering Committee is urged to continue its efforts to recruit additional members of the university community to work within the Program's ranks.

5. Academic Outreach Initiatives

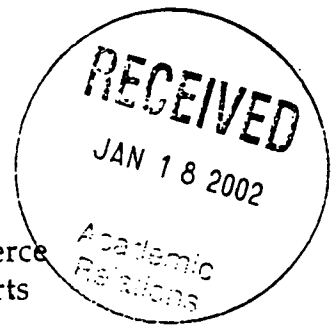
The Program is urged to continue its annual conference and volume series as well as the institution of a series of colloquia.

encl.

c: J. Pierce, Dean of Arts

N. Hedberg, Coordinator, Cognitive Science Program

SIMON FRASER UNIVERSITY
Office of the Dean, Faculty of Arts
MEMORANDUM



To: John Waterhouse
Vice-President, Academic

From: John T. Pierce
Dean of Arts

Subject: Cognitive Science
External Review

Date: January 16, 2001

The Cognitive Science review is a very thoughtful document that puts the choices facing the program in very clear perspective. The report identifies a substantial problem facing program, and outlines two options for addressing this problem. The report also makes the point that the program fills a need for a very dedicated and enthusiastic students, who graduate with high quality academic credentials.

Programs

The Faculty agrees with the case that the Cognitive Science program is at a crossroads with respect to the major in Cognitive Science. Thanks to a series of curricular reforms, the program has evolved from a very difficult major of interest only to a small number (less than 20) of very dedicated students, to an increasingly popular choice for motivated students seeking a strong interdisciplinary major in these fields (now up to 36 majors). This is strong growth for a non-departmental program that essentially has a complex joint major program.

The reviewer sees problems developing because of this growth. There is the potential that there could be over-recruiting into the program with the result that bottlenecks could result in upper-division offerings, particularly in access to Computing Science courses. Offering of COGS 100 and 300 could become more problematic than it already is if numbers increase further.

The program finds itself at an in-between stage, no longer a small elite program and not yet a program with a real critical mass of majors. The choices outlined in the review are to either go back to the smaller state or continue to grow to a sustainable level. The program steering committee makes a clear choice for the latter. In principle, the Faculty agrees. The steering committee has addressed the curricular issues that were inhibiting growth, and are to be commended for the continuing quality of their graduates. Further progress depends on the availability of resources, however, as stated in the review. The Dean's office will work with the steering committee to develop a cost-effective method of reaching a sustainable level of program support so that the steering committee can pursue the larger model, as they desire. The Dean's office is also supportive of the recommendation to bring back the capstone course, COGS 400, subject to satisfactory faculty arrangements (see below). The Faculty will also assist in

the negotiation of a method to regularize Cognitive Science majors' access to CMPT courses as needed.

The review notes that development of a graduate program has been discussed in the past, and recommends against pursuing this idea. The Faculty concurs with this assessment, and the steering committee has accepted this view.

Faculty

The report notes that the faculty complement available to the program depends very much on the individual interests of the faculty participating in the steering committee. While there are very few courses that are not drawn from the constituent departmental programs, even those few are difficult to cover in the present situation. The steering committee agrees in their response and would like guaranteed portions of the teaching load of one member in each discipline. The Dean's office will be happy to work with the steering committee in working out an arrangement that will provide adequate faculty resources to support the program. We do not feel, however, that formal joint appointments are called for at this juncture, although they may become useful at some future time.

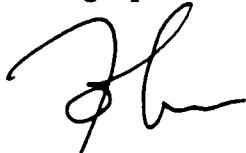
One optimistic development since the review was conducted is that additional appointments of faculty in Linguistics and Philosophy that could be very useful to the program have been made. The call for a future senior appointment committed to Cognitive Science makes eminent sense, and should serve as a catalyst for the further development and growth of the program. The Faculty would like to pursue this, but would need assistance from the Vice-President, Academic, to support such a position, along with its associated infrastructure costs. The Dean's office is also willing to work with the participating departments to find a way for interested faculty to deepen their personal commitment to the program on an ongoing basis. Finally, the Faculty is willing to approach Psychology in an attempt to get stronger participation of faculty from that department in Cognitive Science, up to and including the addition of Cognitive Science to the description of a position to be recruited by Psychology.

The Cognitive Science Steering Committee should identify one member in each of the constituent disciplines who is prepared to commit to becoming an advocate for the program in his or her home department. These may develop later into more formal professional commitments to the program, but for now these four members will work with departments to improve the articulation of the Cognitive Science program and its future plans to the related department.

Administration

The fact remains that a program of this size will never become a stand-alone academic unit, and will therefore be attached to a regular academic

department, as are many other such programs in the Faculty of Arts. If the program continues to grow, the Faculty will have to consider adding to shared staff, space, and other operating resources, but only on a wait-and-see basis. We can appreciate the need for a visible headquarters as part of the development of the program's identity, but space for this purpose can only be developed at the margin, within the space available to the host department. If it proves feasible to do so, the Faculty will be pleased to provide limited space for this purpose. The role of coordinator for Cognitive Science should be assessed by the Dean's office to determine the appropriate level of reward for taking up this task.

A handwritten signature in black ink, appearing to read 'John T. Pierce', written in a cursive style.

John T. Pierce

Response to the Report of the External Review
of the Program in Cognitive Science at Simon Fraser University
by Francis Jeffry Pelletier

Nancy Hedberg
Coordinator, Cognitive Science

1 August 2001

The external reviewer for the Cognitive Science Program, Francis Jeffry Pelletier, outlined two directions in which the program in Cognitive Science could evolve. The first is a return to the small elite program, with only 10-20 majors. This option has the advantage that it wouldn't require a significant injection of University resources into the program. In particular, it wouldn't pose a threat to enrolment restricted courses, in particular in Computing Science. It also wouldn't require significant space and staff resources. A satisfactory elite program would, however, require teaching resources, since Steering Committee members should be released from teaching in their home departments to teach the dedicated Cognitive Science courses.

The second option outlined by the reviewer is to continue on the path that the program started on in 1999, which involves serving more students. This option is referred to as the "full scale program." The results can already be seen in the number of majors: At the time of the External Review we had 31 majors, and by the end of Spring semester 2001, we had 36 majors. By contrast, we had 13 majors at the end of Spring semester 2000. The key to the difference lies in the introductory Cognitive Science course. In the old, elite system COGS 200 was the introductory course and had prerequisite courses in all four participating disciplines (Computing Science, Linguistics, Philosophy, Psychology). Enrolment rarely exceeded 10 in this course. The new system has COGS 100 as the introductory course, with no prerequisites. We have achieved enrolments of 38 in 00-1 and 53 in 01-1 on this system and anticipate continued growth in the future if we open the course up to more students. We foresee, and the external examiner agrees, that we can easily obtain enrolment of 200 students per year in COGS 100. The result of this change on the number of majors has been dramatic. The number of majors has almost tripled, after just two years.

The external reviewer foresees that the full-scale program could, over time, lead to a major that graduates up to 40 students per year. He emphasizes that this option will crucially require an increase in the resources that the University puts into the program. The biggest problem will be in obtaining places for all these students in enrolment-restricted courses, especially in Computing Science. The second big problem is releasing Steering Committee faculty from teaching in their home departments so that they can teach the dedicated Cognitive Science courses. The third big problem is obtaining resources of space and staff to support a full-scale program. The external reviewer feels that a full-scale program should also seek to obtain intellectual leadership through the Canada Research Chair (CRC) program, a program which the discipline of Cognitive Science is particularly well suited for given its intrinsically interdisciplinary nature. In addition, it is advised that the program should continue its highly visible annual conferences and associated Oxford University Press volumes, but supplement these by a regular colloquium series. Finally, more involvement by Psychologists should be sought, as well as opening up the program to other disciplines such as Education, Anthropology and Neuroscience.

Whether the elite program or the full-scale program is pursued, the external reviewer approves the proposal made in both recent 3-year plans that a Cognitive Science minor be established. He also recommends that no graduate program in Cognitive Science be

established at this time. In both approaches, also, a fourth year "capstone" course should be (re)-established.

THE STEERING COMMITTEE IS UNANIMOUS THAT IT WANTS TO PURSUE SOME VERSION OF THE FULL-SCALE PROGRAM. There is great interest, especially amongst the Computing Science members of the Steering Committee, in teaching the dedicated Cognitive Science courses. Some members of Philosophy are also keenly interested and would be very well qualified. The Faculty of Arts has recently been very cooperative in providing sessional stipends for Cognitive Science courses. For example, COGS 100 in 00-1 was taught by a Philosophy professor on overload (Phil Hanson) and in 01-1, it was taught by a sessional instructor. Furthermore, COGS 300 (Special Topics in Cognitive Science) is being taught by a sessional instructor in 01-3. In 00-3, it was taught by a Linguistics/Cognitive Science professor (Nancy Hedberg) on load. At the very least, we hope that some arrangement can be made to allow stipends to be given to the participating departments in return for permission to release their professors to teach the COGS courses.

Our current system, which is supported by the Dean of Arts' office, is to offer COGS 100 once per year (in the Spring Semester) and to offer COGS 300 once per year (in the fall semester). The possibility of offering COGS 100 twice per year has been discussed and tentatively approved, given sufficient enrolments.

Better, however, we affirm that in the ideal large, full-scale program, three new half-time appointments in Cognitive Science would be made, from Computing Science, Philosophy, and Psychology, to join with Nancy Hedberg's half-time position in Cognitive Science and Linguistics. A consequent total of 7 or 8 courses per year from such instructors would enable the teaching of two sections of COGS 100, two sections of COGS 300, and one section of COGS 400, plus a two-course relief for the Coordinator. We recognize that resources are scarce, and this might have to be implemented in stages. In lieu of hiring new professors, some existing Steering Committee members might be converted over into half-positions in Cognitive Science.

As far as a joint position with Computing Science is concerned, we hope that resources to fund such a position might become available in the next few years from the Provincial Government's "Doubling the Opportunity" program, which seeks to double the number of Information and Communications Technology related graduates from BC Post Secondary Educational Institutions.

With regard to the number of majors, while our long-term goal is to grow, this growth will depend on the availability of resources, including the availability of course spaces, especially in enrolment-restricted courses such as those in Computing Science. In order to manage the growth we are currently experiencing, we will probably have to soon institute a mechanism to regulate the number of majors at any given time. In this way, we can set strategic targets, which we can plan for in conjunction with the participating departments.

We also hope that the "Doubling the Opportunity" program will be able to provide resources to fund more places for Cognitive Science students in Computing Science courses in the near future.

The Steering Committee endorses the curriculum changes listed below:

Curriculum changes

- Add the capstone course, COGS 400, back into the program. Try to have it taught by Bob Hadley (Computing Science) or Kathleen Akins (Philosophy), or some other member of the Steering Committee, or perhaps have it team taught.
- Introduce the minor in Cognitive Science, with the organization of requiring COGS 100, COGS 300, COGS 400, plus lower division requirements in three of the four areas, intermediate and upper division courses in two of the four areas.
- Institute a fourth "add-on" credit for courses in the Cognitive Science curriculum taught by Steering Committee members. This suggestion was initiated by the students in the Cognitive Science program and endorsed by the external reviewer.
- Forego establishing a Graduate Program in Cognitive Science at this time.

As far as Steering Committee additions are concerned, we have been in contact with some Psychology professors in the Biological-Cognitive Psychology stream, and have presented them with materials on the Cognitive Science Program. They will be meeting as a group in the near future to discuss the extent to which they want to get involved. One such professor has already expressed interest in joining the Steering Committee. We have also made contact with Kinesiology. We have always had one member of the Steering Committee in Education (Phil Winne), who could probably get more involved, perhaps by expanding the program to allow some of his courses to count towards the Cognitive Science degree.

The external reviewer expresses concern that the Linguistics Department will be losing participation in Cognitive Science with impending retirements. It should be pointed out that two new hires (Chung-hye Han and Maite Taboada) have both expressed interest in Cognitive Science. Both are computational linguists. Thus, this concern is probably misplaced.

We will continue with our conference and volume series (organized by Martin Hahn, Philosophy). Funding by SFU of \$4,000 for the conference, and \$3,900 for the volume should at least continue if not increase. Some progress has also been made in pursuing cooperation with the new Cognitive Science Program at the University of British Columbia in funding the conferences. We plan to continue such cooperative efforts in the future.

We also plan to institute a colloquium series. The undergraduate student union has tentatively taken on the task of inviting SFU-internal speakers to participate in a colloquium series of around two per semester during the 2001-02 academic year. They will receive the help of the coordinator in this endeavor. Future endeavors of inviting SFU-external speakers would require funds from the University. It is also possible that we can cooperate with UBC in funding external Cognitive Science colloquium speakers. As the external review recommends, we would ideally have a weekly or biweekly colloquium series.

The small operating budget of \$1,500 for the Cognitive Science program should be divided, so that \$1,000 is used by the Philosophy Department for conference expenses, and \$500 is used by the Linguistics Department for program-related expenses.

Very importantly, the Steering Committee has decided to pursue the CRC (Canada Research Chair) strategy recommended by the external examiner. Currently, talks about this are underway with the senior administration. An important role of the envisaged CRC would be to provide intellectual leadership.

As recommended in the external review report, a full-scale program will require some University resources directed toward staff dedicated to meeting the advising needs of students in the program. Already there are 36 majors and advising is being given on a voluntary basis by the Departmental Assistant of the Linguistics Department as a favor to the Coordinator of the Cognitive Science Program (Nancy Hedberg). This is an unsatisfactory situation and can't continue if more students enroll in the program. It is therefore necessary to request some staff support from the University for the Cognitive Science program, even if it is on a part-time basis. Staff support to help with the conferences is also advisable.

Dedicated space for the program is also recommended. In addition to space for the staff member, it would also be advisable to provide space for students and faculty to meet. As the external reviewer says, if space is provided, Cognitive Science students will meet to discuss their discipline.

**REPORT OF THE EXTERNAL REVIEW ON THE PROGRAM IN
COGNITIVE SCIENCE AT SIMON FRASER UNIVERSITY**

Francis Jeffry Pelletier
University of Alberta

8 May 2001

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Executive Summary

My fundamental and most important finding is that the current undergraduate Cognitive Science Program is not sustainable as is. Either the Program should revert to its structure of two years ago [with some modifications] or else there needs to be a substantial increase in the involvement of the core cognitive science faculty and their respective departments, enabled by concomitant support from the Faculty of Arts and the University. Such a decision can be taken only at appropriately high levels of administration. In the present report I merely make suggestions for each of these two directions.

Strengths of the present Program:

- The number and quality of the undergraduate students is very high. They are articulate, intelligent, and enthusiastic.
- On paper, there is a well-designed program of study.
- There are several SFU faculty with well-established reputations within Cognitive Science.
- The (almost) annual Vancouver Colloquium in Cognitive Science

Shortcomings of the present Program:

- Since its inception in 1986, the crucial distinguishing capstone course (COGS 400 in the original program) has only been taught two times.
- The distinguishing senior capstone COGS 400 has been deleted from the new curriculum.
- The faculty with the most established reputations in Cognitive Science are not functionally engaged in the teaching of COGS courses, due either to impending retirement, research appointments, inability to get course relief from their home departments, or disinterest.
- There is no Cognitive Psychology involvement in planning, and little in courses. In addition, the upcoming retirements and the possible moves to industry will weaken the Linguistics component to such a degree that it too needs to be addressed by suitable hirings.
- There has apparently been little foresight about the impact of large enrolments in the new COGS 100 course for subsequent quota-controlled courses required in upper-level Cognitive Science (particularly in Computing Science). It is this feature of the current program that calls into question its sustainability.
- There is a lack of clarity at the departmental level as to sessional funding which might offset regular faculty who could then teach COGS courses.
- There is no funding for the administration of the program.

Recommendations:

- There are two routes that might be followed, and senior administration needs to decide which direction makes more sense in the SFU context:
 - The elite route (similar to the program prior to 1999):
Return to the COGS 200/400 program for a small elite set of students.

Have COGS 400 taught yearly, and by Steering Committee faculty (possibly team-taught).
 Return some of the yearly Cognitive Science operating grant to the Director of Cognitive Science from the Philosophy Department.
 Possibly share a part-time secretarial position with another department, maybe Linguistics.

° The full-scale route (following the current implementation started in 1999):

Re-institute COGS 400, taught yearly by Steering Committee faculty (possibly team taught).

Encourage COGS 100 to be taught by members of the Steering Committee faculty.

Consider multiple instances of COGS 300 offered each year, if enrolments warrant it.

There are serious management issues of dealing with increased student enrolments in upper-level courses in the related disciplines. These need a resolution.

There are serious issues concerning the bureaucracy involved in running such a large program, and these determine that extra non-academic support as well as new space be provided. A departmental assistant position is but one of many items required here.

There needs to be more involvement from the interested faculty members as the size of the student body grows. One solution is to return to the plan to have more half-time appointments in Cognitive Science.

It would lend serious stature to the Program if a senior scholar were added. This is an opportunity for administration to deploy their CRC strategy.

- Regardless of the route taken, the Program (and the senior administration) must
 - ° Give serious thought to strengthening the Cognitive Psychology component, for a viable Cognitive Science Program.
 - ° Make home departments re-think their commitment to key faculty for release time to teach the core COGS courses
 - ° Carefully consider how to construct an adequate COGS 400—a senior course of interest to 7 (in the elite program) or 40 (in the full program) majors. This is a quite difficult undertaking, but it is crucial in defining what the entire Program stands for.
- The proposal for a graduate program in Cognitive Science needs further justification and needs a clearer statement of how its management would be done. The faculty in some areas are much more than adequate to direct a thesis/dissertation in “X and Cognitive Science”, and pairs of faculty could give Cognitive Science-like joint MA degrees in “X and Y” using the “Cohort-based program” at SFU (as I understand section 1.3.4a of the Graduate Program in SFU’s *Calendar*.. But it is not demonstrated that there is sufficient expertise to have a “pure” MA/PhD degree in Cognitive Science. And it will continue to be difficult to recommend otherwise unless some accommodation is made with the Department of Psychology.

REPORT OF THE EXTERNAL REVIEW ON THE PROGRAM IN Cognitive Science at Simon Fraser University

I. Background: Review Process

I, Francis Jeffrey Pelletier of the University of Alberta (Departments of Philosophy and of Computing Science), conducted a review of the Cognitive Science Program at Simon Fraser University on 27 March 2001, and I met with the following people and groups:

Professor Nancy Hedberg (Cognitive Science Program Coordinator)
 Dean John Pierce (Dean of Arts)
 Dr. Bruce Clayman, VP(Research)
 Professor Dinay Bhattacharya (Director, School of Computing Sciences)
 Professor Paul McFetridge (Chair, Department of Linguistics)
 Professor Phillip Hanson (Chair, Department of Philosophy)
 Professor Martin Hahn (Philosophy Department [representing Professor Kathleen Akins of the Philosophy Department, who is the Principal Investigator and Director of the McDonnell Project in Philosophy and the Neurosciences])
 Professor Fred Popowich (Computing Science)
 Dr. Youri Pankrantz (Sessional Instructor, Cognitive Science and Linguistics)
 Honours students in Cognitive Science

Additionally, I was a member of the External Review Committee for the Department of Linguistics at Simon Fraser University (which met 28-30 March 2001). This is relevant because of the overlap between the Linguistics Department and the Cognitive Science Program. I furthermore received email from some members of the Steering Committee of the Program in Cognitive Science and from others who had an interest in the Program. Materials that I received both before and during my visit, and at the meetings with the above individuals and groups, form an important part of my evidence for the conclusions I have reached.

I should mention in particular the students in the Cognitive Science Program whom I met. They were extraordinarily articulate and passionate about the Program, both about its strengths and about its weaknesses, and they had numerous suggestions concerning the Program. Much of my report, especially "the full-scale program" portion, follows considerations brought forward by these students. I was surprised...pleasantly so...by these students and believe that some of the credit for their understanding of the issues in Cognitive Science must be due to the education they have received through the current Cognitive Science Program at Simon Fraser University.

II. History and Background: Cognitive Science

A. Cognitive Science

Since Cognitive Science is not a traditional academic discipline, I start this report with a brief explanation of the field and a statement of its place in a University.

Cognitive Science is, fundamentally, the study of "cognition." In this basic sense, it has existed as a field since the very beginning of abstract intellectual thought. However, it was in the 1960's that it first became conceptualized as a separate field of study, when it was recognized that the phenomena associated with cognition were being investigated by various of the traditionally-recognized academic disciplines. It was seen that each of these fields was viewing a part of the overall phenomenon from its own perspective, and it was thought that a merging of the resources and methodologies from these different disciplines could result in new synergies and insights in the area. In this new way of conceptualizing the study of cognition, it was seen that relevant research was being done in the traditional fields of (Cognitive) Psychology, Computer Science (particularly Artificial Intelligence), Philosophy, Neuroscience, Linguistics, and Anthropology. As well, it was seen that there was related research in the fields of Education, Management Science, Sociology, and Anesthesiology. [It might be noted that some of these fields, e.g., Neuroscience, are themselves interdisciplinary endeavours.]

Over the next few decades there was a rapid expansion of this idea, and some Universities (in the US and the UK) founded stand-alone Departments of Cognitive Science. More commonly, universities formed Interdisciplinary Programs that took advantage of existing courses in the participating departments, adding some further "overview coursework" in Cognitive Science to bring all the traditional work into a new perspective. In this latter manner of proceeding, some universities granted (Honours or Majors) degrees in Cognitive Science, while other universities made Cognitive Science be an area of specialization (or a Minor) within one of the traditional disciplines (giving degrees such as "Honours in Linguistics with Specialization in Cognitive Science"). This period of time also saw a large increase in grants, especially in the US, earmarked for research into Cognitive Science. The Mellon Foundation established numerous Chairs of Cognitive Science at universities around the US. The journal *Cognitive Science* was first published in 1976, and the "Society for Cognitive Science" was founded in 1979. The Society now has more than 1000 members.

B. History of Cognitive Science at Simon Fraser University

From 1976 to 1986, there was a Philosophy-Linguistics-Psychology Program that served as a locus for research into a common set of questions and provided a degree program for students who were interested in questions about the nature of language, the relation of language to the world, the nature of innate knowledge, and the like. Students in this program took courses in the three departments and were awarded this interdisciplinary degree. (Seven students received such degrees in the 10 years.)

In 1986, with the increasing strength of Artificial Intelligence in the School of Computing Science, the scope of the program was expanded to become more general and more like the ideal of Cognitive Science, and the name was changed to reflect this, i.e., it became the Cognitive Science Program. Simon Fraser University is therefore one of the very first

Cognitive Science programs in Canada. (Perhaps the program at the University of Toronto and the "area of specialization within a traditional discipline" option at McGill University have been in existence longer.) In the 14 years since the new program was started there have been 23 students who received B.A. degrees in Cognitive Science.

In 1986, when this Program was begun, the plan was to hire split-appointment faculty – one from each of the four related departments (Philosophy, Linguistics, Computing Science, and Psychology). Half of the time of these four faculty would be devoted to teaching courses expressly in Cognitive Science and to administering the Program, but otherwise to be acceptable faculty members of the four departments. It was anticipated that there would also be some form of non-academic position associated with the Program (a Departmental Assistant, for example). For whatever reason (I have been unable to find out why), this plan was not followed and only one of the four split-appointments was ever made: Professor Nancy Hedberg of Linguistics. The funding for this part-time non-academic position was put into the base budget of the Faculty of Applied Sciences, and the position was discontinued in 1990.

C. Organizational Structure of Cognitive Science at Simon Fraser University

Although there is but one part-time position in Cognitive Science, there is much apparent interest in faculty whose appointments are full-time in other departments. This has given rise to a Steering Committee that (currently) contains 17 members from four departments (Philosophy, Linguistics, Computing Science, and Education). This committee sets the curriculum for students taking the various pathways through the Program. Except for the participation of Nancy Hedberg, with her half-time position in Cognitive Science, all the other involvement is done from "love of the area" and a feeling that Simon Fraser University "ought to have such a degree program". It is notable that, at this point in time, the Psychology Department is not an active player in Cognitive Science at SFU. (Matters were different in the past, in this regard).

In the abstract, a 17-member Steering Committee is an unwieldy number for purposes of leadership and management; but I gather that they get together only very infrequently as a whole and that matters are handled "in the spirit of goodwill" by the members of the Committee who are interested in them. The daily (weekly, monthly) matters of administration are handled by a Coordinator, which is currently Prof. Nancy Hedberg, although this position rotates to other members of the committee. Whether the Coordinator receives any administrative relief from other duties is a matter of negotiation between the Coordinator and his or her departmental chair.

Non-academic matters, such as student advising and maintenance of student records, are currently being dealt with by the Linguistics Department support staff, as "overload" to their regular duties and "as a favour" to the professors and students. The Philosophy Department provides organizational support for the yearly Simon Fraser University Cognitive Science

Colloquia, whose funding comes in part through a small operating grant for Cognitive Science that is administered in the Philosophy Department.

III. The Program in Cognitive Science at Simon Fraser University

A. Cognitive Science Courses

The program of study in Cognitive Science has recently undergone a fundamental change, and it is important to be cognizant of this change because it has a drastic effect upon the resources necessary to carry out a degree program in Cognitive Science. I will sometimes refer to "the old Program" (1986-1998) in contrast to "the present Program" (1999-2001) in Cognitive Science.

In common with almost every other Cognitive Science program, the both the old and the new Programs at Simon Fraser University have made use of pre-existing courses in the related departments. Students take a selection of "regular" Philosophy, Computing Science, Linguistics, and Psychology courses (and possibly courses from other disciplines), so long as they have been approved as being of the sort that are relevant to cognitive science.

The old Program at Simon Fraser, again like virtually every other Cognitive Science program, had two further courses required of all its students. At SFU these were COGS 200 and COGS 400. The former was taken after students had amassed prerequisites in each of the four disciplines, and the latter was a "capstone" course. These courses required that there be some regular professorial appointment who had the expertise to teach such courses and would be able to do so as a part of his or her regular professorial duties. Initially it was thought that the proposed four half-time positions in Cognitive might share this load, perhaps in different years or perhaps as jointly-taught courses. However, this never came to pass because these faculty were never hired. Instead, the COGS 200 course has been taught over the years by a selection of faculty from the related departments. (Prof. Phillip Hanson of Philosophy has regularly taught it over the years.). Even so, this foundational, first course in Cognitive Science has not been taught every year. (It was taught eight "regular" times over the 13 years, and once as an independent study with one student). COGS 400 has been offered only three times since 1989, and one of these times had only one student (the other two times had 7 or 8 students). Since COGS 400 was a graduation requirement of students in the Program, most students over the years were granted substitutions for this requirement. Further, one of the two times COGS 400 was offered, it was taught by a sessional lecturer.

The positioning of COGS 200 as a 200-level course with substantial (and difficult to achieve) prerequisites ensured that the old Program would never grow much beyond the eight to ten students who yearly populated it over the 14 years since 1986. And since the COGS 400 was only offered twice (not counting the time with only one student), this teaching requirements of Cognitive Science could be maintained by having only one half-time faculty member in the Program and relying on the "good will" of faculty from other departments. But such a structure requires a very special person to occupy this half-time position: someone with a

synoptic overview of the entire field (which, recall, encompasses at least four traditional fields). It is fair to say of Professor Hedberg, and she would not disagree with this assessment, that her expertise does not extend this far. Indeed, the initial plan to hire four half-time faculty, who might then share the teaching of such a wide field, makes much more practical sense.

Except for a small increase in the enrolments of the "regular" courses in the related disciplines that were required of the Cognitive Science majors, there was essentially no impact of the old Cognitive Science Program on the affiliated departments or on the budgetary considerations of the Faculty of Arts (or of the University). Historically at Simon Fraser, the numbers of students involved was about eight, and this posed no noticeable effect on anyone.

Of course, there are other demands on professorial time because of these Cognitive Science majors: there are calls for independent studies and honours projects. But because of the small numbers of students involved in the old Program, these have been dealt with through "good will" and an intellectual interest in the area by the various professors who are involved in the Program.

Perhaps due to these low enrollments, the Cognitive Science Steering Committee re-defined their Program so in 1999 that the COGS 200 and 400 courses are replaced by COGS 100 and 300. An immediate effect of this change is to allow students into the first course without any prerequisites (let alone prerequisites from *each* of the four related disciplines); and this in turn has seen the enrolment in COGS 100 be 38 in the first time it was offered and 53 the second (current) time. There has not yet been sufficient time for these students to have enrolled in COGS 300, but it is clearly a strong probability that this course will also have enrolments much larger than the old COGS 400. The Steering Committee has proposed that COGS 100 be offered at least two times each year, and they expect enrolments of 100 in each of these sections. If this is correct, then even if only twenty percent of the COGS 100 students continue to COGS 300 (continue as Cognitive Science majors), there will be 40 students each year to take this course. This can no longer be dealt with in the *ad hoc* manner that has been in place for the last 15 years.

Another feature of the present Program is that there is no longer a "capstone course". In one way this has a good side: I've already pointed to the difficulties that the old Program had in offering COGS 400. It is a difficult course for anyone to teach, because of the necessity to "pull together" all the disparate material from many different fields at a senior level, and it is especially difficult to find a scholar with the appropriate expertise. Probably the best that could reasonably be expected in the old Program was for it to be team-taught by professors from different disciplines. On the other hand, most cognitive scientists would take issue with the decision not to have a general, capstone cognitive science course that tried to "bring it all together" for the students after they have gone off for two or three years to their various disciplinary studies. Pretty much every Cognitive Science program has a capstone course of this sort, and I think that the present Program should have one also.

The replacement course in the present Program is COGS 300. This is "Special Topics in Cognitive Science", which allows faculty from different departments to be able to teach some specific topic within their own discipline so long as it is of general interest to Cognitive Science. Thus, in teaching this course, the faculty need not worry about relating their work to more general issues of Cognitive Science. The new COGS 300 is a good course, and allows students to get involved in recent research undertaken by Cognitive Science faculty. It is furthermore much easier to staff. But it is no longer the "capstone course" that was originally envisioned as the old COGS 400 ("Advanced Cognitive Science"). Indeed, if COGS 300 is a specific topic from a contributing discipline, it is unclear how it is distinguished from other approved electives from that discipline.

B. Degree Programs in Cognitive Science

The major in Cognitive Science at SFU divides courses into lower-, intermediate-, and upper-division. Within the lower division, all majors complete a curriculum that consists of courses in Philosophy, Linguistics, Psychology, and Computing Science; and as well they must all take COGS 100. At the intermediate level, majors select to concentrate in three of the four disciplines, and take the required courses in these three disciplines. In the upper level, majors take three courses in each of their three chosen disciplines, as well as COGS 300. Additionally, these students complete the general breadth requirements of the Faculty of Arts. Generally speaking, Cognitive Science major students take about 30 credit hours of upper-division work and accumulate 80-85 credit hours of work in their Major Program.

The Honours Program adds two 5-credit hour honours courses to the major program, and as well requires that the student choose three or four more courses from within one of his or her chosen disciplines of concentration.

Much of the present Cognitive Science degree program is identical with the old Program, involving mostly a difference in the order in which courses are taken. There have been some changes with respect to the Psychology coursework, following a change in emphasis within the Psychology Department. (Not all these changes involving Psychology are good, from the point of view of Cognitive Science. More on this below).

The Cognitive Science Steering Committee has indicated a strong interest in establishing a minor in Cognitive Science, and has also suggested that it might be time to look at a graduate degree program in Cognitive Science. New COGS courses dedicated to the SFU Co-op Program have been introduced (but have not yet found their way into SFU's calendar), although it is as yet unclear how well Cognitive Science students fit into a Co-op program. It is my opinion that the mixture of technical skills and liberal arts that makes up a Cognitive Science education will make these students successful at a Co-op Program...although the relevant businesses will first have to be shown this fact about their education.

IV. Faculty

The faculty associated with the Cognitive Science program are exactly those who constitute the Steering Committee. The Steering Committee currently contains two faculty members who have not yet started their terms at SFU (Professor Eugenia Tervovska [Computing Science] and Professor Oliver Schulte [Computing Science and Philosophy]). In addition, I was told of impending retirements for Professors Richard DeArmond (Linguistics), Wyn Roberts (Linguistics), and Steven Davis (Philosophy). Professor Tom Perry of Linguistics has been an Associate Dean for a number of years, and perhaps has less involvement in the Program than in the past. There are also rumours that Professors Fred Popowich (Computing Science) and Paul McFetridge (Linguistics) are considering moves to private industry.

Three of the four related disciplines are well-represented, although one worries about the impact of the retirements and threatened moves away from academia. If all these come to pass, then one would certainly worry about the Linguistics component, for it would functionally have but one representative, Nancy Hedberg. I think that the Cognitive Science Program should lobby the Linguistics Department to hire in an area of cooperation between the two fields. It is quite notable that there is no one on the Steering Committee to represent Psychology, one of the four central related disciplines to Cognitive Science (some may even say the *most* central of these disciplines). This is an issue that absolutely needs to be addressed.

Many of the members of the Steering Committee are well-known in Cognitive Science, even though only a few (Professors Kathleen Akins [Philosophy] and Robert Hadley [Computing Science]) publish in the journals and proceedings centrally associated with Cognitive Science. The remainder publish in journals and proceedings in their own fields that are receptive to work in Cognitive Science. Some of these Committee members publish quite a lot in these venues while others publish relatively little. In general the Steering Committee runs the usual academic gamut in this regard, and is quite well-suited, as a group, to teaching in an undergraduate or a graduate program in Cognitive Science from the academic point of view.

V. Cognitive Science at SFU is at a Crossroads

A. A Fundamental Choice to be Made by Administration and Involved Departments

The program change set in motion by the Cognitive Science Steering Committee (called "the present Program" in the last section) results in a program that, in my view, cannot be implemented given current available faculty. I plausibly estimate 30-40 Cognitive Science majors who would be enrolling in certain quota-controlled Computing Science courses, for example. And this is but one of the as-yet-unaddressed issues that need resolution before the present Program can be allowed to proceed. It seems clear to me that the present Program cannot be carried out, even minimally, unless there is a large commitment from the home

departments, the Faculty of Arts, and whatever other administrative bodies are involved. This in turn gives rise to an issue that needs to be addressed at the outset.

Cognitive Science is not, or is not currently, a “central” academic discipline. Unlike disciplines such as English or Philosophy or Psychology, an institution of higher learning that did not have a department or program in Cognitive Science could still in good conscience call itself a university. And even though Computing Science is a discipline that is close in age to Cognitive Science, all modern universities have some body within which Computing Science finds a home (as a separate department or as part of some larger department, such as “Mathematical and Computational Science” or “Electrical and Computer Engineering” or whatever). But only a few modern universities have departments of Cognitive Science. This is not to denigrate Cognitive Science (after all, I am myself a cognitive scientist), but merely to state a fact: an institution of higher education simply is not a university if it were to omit one of the component disciplines of Cognitive Science, but it can be a university without having a department or program in Cognitive Science. In this sense a department/program in Cognitive Science is somewhat of a “luxury”, and a university must decide whether it can afford to institute and support such a program in the face of its other budgetary obligations.

For my part, I would like to see SFU undertake the steps required for a viable Cognitive Science department. It has much of the required infrastructure already in place (courses and professors); it merely needs further assistance to carry forward its goal. But I do not see it as part of my mandate to insist on this. Rather, I will lay out two alternatives and say for each of them what is required in order that they succeed on their own terms. The Faculty of Arts itself needs to decide which direction it wishes to go at this crossroads.

B. Option 1: The Elitist Direction

Basically this direction amounts to a return to the old Cognitive Science program that was in place before the change of two years ago. The COGS 100 is deleted and COGS 200 and 400 are re-instated. In particular, COGS 200 retains the prerequisite structure that was in place before: a selection of courses from each of the four departments. COGS 400 returns to its place as a capstone course, bringing together under one intellectual umbrella all the courses that might have been taken by students in the course of their studies over the two years since they would have taken COGS 200. COGS 400 must also be offered each year. I think the COGS 300 “Topics in...” course can either be deleted or retained in the elitist direction, depending on the willingness of the members of the Steering Committee to undertake it as a permanent obligation. (The idea that COGS 300 would be offered only once every five or so years should be strongly discouraged!)

The vision of such a program is that there is a small, elite group of students—experience has shown that there are about 8 each year at SFU—who find their way into such a difficult-to-enter program and an intricate course of study to complete. These highly motivated students can successfully complete this major despite the fact that there is little in the way of institutional support for them. The students who graduate from such a program will find ready employment in various of the high-tech industries, where their combination of

technical expertise and knowledge of human cognitive abilities is in high demand. Many of them would go on to graduate school, either in a stand-alone Cognitive Science program or in one of the related disciplines.

I believe that this elitist program has shown over the years that it is successful for what it is, and is useful to a certain small number of very good students. It furthermore requires very little in the way of institutional resources. However, it is not without costs, and the level of support over the last number of years is inadequate even for the elitist program. Budgetary considerations are of two sorts:

1. Teaching Support for the Elitist Program

There currently is one half-time appointment in Cognitive Science, Nancy Hedberg. Under the elitist proposal, her (half-) time would be partially administering the Program and partially teaching in the program. (With but a total of 20 students majoring in Cognitive Science, this administration seems minimal, but see below under "non-academic support").

Each year there needs be COGS 200 and COGS 400 taught. Past history suggests that there will be some 11 students in COGS 200 and 7 or 8 in COGS 400. Perhaps this is the sort of teaching load that is appropriate for a half-time appointment. However, it does not seem good for the program to have Hedberg always be the one teaching these courses. As I remarked above, Hedberg herself would not think this is the best use of her teaching expertise; and in any case it would be good to have a wider set of professors teaching these courses.

It does not serve the interests of students in such an elite major for them to be taught by sessional lecturers, as has been done in the past. This is not to disparage the quality of the individuals taking these sessional appointments, but rather a statement concerning how an elite program should be run. I would suggest instead that an arrangement be made with those professors who have the relevant expertise, and with their departments, so that they become involved in teaching these courses—possibly team-teaching them or possibly teaching them in alternate years. As I understand the funding situation, the Dean of Arts is willing to make sessional money available to a department so that a regular faculty member can be involved in teaching the COGS courses.

The COGS 200 course has had successful past instances, as for example when it was taught with Professors Phillip Hanson and Kathleen Akins of the Philosophy Department. I note that Professor Robert Hadley of the Computing Science department is the person on faculty at SFU with most publications in the *Proceedings of the Cognitive Science Society*, but he has not taught the COGS courses...to the detriment, I think, of the program. There is also much expertise among other members of the Cognitive Science Steering Committee, and they should be involved somehow in either COGS 200 or COGS 400

The COGS 400 course should really be a capstone course, and not a "topics in cognitive science" course. This will require such a course to be developed, possibly by a team of the interested faculty, and taught each year. It is, once more, out of step with the elite nature of the program that students be given "substitutions" for this capstone course (for then they would have taken only a single COGS course for the duration of their degree program.) I acknowledge that executing such a capstone course, at a senior level, is difficult for a single individual to do, and hence my suggestions about team teaching.

The sort of minor in Cognitive Science that has been proposed by the Steering Committee could be fitted into the elitist program academically, and the experience of the present change to COGS 100 shows that it would be very popular with students. (The requirements mentioned in their document reflect the current courses. But a change from COGS 100 and 300 to COGS 200 and 400 in the elitist program would need to be addressed. Otherwise the proposal seems sound as an addition to the elitist program.) The only issue I have concerns the possible drain on an elitist program by students who require advising and who might require other bureaucratic overseeing. The elitist program is not really designed to allow this sort of overhead.

Thus, as I see the budgetary requirements for the academic side of the elitist program, it calls for enough sessional funding so that core COGS faculty can be released to teach the 2 or 3 COGS courses. This calls for (1) money for sessional appointments to be given yearly to related departments, possibly on a rotating basis, so that members of those departments can be involved in the teaching of COGS 200 and 400, and (2) some sort of arrangement with the Linguistics Department so that Nancy Hedberg can, on some years, be relieved of teaching COGS courses and teach Linguistics courses instead (and the monies thus released from Linguistics should go to the Cognitive Science program so that it can "buy" faculty members from the related disciplines for use in the COGS courses). There might also be justification for a one-time teaching relief so that some professor, or group of professors, can develop a suitable COGS 400.

2. Non-Teaching Support for the Elitist Program

More or less each year (with the exception of the last two years), there is a Vancouver Conference in Cognitive Science. This is one of the most famous of the cognitive science conferences (excepting only the official meetings of the Cognitive Science Society, which was held in Vancouver in one of these last two years in place of the usual annual conference). This Conference is organized through the Philosophy Department; and most of the support for this conference comes from granting agencies, although SFU also gives a direct contribution, which is \$4000 in the present year.

The papers from these conferences are published by Oxford University Press, in their series *Vancouver Studies in Cognitive Science*. Publication of these volumes has been made possible by a SFU publication grant. The current year grant is \$3900.

Negotiations are underway with UBC with an eye to sharing the costs of the conference and publications, as well as sharing the organizational duties. Under the elitist program, I think this is the best strategy since the very small operating budget for the Program is needed for programmatic items much more than for this conference.

The Cognitive Science undergraduate program itself has a small operating budget of \$1500, which is administered by the Philosophy Department. However, this budget is being used to support the annual conference. This means that the Cognitive Science Program has effectively no operating budget to use for such matters as postage, photocopying, etc., and is forced to rely on the largesse of the Linguistics Department. Although the Cognitive Science Conference is an important part of the Cognitive Science Program at SFU, and indeed is what gives the Program most of its academic stature, it certainly seems wrong that the *entire* operating budget for the Program is used (by another department!) for this purpose. I would think that at least \$500 of this budget should be made available to the Director of Cognitive Science for his or her discretionary use.

It is my understanding that when Cognitive Science was founded in 1986, a half-time secretary was provided and it was understood that whatever department happened to take over the administration of the Cognitive Science Program would be given this half-time position. However, this secretarial position was discontinued (by the Faculty of Applied Science), and the duties of advising students, keeping student records, helping with organizational work for the annual conference, conducting correspondence for the Director and for the Steering Committee, etc., have been taken over by the Director herself and by the Linguistics Department's departmental assistant.

In the elitist program, it is not clear to me how much of a secretarial position is required for these duties, but surely some assistance of this kind is called for. And it is inappropriate that secretaries or departmental assistants in other departments should be required to take on the duties of another program in addition to their own full-time jobs. Although it is possible that a half-time secretary is more than the elitist program would require, it is conceivable that some arrangement for sharing a new half-time secretarial position with Linguistics would serve both programs well.

C. Option 2: A Full-Scale Undergraduate Program

The change of two years ago, whereby students are encouraged to take the first Cognitive Science course (the new COGS 100) before having taken prerequisite courses in all the related disciplines, has been very successful in attracting students into the Cognitive Science Program. From the previous enrolments of about 11 per year in the first Cognitive Science course, it has become 58 and the Steering Committee expects that it will be 100 next year. It further expects to offer two sections of the course in the following year that each have 100 students.

It is certainly true that the study of cognition has an attraction to many beginning university students and to other technically- and liberally-educated people. One need only look at bookstores like Chapters or Amazon.com to see this fact. And in other schools that I have had some experience with, when there are no (or only a few) prerequisites for intro courses in Cognitive Science, these courses (as well as the subsequent program in this area) can be quite popular.

The vision of the Cognitive Science Steering Committee is **IMPOSSIBLE** under the current staffing and funding situation, and they must not be allowed to continue with their current plan. In brief, there does not appear to be sufficient teaching or administrative resources in place to absorb the estimated 40 or so majors in the 300 and 400 level courses. This is particularly important for elective courses that are subject to quotas. (It is not at all clear to me how anyone expects this program to continue, except maybe by a further infusion of sessional funding. But even with such an infusion, the administrative exigencies will very soon close the program down.)

However, if the Steering Committee is correct in their beliefs about the attractiveness of COGS 100...and I have no reason to doubt them, but I can imagine that the Dean of Arts would like more evidence...then it seems to me that SFU should support this initiative even at the expense of other more traditional disciplines. The scenario that they posit – 200 students taking Introductory Cognitive Science each year, 50 or more of them going on to COGS 300 each year, and perhaps 40 graduating each year with a Bachelor of Arts in Cognitive Science – seems to merit further funding. For, this would make Cognitive Science be of a size comparable to many traditional departments. And, on the other hand, it would require a much smaller infusion of support than traditional departments because most of the required courses in Cognitive Science would be from other departments. (Further comments about this issue are below.)

I will here outline what I take to be the content and the required support for such a program at SFU. As I mentioned before, the decision as to whether to fund such a program must be made on grounds other than what I can offer...a decision must be made concerning the amount of funding there is to be given to a “non-traditional” discipline, if that is to be at the expense of more “traditional” ones.

1. Academic Courses in the Full-Scale Program

Certainly the COGS 100 course, which has generated the student excitement, should be maintained. I note that it is currently being taught as if it were a “Philosophy and Cognitive Science” course, but wonder whether perhaps there should be more material from other disciplines (Computing Science, Psychology, etc.). In any case I would think there should be a fixed set of topics that will be included in any version of the course that is taught; for otherwise, one would think there really is no field of knowledge here...just a set of different approaches to the study of cognition. Since this is one of the very few courses that are to be taught explicitly in the Cognitive Science program, I think it is preferable that only regular faculty who are on the Cognitive Science Steering Committee

should teach this course. (Perhaps they should somehow team teach it.) Of course, an exception to this should be made is when there is a "distinguished visitor" to SFU whose expertise is in this area. In particular, I think it is wrong to have sessional lecturers be primarily responsible for this course. (Below I talk about funding for this idea.)

The present COGS 300 course is a "special topics" course, which teaches some topic of research interest to some Steering Committee member. I think this required course is a very nice idea, and one that should be continued. But I also think that the topics (and instructor) should change yearly, so as to maintain the feeling of "current research topic." And if the student numbers warrant it, there could be more than one section of this course in some years, where the different professors each teach their own current research topic. (Students need only take one.)

There must also be a required capstone course, COGS 400, where the students all come together again from their specific set of courses that they took in their areas of concentration to discuss broader issues from the perspective of Cognitive Science. Such a course should "put all the specific topics into a coherent whole" from the viewpoint of an interdisciplinary investigation of Cognitive Science. It also seems to me to be a good idea for such a course to require some similarly broad-based and interdisciplinary-oriented "large project" as a kind of final requirement of Cognitive Science majors. (It is a challenge to think of the appropriate sort of person to teach such a course. One option is team teaching by members of the Steering Committee. I mention other alternatives below.)

I very much like the other aspects of the current major and honours programs that are currently in place, by which I mean that way that students take courses in the related departments in lower division, and choose three areas of concentration in upper division. In keeping with remarks made just below, in point (1), I would recommend broadening the number of areas in which a student can concentrate. One topic that seems as yet unaddressed by the Steering Committee is whether there is any guarantee from the related departments that the courses required of Cognitive Science majors will be offered on a yearly basis. **SOME NEGOTIATION ON THIS ISSUE IS MANDATORY.** Related to this is my strong belief that the practice of "substitutions" should be discouraged; for, if the substitutions really are good enough for the Cognitive Science major concentration, they should be already listed as possible options for the students.

The Steering Committee has also put forth a proposal for a minor in Cognitive Science, wherein they take lower-division courses from three of the disciplines (rather than from four, as the majors do) and they continue with intermediate- and upper-division courses from two of these areas (rather than from three, as the majors do). They also take COGS 100 and 300. Given the presumed popularity of the major, and the visible interest from students majoring in the related, traditional disciplines, this introduction of a minor seems to be straightforwardly called for. The only suggestion I would make about the proposed courses is that it (a) should include the proposed COGS 400, (b) should be widened to allow studies in other departments (see below). As I mentioned above, the proposed minor could also be added to the elitist program, but might require substantial overhead

in the realm of advising students and of administrating this part of the program. (I do not know how much of the details of monitoring minor students falls to the individual departments and how much is handled centrally by the Faculty of Arts at SFU.)

I mention here two further items that the Steering Committee might wish to consider if the decision to go ahead with the full program is made, and a third that requires further consultation with the Dean of Arts and with the Department of Psychology:

- 1) Cognitive Science traditionally covers more than the four fields of Philosophy, Psychology, Computing Science, and Linguistics. At the least there is Neuroscience and Anthropology; and many of us would also include Education, Management Science, Criminology, and Anesthesiology. I am aware that SFU does not include a medical school, and that therefore some of these traditional linkages are not available to a SFU Program. Nonetheless, others of these linkages could be forged, and I would urge the Steering Committee to seek out faculty in these other departments who have the required interests, both for the purpose of joint research and for the purpose of having concentrations in these areas for Cognitive Science. (I note that Prof. Phil Winne of the Faculty of Education is already on the Steering Committee, but that no Education courses are eligible for Cognitive Science majors to take). I think there could easily be further involvement of the Education departments in the Cognitive Science Program, both in the lines of courses of study for students and in the lines of joint research initiatives. Other departments as well could find a place in the Steering Committee.)
- 2) The Cognitive Science majors have proposed an innovative concept involving the courses taught in the related disciplines by members of the Steering Committee and taken as courses toward an area of concentration by Cognitive Science students: that there should be an extra hour/week meeting just for the Cognitive Science majors who are taking that course. This extra meeting would discuss the role of this course in the broader Cognitive Science paradigm, and it would not include the other students in the course (who were enrolled simply for credit within the related department). These extra hours would be counted as one-credit courses by the students. This seems to me an excellent idea, assuming some equitable course relief for the instructors can be negotiated.
- 3) It is my understanding that the members of the Psychology Department who were traditionally involved in the Cognitive Science Steering Committee have retired (or moved), and that a set of new directions for, and hirings in, the Psychology Department has been instituted that does not include the areas that are associated with Cognitive Science. For example, there are no longer any Psycholinguistics courses being offered, and so the Psychology Concentration for Cognitive Science has been changed so as to encompass the biological stream of Psychology. Although I see nothing wrong with a biological stream as being a possible concentration for Cognitive Science majors, the fact remains that this is not the area of Psychology that is closest to Cognitive Science. Many people feel that areas of "reasoning", "thinking", and "language" within Cognitive Psychology are the very center of Cognitive Science; and

I find it wrong that none of these areas are available in the SFU Psychology Department. This is something that requires discussions to be held between the Cognitive Science Program and the Psychology Department, perhaps mediated by the Dean of Arts, if the full-scale program is to go through.

2. Academic Staff in the Full-Scale Program

The picture painted by the full-scale program makes Cognitive Science be "almost a Department." In terms of expected majors, it is the size of a smallish (but not tiny) department. I have not specifically recommended this, for I think it can also quite nicely work as an interdisciplinary program. Still, being a separate department might confer advantages (of the sort laid out in the next subsection). In either case, it seems clear that the full-scale program requires more academic staff, both to meet the teaching of the courses outlined just above and to direct students in independent studies courses as well as in honours projects. A straightforward way to attain the required academic staff would be to return to the initial plan of having four half-time appointments in Cognitive Science, one from each of the four related departments...that is, to add three half-time positions to Cognitive Science. In fact, two of the relevant people are already at SFU: Kathleen Akins in Philosophy and Robert Hadley in Computing Science. (Fred Popowich of Computing Science is also a plausible candidate.) If these people had the interest, they would be excellent half-appointments to the Program in Cognitive Science, leaving only the half-time "hole" from Psychology to be filled. (But see point (3) of the preceding subsection). Of course, the affected departments (Philosophy, Computing Science) would want to be "compensated" in some way for the loss of these half-positions, but I think this could be somehow worked out. A further issue concerns Prof. Akins, who is in the second year of a five-year grant that releases her from teaching responsibilities. Prof. Akins is one of the more well-known cognitive scientists at SFU, and it would be immensely beneficial to the proposed Cognitive Science Program if she could be enticed to teach in it. In particular, she is admirably suited to the capstone COGS 400.

Despite the fact that such a group of half-time appointments might be able to meet the teaching requirements of the full-scale program, especially if there were occasional visitors to SFU in the area, it seems to me that it is not enough. What is missing from the envisaged program is a distinguished senior scholar who would set an agenda for Cognitive Science at SFU and provide leadership for such a program. There are two solutions to this: look within SFU for someone suited to this role, and alternatively to hire from without. It is possible that Prof. Akins is a good choice for this role, but some may think she is a relatively too new a scholar and that someone more senior would be better. I note that SFU's Strategic Research Plan for Canada Research Chairs contains two possible locations for such a distinguished scholar. The most natural place would be under the "Language, Communication and Information Dissemination" category, but there could equally well be a distinguished Cognitive Scientist hired under the "Behavior, Culture, and Social Relations". (Of course, these categories represent different research directions; but for each of these categories there are Cognitive Scientists whose research

has that emphasis.) If SFU is serious about the full-scale program in Cognitive Science, then the CRC initiative represents a very attractive option to pursue. SFU could at once become the premier place for undergraduate study of Cognitive Science in Canada. (The only competition would come from University of Waterloo and McGill University [which do not give a degree explicitly in Cognitive Science] and the University of Toronto. UBC is now undertaking feasibility studies concerning the viability of a full-scale undergraduate program. No other programs that I know of in Canada are of the full-scale variety. And as I see the academic landscape, with the current faculty re-deployed as suggested, and with a new hire in Psychology, and with a suitable CRC appointment, Waterloo and McGill certainly would not match SFU. [Whether UBC could match SFU depends on the direction it chooses to go].)

3. Non-Teaching Support for the Full-Scale Program

A program the size of the imagined full-scale option requires a full-time departmental assistant. It furthermore calls for some sort of released time (and consequent supplementation from the TI budget) for a director. This much is true regardless of whether the Program becomes a free-standing department or just a program. It is also true even if a CRC appointment in the area is made and that person agrees to direct the Cognitive Science program. Following from this is the necessity for space to house the Program. There needs to be an identifiable "Program Office" where the departmental assistant and the program director are located. This location needs furthermore to contain some sort of space sufficient to allow for seminars and group meetings of the faculty associated with the Program, especially since it is an interdisciplinary group who have locations in other areas of the campus. It would be best (in terms of fostering the requisite "spirit") that it allowed also for a place that the students could get together for academic and social reasons. My experience has been that a group of cognitive science students will gather and discuss academic and classroom issues with one another if they are given a place to do so. They often feel "out of place" in gatherings of students from the related disciplines, and they yearn for a place of their own to get together. This is certainly one of the very strong recommendations of the current group of SFU Cognitive Science students, and comports well with my own beliefs.

The stature possessed by a full-fledged department might give the Cognitive Science Program (and its director) more "clout" in negotiations with the Dean and with other departments. But regardless of whether Cognitive Science becomes a regular department or remains an interdisciplinary Program in a successful implementation of the full-scale proposal, it is essential that the director have the same channels of communication to the Dean, to other administration, and to departmental chairs that regular departmental chairs have.

Whether it is conceived as a free-standing department or as a degree-granting program, the full-scale Cognitive Science Program makes essential use of existing courses in other, related disciplines. Much of the discussion has evolved around the "40 majors each year" and the "100 students in each of two sections of COGS 100, each year". But while

these may form some sort of justification for the full-scale program, the fact is that the brunt of services are being supplied by the related departments. For example, the lower division minimum requirements for a major now require two courses in each of Computing Science and Psychology, and one course in each of Linguistics and Philosophy; in the intermediate stage of their education they have to choose three of the four departments and take one, two or four courses in each of the three (the number depends on the particular department chosen); and at the upper-level they are required to three further courses in each of the three departments in which they have chosen to concentrate. Departments that are already stretched to the limit of their ability to offer classroom space for their own majors will justifiably feel that they cannot entertain the spectre of some 40 more students in each year. I think here especially of Computing Science with its laboratory requirements, but similar comments could be made for any of the disciplines...it is difficult to see how 40 more students can easily fit into a limited number of upper-division Philosophy courses where the students are evaluated by essays and essay-style exams. **UNLESS THIS ISSUE CAN BE SATISFACTORILY ADDRESSED, PERHAPS BY SOME SORT OF FUNDING EQUALIZATION SPEARHEADED BY THE DEAN OF THE FACULTY OF ARTS, THE FULL-SCALE PROGRAM IN COGNITIVE SCIENCE CANNOT BE UNDERTAKEN.**

The Cognitive Science Program puts on the annual Vancouver Cognitive Science Colloquium, although in fact it is normally run by the Philosophy Department. This is an important manner in which SFU generally and Cognitive Science at SFU in particular is brought to the attention of the wider academic community. There should be continued support for this initiative from SFU, and also continued support in the form of publication grants for the printing of the Proceedings (if future subventions are necessary). This continued support for the Conference should be the case regardless of whether the elitist program or the full program is adopted by SFU. UBC has informally approached SFU's Cognitive Science Program with an offer to share the administrative duties required for the conferences and to share the associated costs. Although this may result in some decreased visibility on the part of SFU's Cognitive Science Program, I think this is a highly beneficial turn of events, and that it should be accepted (if it ever becomes official).

In addition to this yearly event, the Cognitive Science Program should have weekly or bi-weekly colloquia. These are envisaged as more like ordinary departmental colloquia, often given by local faculty members or by other visitors already in the area (who then only require a small honorarium). Only occasionally would there be a call to go for "external, outside speakers" who would cost somewhat more. I think this would be a necessary accompaniment for the full program, and that there should be some modest speaker budget given to the Program from the Faculty to support it. (Some costs could also be shared with the related departments and maybe with UBC).

VI. A Graduate Program in Cognitive Science?

I have also been asked to comment on the appropriateness and viability of a graduate program (both MA and PhD) in Cognitive Science at SFU. So far as I am aware, the only graduate Cognitive Science degree given in Canada is at Carleton University, although there are various places (e.g., University of Waterloo) where one can get a graduate degree in a traditional discipline with a "specialization" or "concentration" in Cognitive Science. And of course many universities allow joint degrees at the graduate level.

There is no specific plan for such a program that has been advanced, although the self-study material I received contains a 1993 *proposal* which was presented to the review team at that time. The 1993 proposal consisted of (a) a set of discussion points about the governance of such a program, and (b) a set of COGS graduate courses, with brief calendar descriptions. As such, it did not constitute either a finalized proposal or a plan for implementation. Specifically, the discussion points in the 1993 proposal lay out three options concerning the governance of a Cognitive Science graduate program. But the document does not specify which one should be pursued. For example, the document mentions that there might be a separate (graduate) Department of Cognitive Science or that it might be housed within one of the traditional departments or that each of the traditional departments have a Cognitive Science "wing". This is an important decision, because it involves issues of graduate student admission, issues of graduate student funding, issues of faculty involvement in Cognitive Science while being a member of a traditional department, the use of courses offered by related disciplines, and the offering of separate courses in Cognitive Science.

Neither the proposal nor the current statement of interest in re-starting negotiations for a graduate program in Cognitive Science have addressed the issue of teaching the proposed COGS graduate courses. Is it expected that home departments will simply allow their professors to teach COGS graduate courses instead of a graduate course in the home department? Is there any notion of "buying out" the teaching time? Furthermore, even if a professor from one department is seconded to teach a COGS graduate course, then that professor will not be teaching his or her regular, favourite graduate course in the home department. But that regular, favourite course was probably one of the courses that is allowed as credit toward the Cognitive Science degree! Issues such as these need to be carefully specified before a serious evaluation of the program can be undertaken.

Although the faculty who drafted the 1993 proposal apparently agreed on specific graduate courses from the related departments that would be credited toward a graduate degree in Cognitive Science, it is not clear to me that the same agreements would be in effect now. I suspect that the courses that departments offer now are different than they were then, and I suspect that there is now a lot more "protectiveness" on the part of departments toward class enrolments in their graduate seminars. (One can imagine them saying, "Who wants students in their courses who do not have the specific background in the traditional discipline? I don't care how much they know about some other field, they have not got the background for my field!")

A further difficulty, at least at present, is the non-involvement of Psychology in the Cognitive Science Program. The Psychology Departmental report on their re-organization ("Three Year Plan: 2000-2003") does not mention Cognitive Science at all, not even in the section "Relation to

Other Programs". I would be *very* uneasy about recommending a graduate program in Cognitive Science that did not include a strong representation from Psychology.

The previous review team (1993) recommended that the graduate proposal be put on hold until the undergraduate program is more firmly established. Given the state of flux which characterizes the undergraduate Cognitive Science Program, it might be wondered whether the precondition stated by the previous committee has been met. I would say it has not been met.

There have been a number of important hirings in the intervening years; and the stature and interests of these new faculty may argue for a graduate program. Certainly they seem to be interested in instituting such a program. Nonetheless, it seems to me that no case has as yet been made for a graduate degree explicitly in Cognitive Science, as opposed to a joint degree in two (or more) fields [e.g., a PhD in Computing Science and Linguistics] or a degree in one field with a specialization [e.g., a PhD in Philosophy with a Specialization in Cognitive Science].

All that having been said, the 1993 proposal – vague though it is in matters of administration and funding – has much to be said in its favour. *If* the administration issues could be worked out satisfactorily, and *if* the issue of funding for graduate students in the program could be solved, and *if* the issue of how faculty in traditional departments can be released from their teaching duties so as to teach Cognitive Science courses (there were five new COGS graduate courses proposed, as well as two "Topics" courses in COGS), and *if* the traditional departments would agree to offer the necessary courses each year, and *if* the issue with the Psychology Department could be resolved, then I think the administration should look favourably on a graduate degree proposal.

But until some solution to these issues comes forward, I believe the Program would be better served by joint graduate degrees or by degrees with a specialization in Cognitive Science. Since considerable time has lapsed since the 1993 proposal, it also seems appropriate to determine whether the current faculty and current graduate programs within each home department are receptive to the idea.

Appendix: Answers to explicit questions posed to the Review Committee

I was asked to comment on three "issues of particular interest" ((a)–(c) below) and on five "other areas to be considered" ((1)–(5) below). In summary form, here are my comments on these items. Further discussion and justification for these comments can be found in the body of this document.

- (a) The current (undergraduate) Program, with its dramatic increase in students over the past two years and its expected continued growth, cannot exist with the present method of sharing resources across departments. Not only would it be required that the COGS courses be taught by sessional lecturers (not good in itself and anyway requires an increase in the TI allocation to Cognitive Science), but none of the affected departments (Philosophy, Linguistics, Computing Science, Psychology) are able (or even desire) to teach the anticipated increase of students in their upper-level courses. This is particularly noticeable in Computing Science, where there are strict limitations in place concerning the enrolment of non-computing science students. Even the earlier [more than two years ago] small trickle of Cognitive Science students raised this issue, and there continues to be a dispute about how many Computing Science course-enrolments should be reserved for Cognitive Science students. Furthermore, there are not enough faculty members to teach the anticipated number of Cognitive Science courses. It would be good if members of the Steering Committee were to teach these courses, rather than relying on sessional lecturers, but these members seem to be committed to their home departments and often are not interested or able to teach the COGS courses. This is a particularly vexing issue, and the current Program cannot continue unless something is resolved in this venue.
- (b) There is sufficient localized expertise, especially in the area of "Philosophy and Cognitive Science" and possibly in "AI and Cognitive Science" or "Cognitive Science and Computational Linguistics" (this latter may be impacted by possible moves to industry), to offer graduate degrees in these tightly-constrained areas. But there does not seem enough expertise in Cognitive Science as an independent and separate field to have a free-standing graduate program. Nor is there involvement from the Psychology Department, which I see as a crucial component for a graduate Cognitive Science program. This might change if some further hirings were made (especially a distinguished senior person in the area of Cognitive Science, someone in Cognitive Psychology, and possibly more Linguists), but there would then need to be some sort of accommodation made with the relevant departments for their faculty members to teach courses and direct theses in this new area. Graduate student support for Cognitive Science students would also have to be guaranteed somehow.
- (c) The Cognitive Science program currently uses the Linguistics Department to manage its administrative duties (advising students, mailing, photocopying, etc.). Linguistics gets no extra financial aid for this, which should be changed. Hedberg is half-time in Linguistics and half-time in Cognitive Science. It would seem that her Cognitive Science half should cover her directing a small program and teaching one Cognitive Science course. And this should not impinge on the Linguistics duties that make up her other half. When the directorship of Cognitive Science rotates away from Hedberg, then perhaps her teaching in Cognitive Science would increase ...unless Linguistics wishes to "purchase" a part of her for teaching in

Linguistics. Matters would be different in a larger, free-standing Program, because the administrative duties would no longer be dealt with in Linguistics.

- (1) The undergraduate program as it was two years ago is a well-designed set of courses for an elite body of students. With small changes it could continue in this vein. The newly-installed program is a more popular (but still academically respectable) set of courses that can be quite a successful undergraduate major (and minor) with some additions. But as mentioned, this new program will require some infusion of funding and a serious re-thinking of the relation of the affected departments with Cognitive Science upper-division students.
- (2) It is difficult to assess the contributions of faculty members to the Program, since there is only one half-time official member of Cognitive Science. The majority of the Steering Committee have not taught a COGS course, although they of course teach the courses in their home departments that are taken by Cognitive Science majors. Students complain that these courses "do not have enough Cognitive Science" in them, as opposed to containing material that is strictly from the related discipline. Some of the 17 members of the Steering Committee will retire in the next few years. It is notable that the faculty who are most active in Cognitive Science research only very rarely are involved with teaching the pure Cognitive Science (COGS) courses. These same faculty are the ones with substantial research grants (Akins, Delgrande, Hadley, McFetridge, Popowich, Winne) and whose Cognitive Science expertise could be invaluable to students in these courses. One would wish this to change. (Of course, these people do teach Cognitive Science students when they take courses in the related departments. But it would be good to see these people teaching the regular Cognitive Science courses.) If the Program is allowed to develop along its current path, then there needs to be some re-organization of the faculty so that more people are directly involved with the actual Program. This is most straightforwardly accomplished by having more half-time appointments in Cognitive Science, and possibly by also hiring a senior outsider to be a figure who will set a general research agenda for the Program.
- (3) The administration and organizational structure of Cognitive Science is haphazard and baroque, as would be expected when almost all of its members operate on an "overload" basis and contribute their time *pro bono*. Still, with the elitist program of two years ago, this structure is probably sufficient. But if the Program is allowed to continue its current path, some drastic changes need to be made. There must be more faculty who are directly in the Program, and the Program should be allowed to develop to be more like a regular department. Possibly someone with a "vision of what Cognitive Science is" could be appointed as director. Although the earlier program had sufficient lab and computer space supplied by the related departments (there were very few Cognitive Science students), under the new program this will not be true. There will need to be some sort of method to allocate lab and computer resources to Cognitive Science students. The library resources seem adequate in their reflection of the current interests of the Steering Committee members (to my quick look at the volumes available), but would probably need to be strengthened if Cognitive Science were to widen its scope of inquiry.
- (4) By its very nature Cognitive Science has close ties with at least three departments (it ought also to have close ties with Psychology, and that is something that needs to be addressed separately). It could, however, be tied more closely also with Management Science, Anthropology and Sociology, and Education; and the Steering Committee might look at instituting areas of concentration in these fields also. The Program maintains a high visibility

with its annual Vancouver Cognitive Science Colloquium and subsequent publication of these conferences.

- (5) As mentioned above, the future directions that were outlined for the Program are unworkable without support from the Faculty of Arts and the University generally.