

Program evaluation report 2014

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1 Background information

Report from programsensor for "Bachelorprogram i kognitiv vitenskap" (KogVit), Det samfunnsvitenskapelig fakultet, Universitetet i Bergen (UiB).

Evaluation period: Calendar year 2014, i.e. spring and fall 2014

The evaluation is based on meetings with: Liv Kristiane Bugge, Csaba Veres, Weiqin Chen, Michal Walicki, Christer Johansson, Koenraad de Smedt, and the students Roar Mjelde and Tor Hagland.

Time for meeting: May 12 2014

I have also used material sent to me by Liv Kristiane Bugge, and public and private web pages (I have been granted access to privileged information).

As this is my first sensor report I will give a brief background of me. I am professor in computer science, at the Department of Computer and Information Science, Institute of Technology, Linköping University, Linköping, Sweden. My research is on various aspects of language technology. I was one of the co-founders of a four year "magister" program in cognitive science, at the Faculty of Arts and Science at Linköping University, that started 1994. I was program director for the program for nine years. I was then involved in developing the four year program into a three year bachelor's program and a four year master's program. I have been program director for the master's program for seven years and will continue with that 2015.

2 Evaluation of the program

The bachelor's program in cognitive science at UiB (KogVit) started 2006 and is the only one in Norway. Cognitive science is an area that studies human behaviour from many different perspectives using theories and scientific methods that are very different. Starting, and running, a bachelor's program in cognitive science is, thus, not an easy task as it requires teachers with very different research agendas to co-operate and have them engage in a program not only focussing their own interests. Such an endeavour is truly an achievement that I think that UiB has succeeded doing.

The benefits are not only to have the only cognitive science program in Norway, and one of a very few in the Nordic countries, from what I understand it has also formed new unique teacher/researcher co-operations in Bergen. It is further clear, from what teachers express, that cognitive science students often stand out in the classes. This is something we find in Linköping as well. Cognitive science students are special and one reason, I believe, is that they learn many perspectives on what knowledge is and how it can be acquired. This is, however, also a source of confusion where I think there is room for improvements at UiB, see below.

The program has a yearly intake of 20 students. On average 30 students are admitted to the program and 20 finishes it. That may be acceptable, but still something that can be improved. From what I understand the majority of students leaving the program do so the first semester and then mainly because of programming. One way

Table 1: Course categorisation

Area	Courses	credits
Theory of science	EXPHIL-PSSEM	10
Cognitive science	KOGVIT101	10
Linguistics	EXCAF00SK, LING122	20
Computer science	INFO100, INFO 102, INFO282, INFO 232	20
Logic	LOG110, LOG111, INF227	30
Cognitive psychology	DASP106, PSYK120	15
Philosophy	FIL105	10

of having more students stay on the program is to more clearly inform prospective students that programming is essential. My impression is, however, that the web page presenting the program¹ is clear here and I do not think it needs to be modified in order to attract "the right" students.

Cognitive science is an interdisciplinary discipline and students enrolled in bachelor's programs are often confused. Another way of keeping students at the program is, thus, to have them understand first of all what a cognitive scientist can do and, second, the nature of interdisciplinary research and teaching, e.g. some courses involve hacking a computer to achieve human behaviour, some focus on studying human behaviour through experiments and some use formal language to represent human behaviour. This is no easy task and to start with programming, or logic, is to make it unnecessarily hard I think.

During my discussions with the cognitive science students at UiB I learnt that there is a student mentor program where new students meet previous students for one week, during the start of the program. This, however, does not continue after the first week. Continuing the mentor program may motivate students to stay on the program.

From what I understand, the cognitive science students are not in majority in all the courses the first year, but according to the students I talked to, they form their own little group in the lectures and also study together. Talking to this group can be used as a mean for information on what cognitive science is and what types of jobs cognitive scientists have etc.

The bachelor's program is in theory a three year program, but the third year comprises either courses abroad, or courses specific to other study programs in Bergen, in order to ensure that the students are allowed to enter a master's program in one of four other disciplines. I will come back to this, but from now mainly concentrate my assessment on the first two years.

Cognitive science is an interdisciplinary research area comprising at least the fields computer science (artificial intelligence), psychology (cognitive psychology), linguistics, philosophy, neuroscience, and anthropology. The cognitive science program at UiB contains 14 compulsory courses the first two years that can roughly be divided into seven fields, see Table 1. It is hard to cover all areas, but the bachelor's program comprises elements on all fields but anthropology, that may be covered in the introductory course. The division between the fields is, however, not equal. Looking at the amount of credits given in each area cognitive psychology is only given 10 credits (5 of the 15 credits are neuroscience). Linguistics and computer science are equally large, 20 credits. Logic, 30 credits, is not in itself a field of cognitive science, but can be considered philosophy or computer science making one of these fields the largest. In fact, logic is so dominant that dividing it equally between philosophy and computer

¹<http://www.uib.no/studieprogram/BASV-KOGNI>

science makes these the largest fields.

Looking further at the methods for studying cognitive science they can, very simplified, be divided into three: modelling, experiments and description, mainly corpus analysis. Modelling includes building artificial models, often by writing computer programs or a rigorously formalised model, but also by training e.g. an artificial neural network. Experiments means doing studies on humans, through tests of various types or through observations, in the latter I include all levels from inside the brain (brain imaging) to watching humans in natural environments. Corpus analysis is used in linguistics where a corpus, often comprising transcribed conversations, is analysed.

Looking at Table 1 and the course descriptions in Section 3 my impression is that the modelling method comprises 50 credits (INFO100, INFO102, INFO282, INFO232, LOG110, LOG111, INF227), of which formalisations account for 60%. The experimental perspective comprises 15 credits (DASP106, PSYK120) and the descriptive 30 credits (EXCAF00SK, LING122, FIL105). I assume that EXPHIL and KOGVIT101 cover all methods. I may have misclassified some courses but it is anyhow obvious that modelling, and especially formal models is the method that gets most attention in the program. Formal methods are important but there are other methods that are equally important for a cognitive science student to learn.

In my experience many students work in areas related to human machine interaction, including all aspects of interaction between a human and an artificial artefact, e.g. human-computer, human-vehicle, and human-control room. In all these areas it is imperative for a cognitive scientist to be able to collect empirical data on human behaviour in the situation at hand, i.e. to conduct their own experiments, both quantitative and qualitative. My impression is that the program is weak in this aspect. I find no course on qualitative methods, and it seems not to be included as a moment in any course. I further think that it is important for the students to practice quantitative and qualitative methods by conducting their own experiments, under supervision. I can not find any such moments in any course.

3 Evaluation of program courses

In this section I look at each course on the first four semesters of the program.

3.1 Semester 1

This semester comprises three courses.

EXPHIL-PSSEM, 10 sp. This is a general course with no specific content related to cognitive science. To the exam 10 cognitive science students were registered, 9 passed the exam and 1 did not show up and the mean grade was C. This course has an extensive student course evaluation. The students are in general satisfied with the course, but they do not provide any comments.

INFO100 Grunnkurs i programmering, 10 sp. This is an introductory programming course. No content specific for cognitive science but being able to write computer programs is essential for cognitive scientists. To the exam 26 were registered, 14 passed, 6 failed and, 6 did not show up. Mean grade C. Teacher's course evaluation from 2013 claims that all is fine. Not many drop-outs and the grades had a mean between B and C and the teacher thinks that the exam may have been too easy. For this course I browsed back to look for student evaluations but did not find any from 2007 and forward.

EXFAC00SK Examen facultatum, Språk og kommunikasjon, 10 sp. This is also a general course, but to understanding language and human communication is an

integral part of cognitive science. To the exam 30 were registered, 17 passed, 5 failed and, 8 did not show up. Mean grade C. No course evaluation found for 2014, 2013, 2012 or 2011.

3.2 Semester 2

The second semester comprises four courses, as LOG110 and INFO102 are 5 sp each.

LOG110 Introduksjon til formal logikk, 5 sp. This is an introductory course and comprises propositional and predicate logic, the most common means for formal representations of human knowledge. To the exam 20 were registered, 16 passed, and 4 did not show up. Mean grade C. This course has a student evaluation from 2014 where 8 students responded, and overall the course gets good scores. The students are overall satisfied with the teaching as well as the content. The course was reasonably difficult and all moments, lectures, tutorials, exam etc get good scores. The exam is also considered good.

LOG111 Førsteordens logikk, 10 sp. This course builds on LOG110 and seems to focus on natural deduction. It may be that LOG110 only included formalising expressions in predicate logic and this course introduces inference. It also comprises set theory. To the exam 20 were registered, 12 passed, and, 8 did not show up. Mean grade C. This course also has a student evaluation from 2014 where 2 students responded. Overall the course gets good scores. The two students like the course, the teachers, the exam etc.

INFO102 Formelle metodar for informasjonsvitskap, 5 sp. This course provides basic knowledge on logic, set theory, relations, graphs and functions, concepts that are important in programming. To the exam 3 were registered, 2 passed, and 1 did not show up. Mean grade C. INFO102 was evaluated by the teacher 2014. The evaluation was very short, but the teacher claims that the course is fine and comments on having only 3 drop outs and that the grades are centered around C with a skewness towards D/E.

KOGVIT101 Introduction to the Cognitive Sciences, 10 sp. This course provides an overview of cognitive science. To the exam 16 were registered, 11 passed, and 5 did not show up. Mean grade C. This course is evaluated by the teacher 2014 and discusses difficulties during the course due to illness and how that was handled satisfactory. The course grades are presented with an ok distribution of grades. The teacher had hoped for a slightly better result.

3.3 Semester 3

This is another semester with four courses.

INFO282 Knowledge Representation and Reasoning, 10 sp. This seems to be a classical introduction to AI course, a topic that is one of the cornerstones of cognitive science. To the exam 11 were registered, 9 passed, 2 did not show up. Mean grade D. Course evaluation by the teacher 2012 when the course was called artificial intelligence. All went well and the grades clustered around B and no student failed at that time. There is also a student evaluation from 2013 reporting that the course is demanding but interesting and that the teaching is good and that the seminars fill their role but that the quality varies between seminar leaders.

INFO232 Logikkprogrammering, 5 sp. A course on prolog, a programming language that is close to logic. To the exam 17 were registered, 14 passed, 3 did not show up. Mean grade C. A teacher evaluation 2013 reports that all is fine. There is also a student evaluation reporting that the course is well received and considered relevant for the program.

LING122 Språk og kognisjon, 10 sp. In this course cognitive and psychological aspects of language is emphasised. To the exam 8 were registered, 8 passed. Mean grade B. No course evaluation found for 2014, 2013, 2012 or 2011.

DASP106 Statistikk og kognisjonsforskning, 5 sp. In this course quantitative methods are presented with a focus on statistical analysis. To the exam 13 were registered, 12 passed, 1 did not show up. Mean grade B. No course evaluation found for 2014, 2013, 2012 or 2011.

3.4 Semester 4

This semester comprises three courses.

PSYK120 Biologisk og kognitiv psykologi, 10 sp. This course includes two of the most important areas of cognitive science, neuroscience and cognitive psychology. To the exam 14 were registered, 10 passed, 1 failed and, 3 did not show up. Mean grade C. No course evaluation found for 2014, 2013, 2012 or 2011.

INF227 Innføring i logikk, 10 sp. This is an introductory course to logic. To the exam 15 were registered, 5 passed, 4 failed and, 6 did not show up. Mean grade C. This course has a thorough student evaluation indicating that this is a very hard course that may require mathematical skills that some students do not have. It is also clear that this is a course with active teachers that really try to help the students, and the course evaluation gives ideas on how to further improve the course.

FIL105 Innføring i sinnsfilosofi, 10 sp. Classical course on philosophy of mind, an important topic in the understanding of human cognition. To the exam 10 were registered, 7 passed, and, 3 did not show up. Mean grade B. No course evaluation found for 2014, 2013, 2012 or 2011.

3.5 Semester 5 and 6

For the final year students are encouraged to go abroad or select courses that allow them to enter a master's program in "informaticsvitenskap"², "informatikk", computational linguistics or philosophy. "Informationsvitenskap" allows the students to select any INFO-course, not already taken, for 50 sp; 10 sp are free. The other specialisations have more or less no free courses.

There are no courses that can be termed cognitive science the last year. For students specialising in "informaticsvitenskap" where there are a number of courses to choose from, there are courses such as Interaction Design and Semantic Technologies, that can be considered as applied cognitive science, but for the other there is nothing on cognitive science.

4 Evaluation of assessments

The courses have a variety of assessments and I am confident that each teacher has chosen the appropriate type of assessment for their course and also that the gradings are appropriate and that markings are correct.

The program has a policy that every course shall be evaluated each year by the teacher and every third year by students.

Here I find a large variability between courses. I have looked for course evaluations in "kvalitetsdatabasen" on all 14 courses provided the first two years of the program from 2011 to 2014. I found student evaluations for four courses, EXPHIL-PSSEM, LOG110, LOG111, INF227, and teacher evaluations for five courses, INFO100, KOGVIT101,

²I will use the Norwegian terms here as the use of these subjects varies between universities.

INFO102, INFO282, INFO232. Five courses, EXCAF00SK, LING122, DASP106, PSYK120, FIL105 have no evaluations at all in the database.

Teacher evaluations may be valuable, if done honestly, but I believe that student evaluations are a more important instrument in order to ensure not only a course' quality but also for the program board to understand how individual courses fit in the program for instance concerning prerequisites, overlap, relevance to the program and future studies.

Consequently I find it remarkable that only five courses have been evaluated by students and recommend the program board to actively encourage teachers responsible for courses provided to cognitive science students to conduct student evaluations. As only one course is specific for cognitive science students this is even more important as courses may be adapted for students at other programs and neglect cognitive science students needs. To further stress this, cognitive science students are in majority on many courses, e.g. INF227, DASP106, LOG101, LOG111, LING122, INFO282, INFO232 and FIL105, and these courses ought to consider that, e.g. in how examples are chosen and which topics that are emphasised in the course.

5 Summary

My impression is that the cognitive science program in Bergen is a program that works well with enthusiastic teachers and motivated students. I believe, however, that the program can be further improved.

First of all, I think that the program is too short, only two of the three years are controlled by the program board and that is not enough if you want to ensure that students have a bachelor's in cognitive science. My first advise is, thus, to try to get control over more courses the third year. In my opinion there are also too many courses on formal methods.

I also believe that the program should include a thesis. Although the students did not want to get rid of any course, I believe that conducting an independent research work gives the students skills that can not be acquired in a course, given thorough supervision form a supervisor. It also gives the students confidence that they can work as a cognitive scientist.

Another possibility is to have a project course at the end of the fourth semester where students, under supervision, conduct cognitive science research preferably in a research project at UiB. The project should involve conducting an experiment as well as modelling. Such arrangement will not only allow researchers to try out ideas they may not have funding for, it also allows the students to try their wings for real, on real problems and with results that may well be published at national, or Nordic, conferences.

I also suggest to move the introductory course to the first semester. Not only will it help the students understand interdisciplinary research and teaching, it will, probably, also motivate the students to stay on a program that is truly more interesting than any alternative; given that they have chosen cognitive science in the first case. As a complement to the first week student mentor program I also suggest to have more regular student mentor meetings during the rest of the first, and maybe even second, semester.