Maryland's IGERT Program in Language Science

Summary of Activities and Outcomes (end of Year 2: May, 2010)

1. Participation

Student Enrollment

38 PhD students from 7 different departments are formally connected to the IGERT program in some way, either by submitting a full application, or by applying to be a program affiliate. Of these, 26 have submitted full applications, and all but 2 are actually following through on their plans.

Department	Full (NSF fellows)	Affiliates
Computer Science	1 (1)	0
Electrical Engineering	1 (1)	0
Hearing & Speech	1 (1)	3
Human Development	1 (1 applied for)	3
Linguistics	15 (5 + 2 applied for)	3
Philosophy	0	1
Psychology	2 (1 + 1 applied for)	0
Second Lang. Acq.	5* (1)	2
TOTAL	26 (10 + 4 applied for)	12

* Of the SLA students who submitted full applications to the program, only 2-3 are active in the program.

The number of students is very large for an IGERT program that is only in its second year. Challenges: there is uneven buy-in across departments and colleges. Linguistics accounts for a large proportion of the students. This was expected in part, as Linguistics has the largest group of language science students on the campus. But it is more extreme than expected. The proportion of participating students from areas such as Second Language Acquisition and Computer Science is lower than anticipated.

Faculty Involvement

39 faculty are involved in the program in some fashion (including a number of new hires starting in 2010; *see separate document summarizing participation*). The faculty represent 9 departments and the Center for Advanced Study of Language and the National Institutes of Health.

22 faculty are involved in mentoring IGERT full participants or affiliates, either as a primary or secondary mentor, or as the sponsor of a research rotation.

Many faculty have taught IGERT courses, given research talks at Winter Storm or the IGERT Lunch series, or have served on the Executive Committee.

However, there are rather uneven levels of involvement and 'buy-in' to cross-departmental activities. Most IGERT activities have been coordinated by a core cluster of Linguistics faculty, with support from a small group of faculty from other departments who are closely engaged. Long-term success will depend on significantly broadened leadership in language science initiatives.

2. Activities

Winter Storm

Winter Storm is one of the signature activities of our IGERT program. It is an intensive workshop that meets all day, every day for 2 weeks in late January, immediately preceding the Spring semester. It is open to all IGERT and other students and faculty. In 2010 Winter Storm was organized by a core team of 7 students from 5 departments, and 15 students were involved in organizing specific events. 56 students and 11 faculty participated in some or all of Winter Storm. The two Winter Storms so far have included the following activities:

- Student-led workshops on research tools and data analysis methods
- Daily lunch talks that showcase diverse faculty research
- Cross-department research groups that meet to develop integrative research projects in different areas of language science
- Social activities
- In 2010 a professional development talk by Jon Sprouse, a recent Linguistics PhD who is now a faculty member in Cognitive Science at UC Irvine – overwhelmingly positive student response to this, and requests for more similar activities in the future
- In 2010 a 1-day "I-95 Summit" featuring talks by faculty from IGERT programs at Maryland, Penn, and Johns Hopkins on phonological development.

Much information on the Winter Storm workshops can be found in the wikis that students created as a repository for all WS activities: http://www.ling.umd.edu/winterstorm2010/doku.php

New Courses

In the IGERT proposal we described a number of new courses. <u>By Spring '11 we will have offered all of the new courses outlined in the proposal</u>.

- Y1 (Spring '09): *Language Diversity and Language Acquisition* (600-level; Hornstein & Lidz). This course was planned as a second-semester syntax course targeted at a broader audience than the standard Syntax II course offered by LING. The course was well received by students … but only Linguistics students enrolled. Future status of the course is uncertain.
- Y1 (Spring '09): *Seminar on Events Perception and Language* (800-level; Woodward & Lidz). This seminar brought together students from multiple departments to discuss the relation between cognitive and linguistic development. University funding supported a number of external guest speakers. At least one new cross-department student project resulted – Lee-Ellis and Hoerner's project on cross-linguistic perception of spatial relations, already presented at a conference.
- Y2 (Spring '10): *Seminar on Categorization* (800-level, Idsardi). Interdisciplinary approaches to categorization phenomena, comparing speech categorization with other domains. Good student participation, but mostly from LING.
- Y2 (Spring '10): *Seminar on Psycholinguistics and Language Disorders* (800-level, Zukowski). Focus on comparing detailed psycholinguistic profiles of various language disorders, considering contributions of cognitive and linguistic deficits. Small enrollment from 3 departments proved successful in generating extensive discussion without domination from one constituency.
- Y3 (Fall '10): *Seminar on Infant Perception* (800-level, Newman).

- Y3 (Spring '11): *Introduction to Computational Modeling of Language* (600-level, Feldman). This new core course fills a critical need for foundational training in computational modeling, to be taught by new hire Naomi Feldman.
- *Ethics training*: IGERT students are expected to take a course in research ethics. Our first cohort of students did this in Spring '10, in most cases taking advantage of existing courses offered by the NACS program.

Summary: our new course offerings largely meet the goals laid out in the IGERT proposal, but breadth of enrollment has not always met expectations.

Outreach Activities

- *Northwood High School:* we have organized two activities per year in connection with Northwood High School in Silver Spring, a school with a 65% minority enrollment. The specific connection is with the AP Psychology curriculum, but the broader aim is to use language science as a model of how a field is relevant across the curriculum. Jeff Lidz has given two talks at NHS, most recently to ~150 students. IGERT students have organized successful half-day workshops for NHS students on campus. In April 2010 this involved a visit by 90 NHS students, for whom IGERT students organized 10 different activities, focusing on different areas of language science. [*see student presentation, Thurs. am*]
- *Maryland Day*: the IGERT program has sponsored a tent organized by the infant studies group at this large community outreach event for the university (60,000+ attendees each April).

The high school outreach has been very successful to date, and students have developed a series of effective activities, stored on the program wiki. Graduate students have found it valuable to work together on developing accessible and engaging materials. We are now in a position to discuss how to extend or reinforce these activities.

Advanced Rotations

As a part of the program's expectation that students' training take them 'outside their comfort zone', students carry out an 'advanced lab rotation'. We require this for NSF-funded fellows; optional for other full participants. The initial cohort of IGERT students is currently going through this process.

- Brian Dillon (LING) is a psycholinguist who will spend much of Fall 2010 deepening his computational skills at labs in Michigan, Maryland, and Potsdam. (Rotation delayed by successful foray into the faculty job market.)
- Kevin Donaldson (NACS/Elec Eng) is an auditory neuroscientist based in the Electrical Engineering Dept. He spent Fall 2009 based in a cellular neuroscience lab in Biology, and Spring 2010 based in a human cognitive neuroscience lab in Linguistics.
- Annie Gagliardi (LING) is a language acquisition specialist who has taken a number of courses to develop computational skills, and has taken a computational linguist as a co-advisor.
- So-one Hwang (LING) is a psycholinguist with a speech focus who has spent much time working with collaborators at Gallaudet University on a project on the perception of temporally-inverted ASL. The project is co-funded by Gallaudet's NSF Science of Learning Center in visual language. So-one is also taking ASL courses.

- Sunyoung Lee-Ellis (SLA) has developed her research on heritage language acquisition through multiple collaborations with faculty and students in Linguistics.
- Derek Monner (CompSci) is a computational modeler who has developed a research project on critical period effects, collaborating with an SLA faculty mentor and students from SLA, HESP, and Linguistics. Derek is first author on an abstract for the upcoming SLRF conference. This project emerged from the 2009 Winter Storm.
- Joshua Riley is a neurolinguist who has been spending much time at NIH, conducting neuroimaging studies with different atypical populations (foreign accent syndrome; stuttering) in the lab of Al Braun. Nan Ratner (HESP) is helping to mentor his research on stuttering.

Summary: the goals of this program requirement are being met.
Improvements needed: more advance planning; students remain reluctant to leave their 'home'

Student Collaborations

A number of new cross-departmental student collaborations have been formed as a result of the program.

- *Neural network models of critical period effects*: emerged from a research group at Winter Storm 2009. Led by Derek Monner (CompSci student) and Robert DeKeyser (SLA faculty), with student collaborators from HESP and LING. Abstract submitted to SLRF 2010 conference.
- *Ferrets & Phonemes*: emerged from a research group at Winter Storm 2010. An entirely student-led project, bringing together students from Elec Eng., Linguistics, Biology, CompSci. Aim is to use a combination of linguistic and machine learning expertise to analyze patterns of neuronal activity to speech sounds recorded directly from ferret auditory cortex.
- *Memory & ERPs ('MERP')*: emerged from a research group at Winter Storm 2010, involving 3 LING and 1 HESP student. Focus is on better understanding striking parallels between ERP findings in the memory and language literatures, which apparently have been rarely discussed previously.
- *Cross-linguistic Event Perception*: emerged from Woodward/Lidz IGERT seminar, led by Sunyoung Lee-Ellis (SLA) and Shannon Hoerner (LING). Investigates Korean Heritage learners' categorization of spatial relations that are expressed differently in the two languages. [See 'highlight' piece in 2010 NSF Annual Report.]
- *Developing Eye-tracking Infrastructure*: cross-department student teams have collaborated on establishing the two new eye-tracking labs supported by the IGERT. *EyeLink* eye-tracker for reading studies (PSYC & LING & CASL collaboration). *ASL Remote* eye-tracker for visual world studies with children and adults (HESP & LING collaboration).

Lunch talks

In 2009-2010 we initiated regular 'IGERT Lunch' talks, held on as many Thursdays as was practical. The talks primarily featured research presentations by IGERT students, pitched for a broader audience than they would normally speak to. These talks were very well received, and students generally did very well at setting their work in a broader context. Other students who served as 'lunch elves' each week made impressive contributions, too. Typical attendance: 30-40 people.

Summary: these events, absent during Y1 of the program, have proven more popular than expected. Improvements: more talks needed; concern about always holding them in LING; better to move locations.

Symposia Sponsored

We proposed to sponsor symposia at leading disciplinary conferences that showcase the value of interdisciplinary language research. The goal of these symposia is to take the message of our program to a broader audience. We have already organized a number of such workshops.

- 2008-2009: Linguistic Society of America (San Francisco), symposium on 'Psychosemantics of natural language quantifiers'; organized by Jeff Lidz
- 2009-2010: International Society for Infant Studies (Baltimore), symposium on 'Statistical inference in infant language acquisition'; organized by Bill Idsardi and Jeff Lidz
- 2009-2010: Maryland Mayfest (College Park), workshop on 'Linking language acquisition and language typology'; organized by Linguistics graduate students
- 2010-2011: Second Language Research Forum (College Park), workshop on psycholinguistic methods in SLA; organized by Nan Jiang & Colin Phillips

3. Recruitment

Most IGERT programs recruit graduate students directly to the IGERT program, and use the very generous NSF fellowships as a recruiting carrot. We have chosen to follow a different model, where we recruit students to the IGERT program only after they are already enrolled in a U of Maryland PhD program. This approach has a number of motivations.

(i)   It allows students to get involved in program activities before they officially join the program, ensuring that students have a better idea of what they are getting into.

(ii)   It allows us to ask that students develop an extensive research and training plan in order to join the program.

(iii)   It reduces potential difficulties involving assignment of funding 'quotas' to departments, and increases commitment to the program from students and their advisors or home departments, who are relieved of a funding commitment that they had already made to the student.

(iv)   It allows students to reapply for NSF fellowships two years in a row, if they are not successful the first time around.

(v)   We still use the program as a recruiting carrot, but we focus on the intellectual benefits of Maryland's broad language science community, rather than on the financial consequences. This is healthy.

We have, in general, been very satisfied with our use of this model. But some aspects need improvement …

Recruitment to PhD Programs

Our impression is that PhD student recruitment to participating departments has not been significantly affected by the presence of the IGERT award. Individual participating programs all face area-specific recruiting challenges, and we have seen little change in this in the past two

years. The competition for admission is rather different across the participating programs, and we have not sufficiently leveraged our combined strengths to benefit recruiting.

Examples: in 2010 Linguistics received 140 PhD applications, for an incoming cohort of 6 students, at least 4 of whom will almost certainly become IGERT participants; meanwhile, HESP received very few PhD applications – this is a nationwide difficulty – and no students accepted the department's offer of admission. (Context about applications to the participating programs can be found in the original IGERT proposal on pp. 38-44.)

This is an area that should be targeted for improvement in Year 3. Completion of the new languagescience.umd.edu web site is a critical early step in this process.

Application Process

Students submit an extensive application before they join the program as full participants (see additional document and sample applications provided to advisory board). Applications are reviewed once per year, in the Spring semester. The structure of the application has remained largely unchanged over the 3 application cycles to date, but the review process has been improved in a number of ways in the most recent cycle.

Student applications consist of: (i) CV; (ii) unofficial transcripts; (iii) training plan [2 pages]; (iv) research plan [4 pages]; (v) outreach plan [1 page]; (vi) 2 reference letters; (vii) advisor commitment letter. Students who have prepared an NSF GRF application in the fall semester have a head start in this process.

In the 1st and 2nd iteration of this process, students received limited feedback or no feedback at all on their applications, but in the most recent iteration we have followed a more structured process that provides students with reviews prepared by the Executive Committee, and that engages students in a revision process that is aimed to lead to better developed plans. (Students can prepare revisions during the later part of the For example, the committee may ask that students meet with specific additional faculty from other departments in preparing their revised proposal. The revision process is turning out to be in many ways more valuable than the initial application process … perhaps unsurprisingly, since the same is often true of faculty grant applications.

We feel that the application process is an integral part of the program, and contributes to students' professional development. Future improvements of this process that we have discussed include: (i) more mentoring of beginning students by more experienced students [impromptu cases of this have already proven effective; (ii) developing activities that guide students through the application process, starting earlier in the year.

4. Infrastructure & Organization

New Equipment

The start-up funds for the IGERT program provided for various equipment purchases. These have mostly been successfully completed.

- In Year 1 the program paid for half of the cost of two new eye-tracking facilities that are being shared by students from multiple departments. (The remaining funding came from a private donation to the Linguistics Dept.)
- In Year 2 the program paid for an upgrade to research facilities in the shared lab run by the Second Language Acquisition program.
- In Year 1 the program paid for creation of new data storage and backup facilities that are particularly useful for electrophysiological research.
- In our proposal we suggested that we would use programs for partial support of a NIRS device. In lieu of that, the program will likely contribute to specific equipment in the new Maryland Neuroimaging Center that serves program needs.

Program Staff

In Year 2 of the program we hired a 50% time Program Coordinator, Csilla Kajtar. This has *enormously* benefited program management, and has helped to correct coordination and planning difficulties that arose in Year 1, when the PI underestimated the complexity of setting up the program's many activities. Csilla works closely with the PI and other faculty on all program activity, manages all program finances, coordinates web development and information dissemination, is involved in all program assessment activities, and serves as a consistent point of contact for students. *This position is an essential component of our efforts in language science.*

In both years of the program, technical support for program activities has been provided by Phillips' full-time research assistant, whose salary is partially covered by program funds and university match. Mike Shvartsman (Year 1) and Alan Mishler (Year 2) have led the development of new research infrastucture for the program (especially eye-trackers), IRBs, research data backup, data collection for program reporting, etc. *Search currently underway for Y3 RA.*

Executive Committee

A 7 member IGERT Executive Committee was formed even before the program officially began. Current members are the 5 co-PIs on the project (Colin Phillips, LING; Jeff Lidz, LING; Mike Long, SLA; Amy Weinberg, LING; Amanda Woodward, PSYC) and two faculty representing other key sub-areas (Rochelle Newman, HESP; Jim Reggia, CMSC). The committee met sporadically in Year 1, as specific needs arose, and since Fall '09 it has met monthly, allowing it to discuss a wider range of issues relating to program organization and planning.

The Executive Committee has focused on such topics as: (i) review of student applications to join the program; (ii) review of student progress through the program, e.g., shaping proposals for advanced rotations; (iii) formulation of program policies on courses, funding, etc.; (iv) discussion of strategies for broadening participation in the program; (v) planning for the advisory board meeting.

Our original proposal suggested that we would form additional committees. This has not yet happened.

    (i)   Recruitment committee. This is an area where new initiatives are needed, in order to leverage cross-departmental strengths to improve departmental student recruitment, and to organize initiatives for targeting underrepresented minorities.
    (ii)   Assessment committee. Assessment activities are underway, but without a formal committee. These activities have been coordinated by Phillips, Kajtar, and Idsardi, and IRPA, with close

>
> *involvement of graduate students. (The student participation in program assessment is an important component that was not a part of our original plans.)*
>
> (iii) *Student committee. This committee was not formed, but students have been closely involved in most aspects of the program, and ad hoc student committees have led the organization of many specific activities (e.g., Winter Storm, High School outreach). We are not sure whether a separate student committee is needed.*

Internal Assessment

NSF requires all IGERT programs to engage in a formative assessment process, in order to monitor program progress and to identify strategies for improvement. Our internal assessment is carried out in coordination with the University of Maryland's Office of Institutional Research, Planning, and Assessment (IRPA), under the direction of Sharon La Voy and her graduate assistant Corbin Campbell. Although the initial ramp-up of this process was delayed, due to the lack of a program coordinator in Year 1, it is now hitting its stride, and is already yielding useful results. We are coming to appreciate the value of this process.

- A key feature of our assessment process is the strong involvement of students, not only in providing information but also in digesting results and devising responses to lessons learned. This role helps students to take a broader perspective on our joint efforts, and gives them greater ownership over the program.
- We have conducted on-line surveys after each Winter Storm. Results of these surveys are available in separate documents. The 2009 survey was entirely student-run, and the 2010 survey was coordinated by IRPA, with substantial student input.
- IRPA conducted a student focus group in April 2010. Results from this have been analyzed and are available separately. A parallel faculty focus group will take place during the Advisory Board meeting on Thursday May 13th.
- Many other aspects of program assessment are carried out fully internally, in the context of NSF Annual Reports (see available files), IGERT Executive Committee meetings, and now the advisory board meeting. We have a great deal of data on certain aspects of the program.

Creating Language Science Identity: Web Presence & Newsletters

During the first 2 years of the program we have been constantly reminded of the need to create a common sense of identity for the language science community, and the difficulty of keeping this broad community informed about activities and achievements. Program leaders are often aware of a wide range of faculty resources, research opportunities, and student and faculty achievements. But this knowledge cannot be presumed to be shared by all, and it is particularly difficult for students to learn about such a broad group in a short time. We have taken a number of steps to address this 'information gap', and we see various indications that this is starting to pay off.

- Email reflectors for language science faculty and students. Mostly used for IGERT program business at present, but people are encouraged to use these more broadly.
- In Spring 2010 we started regular electronic newsletters, *Language Science News*, distributed to all relevant faculty and students via email and the web. Includes announcements of upcoming courses and events, profiles of new faculty, news about new grants and awards, and student research highlights. The aim is to use these newsletters to build a strong sense of community, and a broader awareness of the campus' strength in language science.

- *languagescience.umd.edu* web site. Rather than create a web site specifically for our IGERT program, we have created a site that focuses on our language science efforts more broadly, with the IGERT as one component of that. The current site was created in-house in Year 1, and has been updated and expanded in a number of ways this year. A more professional and extensive version of the site is currently under construction and should be ready to launch during the summer. This should be valuable for more closely coordinated student recruitment efforts.

Funding Sources

Although the primary source of funding for the program comes from the IGERT grant itself, our ability to support a far broader network of participants relies on many additional sources of support.

- Around 5 new students each year can be supported directly by 2-year NSF fellowships. These are extremely generous fellowships ($30k/year), particularly by the standards of some participating programs. We anticipated that this might create problems, but these have not materialized (in most cases).
- The College of Arts & Humanities has provided supplemental funding for international ARHU students (i.e., LING, SLA) who are full participants in the program.
- A number of students in the Linguistics program hold Graduate School Flagship Fellowships, these are generous and highly competitive supplemental funding awards that are made to around 10 new graduate students across the entire university each year. By not taking NSF-IGERT fellowships, these students have allowed us to support additional students with NSF funds.
- CASL is an important source of student funding, particularly for students in SLA. This funding does, however, come with significant somewhat-off-campus responsibilities, which can make it more difficult for those students to fully engage in program activities.
- In our initial application the College of Behavioral and Social Science promised additional support for HESP students who participate in the IGERT program (support for PhD students in HESP is a chronic difficulty). We hope that this support will materialize in the not too distant future.

We have tried very hard to get students interested in participating in the program for intellectual reasons, rather than for monetary reasons. This has been only partly successful. In some programs we see significant participation from non-funded students, but in others only the NSF-funded students are active. (In all cases this must also be scaled against the number of potential language science students in each program.)

5. Additional Student & Faculty Highlights

Student Highlights

- *Job placement:* despite the poor economy, students involved in or closely related to the program have received a number of highly sought-after tenure-track positions. The 2010 haul was particularly strong, with most psycholinguistics positions in linguistics departments going to people trained at Maryland: Diogo Almeida (2009 – Mich St. U); Brian Dillon (2010 – UMass/Amherst); Ellen Lau (2010 – Maryland); Akira Omaki (2010 – Johns Hopkins); Matt Wagers (2008 – UC Santa Cruz); Ming Xiang (2010 – Chicago, Xiang was a UMd postdoc). Dillon was hired as part of a multi-department 'cluster hire' in language science at UMass, a top linguistics department, despite being a 3rd year PhD student.
- *Additional fellowships & awards*:

- o Candise Chen (Human Devt.): 2009 NSF-EAPSI award for research in China
- o Brian Dillon (Linguistics): 2009 NSF-EAPSI award for research in China
- o Annie Gagliardi (Linguistics): 2009 NSF Graduate Research Fellowship
- o So-one Hwang (Linguistics): 2010 NSF dissertation grant
- o Sunyoung Lee-Ellis (SLA): 2010 NSF dissertation grant
- o Akira Omaki (Linguistics): 2009 NSF dissertation grant

Faculty Highlights

- Despite the current hiring freeze, the university made 6 new faculty appointments in areas closely related to language science in 2009-2010: Jordan Boyd-Graber (iSchool – NLP, modeling), Hal Daume (CMSC – NLP, machine learning), Naomi Feldman (LING – computational psycholinguistics), Ellen Lau (LING – cognitive neuroscience of language), Liz Redcay (PSYC – developmental cognitive neuroscience), Bob Slevc (PSYC/CASL – language production, language disorders).
- *Maryland Neuroimaging Center*. In 2009 a team of NACS program faculty secured a $2 million NSF Major Research Instrumentation award to support the purchase of a 3T scanner for fMRI studies. 3 of the 5 co-PIs on this project are IGERT faculty. With strong support from the university, the MRI scanner will be the centerpiece of a new 7000 sq ft neuroimaging center, which will ultimately support multi-modal imaging. Phillips & Bolger are key members of the design team; construction to begin Summer 2010.
- Nan Ratner (HESP) was the 2010 recipient of the university's Undergraduate Mentor of the Year award; Jeff Lidz (LING) was a 2010 recipient of the university's Graduate Mentor of the Year award.