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## Preview of Award 1449815 - Annual Project Report

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### Cover

Federal Agency and Organization Element to Which Report is Submitted:	4900
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PD/PI Name:	Colin Phillips, Principal Investigator Hal Daume, Co-Principal Investigator Robert M DeKeyser, Co-Principal Investigator William J Idsardi, Co-Principal Investigator Rochelle Newman, Co-Principal Investigator
Recipient Organization:	University of Maryland College Park
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Submission Date:	06/12/2017
Signature of Submitting Official (signature shall be submitted in accordance with agency specific instructions)	Colin Phillips

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### Accomplishments

#### \* What are the major goals of the project?

The impact of "Big Data" analysis on language science and technology is exemplified by tools like Siri and Google Translate. This technology relies on analysis of billions of words and sentences in English, but it is squarely outperformed by human children, who learn language using only modest amounts of data. Understanding how human learners make such

economical use of language input and translating these insights into “smarter” methods in language technology requires an interdisciplinary approach. Our NRT project combines team based research on the efficient use of language data (“Beyond Big Data”) with a strong emphasis on student leadership, science communication, outreach, public policy activities and preparation for diverse careers.

Major goals of the project include: (i) understanding efficient use of language data, with a focus on the informativity of data to human and machine learners; (ii) adopting team-based approaches to complex research problems spanning multiple fields; (iii) providing students with the experience and skills to be flexible communicators in writing and speaking; (iv) training students to become future leaders in interdisciplinary research.

The project’s training model is designed to train future leaders in the field of language science: researchers who are creative, adaptable, and skilled at working in teams to solve complex problems.

Building on lessons learned from our IGERT program, emphasis is placed on “enabling” activities-- activities that may at first seem like distractions, but in fact build communication skills and catalyze cross-disciplinary interactions, providing students with skills needed to become leaders in interdisciplinary and translational research. Specific activities fall into one or more of the following six categories: community activities, communication training, team-based research on flexible data use, career development, public policy experiences, and training that pushes students beyond their comfort zone. These activities are discussed in greater detail in the Major Activities section of this report.

We have been working in close conjunction with our NRT evaluator, Prof. KerryAnn O’Meara, to develop a comprehensive training and evaluation model. The model comprises a detailed program objectives statement, a logic model, and guidelines for measuring outcomes. Each of these components are included in the report. The program objectives statement is included in the Specific Objectives section. The logic model is included as a PDF attachment to the Accomplishments section. Finally, guidelines for measuring outcomes are included under the relevant subheading of the Major Activities section.

**\* What was accomplished under these goals (you must provide information for at least one of the 4 categories below)?**

Major Activities:

**RESEARCH**

We highlight three areas of interdisciplinary research activity: (i) understanding the impact of poverty on the development of language and literacy; (ii) developing resources for an understudied language and an underserved community at our field station in Guatemala; (iii) using insights from linguistics and psycholinguistics to inform natural language processing (NLP) techniques.

i. There has been a lot of research and attention in recent years on the impact of poverty on the development of language and literacy skills. Despite the inherently multidisciplinary nature of the problem, much of this work has been siloed in different disciplines, and it is difficult to integrate the results from different fields. Should we attribute delays in language development to differences in input quantity? Input quality? Parental stress? Dialect mismatch? Given the many risk factors, how do we identify and prioritize the most effective interventions? Our team has undertaken multiple activities to initiate a broad research program on language and poverty, engaging students and faculty from multiple departments. (i) We hosted a workshop on 3/10/17 (which NRT student Laurel Perkins helped to organize and lead) featuring discussions among experts in language development, literacy, education, and socioeconomic risk factors. The workshop drew participation from many different departments at UMD. (ii) A thematic group on language and poverty met during our 2-week Winter Storm workshop in January 2017 to develop research ideas and discuss strategies for community engagement. (iii) We developed partnerships with school districts in Washington DC and Baltimore. (iv) Faculty submitted multiple grant proposals related to this theme. (v) A co-taught seminar is planned for Fall 2017, building on the results of our March workshop.

ii. In 2016 we launched our research field station in Guatemala. The field station creates a focal point for research involving indigenous Mayan communities of Guatemala, not limited to linguistic research. In the summer of 2016 a team of faculty and students, including NRT student Paulina Lyskawa, took part in a month-long summer field project. Students participated in a two-week intensive language school in Kaqchikel, a major Mayan language, and then spent two weeks engaged in linguistic fieldwork. They lived with Kaqchikel-speaking families throughout their visit, enabling them to engage more deeply with community members. In addition to the field school, researchers from our team conducted a pilot project on developing an instrument for measuring typical and atypical language development in Kaqchikel speaking children. This effort involved a collaboration between experts in linguistics, speech pathology, and child health. This collaboration among diverse faculty provides a foundation for creative student projects, and is an example of the sustainable team-based efforts that our NRT project aims to build.

iii. In last year's report we highlighted how linguist Allyson Ettinger learned skills from natural language processing (NLP, computer science) and brought them to bear on problems in cognitive neuroscience. In the past year Allyson has teamed up with faculty and other students to bring linguistic insights to problems in NLP. Allyson is part of a team with Prof Hal Daumé and NRT trainee Sudha Rao (both computer scientists) and Prof Emily Bender (Linguistics, U of Washington) that has created the "Build It, Break It" challenge. This shared task aims to improve NLP technologies by working with linguists who will use their expertise to try to 'break' language technologies. Allyson also teamed up with computer scientist Ahmed Elgohary on a project that uses methods from psycholinguistics to create better ways of evaluating the performance of NLP technologies. This project won a Best Paper award at the Association for Computational Linguistics conference in summer 2016. Allyson has also teamed up with a broad group of students who are interested in research on linguistic meaning.

## EDUCATION AND TRAINING

This year we focused on revitalizing student leadership, developing a more coherent strategy for student career development, and taking initial steps to involve students in policy and advocacy efforts.

i. Student leadership is an important part of our training model. By taking the lead in development and planning, students develop important professional skills while ensuring that community events and activities meet their needs. In Fall 2016 we refreshed the organization of our student committees to focus on three broad training goals (Research Skills and Collaboration, Professional Development and Communication, Outreach) rather than on specific recurring events. This allows the students to focus on why they are organizing different events and activities, and to be flexible about how they pursue their goals.

ii. We have always taken professional skills seriously, but previously lacked a strategy for connecting them with long-term career development. This fall we developed a coherent model for student career development (detailed in the section below on "opportunities for training and professional development). We have a set of goals for students at all stages, which allows us to develop year-round programming and consistent check-ins. We are also coordinating with university-level initiatives, both to take advantage of their offerings and to serve as a model program for addressing the

career development needs of PhD students and postdocs.

iii. Students who participate in the NRT program are expected to complete a policy internship or other policy experience. Students have found this requirement daunting, because we don't have many models from previous students of what it might look like. This year, students have been more receptive, due in part to the national political climate and increasing interest in activism in the broader scientific community, and due in part to more systematic support from the NRT program. We are working with students to identify avenues for policy work that align with their individual goals. For example, Lara Ehrenhofer is pursuing an internship in science diplomacy with the Helmholtz Society in Berlin, Germany. This internship is allowing her to develop many valuable skills and connections. We have also provided opportunities for students to work on skills related to advocacy and policy. Immediately following Winter Storm, we had our first "Language Science Day of Action", a hands-on workshop on how language scientists can have an impact on the general public and decision makers at different levels. We also sent a large group of students and faculty to the JNCL's annual Language Advocacy Day on Capitol Hill, to meet with staffers from the House and Senate science committees.

## EVALUATION

In the current reporting period, our evaluation team conducted a faculty focus group and several student interviews. We have also made significant progress in our preparations for an annual survey of our NRT trainees and a control group of students from peer institutions. Faculty at three universities (University of Connecticut, University of Wisconsin, and The Ohio State University) have agreed to help us recruit students to participate. Their feedback led us to work with our evaluation team to refine our program goals and make some small revisions to the survey. The new version includes new questions about career development and more fine-grained questions about communication skills.

Last year, we collected information about trainee progress through a written progress report prepared by the trainee. This year, the written report has been partially replaced by a meeting between the trainee and the program coordinator. The meetings have been more effective as formative assessment for the program: we have collected much more information about students' successes and challenges, and areas where we could provide more support or programming.

### Specific Objectives:

Our research objectives have not changed since last year. We aim to create productive bridges between cognitive and computational research on language, to examine how human and machine learners can do more with less, and to create sustainable research teams that draw from multiple fields. The project falls under the NRT "data-enabled science" umbrella, but in our case this does not entail a focus on Big Data. Rather, the focus is on how to do more with less.

This year we added a new training objective related to student career development. We aim to enhance students' ability to pursue careers within and outside of academia by helping them assess their own skills and values, understand the career options available, and make a plan to achieve their career goals. The four pre-existing training objectives have not changed: (i) Enhance students' 'agency' as interdisciplinary researchers, via their research skills, independence, collaborative skills, risk-taking and

ability to move beyond the personal comfort zone, and ownership of program activities. (ii) Change students' professional networks, across disciplines, institutions, career stages, and career types. (iii) Enhance students' ability to connect specific research problems with their broader context ("zooming in" and "zooming out"). (iv) enhance student ability to communicate particular research problems and the contexts surrounding them to diverse academic and nonacademic audiences in writing, in speaking and in diverse contexts.

## Significant Results:

### RESEARCH

i. Lara Ehrenhofer (Linguistics) conducted research on German children's comprehension of active and passive sentences, in a project that was co-supervised by 3 faculty at UMD and involved a partnership with the University of Potsdam and the Leibniz Institute ZAS in Berlin. It is well known that children often misunderstand passive sentences like "The dog was chased by the cat." Lara tested the idea that this is because children initially understand the sentences as actives ("The dog was chasing ...") and then get stuck with that interpretation. She took advantage of the word order flexibility of German to manipulate the order in which children received information. She found that German children outperformed children tested in languages like English and Mandarin, irrespective of word order. This has led to a new hypothesis about the source of children's difficulties with passives.

ii. Sudha Rao (Computer Science) has contributed to our NRT project's goal of bridging research on technology and humans. An important current topic in natural language technology is how best to combine the strengths of humans and machines to yield superior performance. Roughly, humans are smarter, but machines are faster. Sudha's research has shown the benefits of language technology tools that improve performance by asking clarifying questions to human users.

iii. A core motivation for our NRT program is the fact that human children receive far less 'training data' than current language technologies, yet children do a far better job of mastering the fine-grained details of language. How are they able to do so much with so little? Linguist Nick Huang has been exploring this question using constraints on question formation as a model system. He asks whether apparently idiosyncratic details of these constraints follow from more general principles, and whether they are plausibly derivable from child-directed speech. This project draws on a combination of skills in linguistic analysis, corpus research, and language acquisition. Nick has shown how certain phenomena are hard for children to observe directly, but they can be learned from readily available cues in the language. Meanwhile, other phenomena are also not linked to reliable direct cues, but they can be derived from semantic constraints.

### EDUCATION AND TRAINING

i. After our reorganization of student leadership (described above under Major Activities), students have been taking more ownership and a longer-term perspective on accomplishing our training goals. For the Outreach committee, this shift has already produced some concrete results. This committee is always extremely productive: they organize multiple high school visits, career fairs, and community events every year. However, they have not often provided opportunities in between events to help students develop new material and practice their communication skills. At this year's Winter Storm, members of the Outreach committee led a series of four two-hour sessions on

communicating science to different audiences: (1) “Distilling your Research”, (2) “From Kids to Congress: Engaging Diverse Audiences”, (3) “Building a Research Narrative: Elevator Pitches and More”, and (4) “Diamonds to Demos: Selling Your Research”. During these workshops, several students developed new activities for children that debuted at AAAS’ Family Science Days in February in Boston. The committee hopes to continue providing more development and practice sessions throughout the year, which will make it easier for more students to get involved.

ii. A more systematic approach to mentoring early-stage students led to an unusually large pool of applicants to the NRT program. We recruit students to the NRT program after they are already enrolled in a UMD PhD program, and we encourage them to become involved in NRT-related activities prior to joining the program, so that they have a clearer sense of what they are committing to. One benefit of this is that we can expect applicants to develop a detailed research and training plan that goes beyond what would be possible if we were recruiting students to the NRT program during the PhD application process. Nevertheless, the research and training plan proves daunting to many beginning PhD students. In 2016-2017 NRT program coordinator Shevaun Lewis developed a multi-step process of meetings and feedback for students that led to more and better quality proposals.

iii. In Fall 2016 we offered an interdisciplinary seminar in speech recognition that has catalyzed a new interdisciplinary research community. Carol Espy-Wilson (Electrical Engineering), Naomi Feldman (Linguistics) and Anton Rytting (CASL) co-led the seminar that brought together students with diverse backgrounds in speech perception by humans and computers. The seminar also brought a series of invited external speakers to UMD. These speakers spent much of their visit in discussions with students, rather than simply giving a talk. The seminar was successful in creating new connections among researchers who might not otherwise come together, and those connections have been sustained through various follow-up activities since the end of the seminar.

## EVALUATION

The main evaluation findings from this reporting period come from a faculty focus group and a series of one-on-one interviews with trainees. Corresponding to program goals, students reported that the NRT program has facilitated cross-department collaborations that they might not have experienced otherwise. Students found several ongoing activities particularly useful for growing and diversifying their academic network (a key program goal): the weekly Language Science Lunch Talks, reading groups, cross-disciplinary courses, and research theme meetings. Students also expressed that their involvement in organizing community events and activities had improved their leadership skills. Finally, students reported that their current understanding of policy and real-world connections to their research was a result of NRT activities. Some room for growth in this goal area exists, as some students reported difficulty in articulating broader implications of their research, though they understood the importance of communicating such work outside of academia.

Faculty appreciate the role of the NRT program in institutionalizing interdisciplinary work. Similar to students, faculty reported cross-department and cross-discipline connections (with faculty and students) that might not have happened otherwise. Finally, faculty reported that their experience with teaching interdisciplinary courses has required them to teach content in new ways that they think improved their courses.

Key outcomes or Other achievements: RESEARCH

i. Progress on the Language and Poverty research theme has been greatly facilitated by the hire of Jan Edwards to a senior position in the Dept of Hearing & Speech Sciences (HESP) and the arrival of several of her students. Their involvement and leadership has helped increase our contact with researchers in the College of Education who we had less contact with previously. Just as important, their dedication to addressing the challenges of underserved populations in the US has drawn the interest of minority students who have been underrepresented in the UMD language science community.

ii. The Guatemala Field Station stimulated extensive student research. The summer field schools in 2016 (12 students) and 2017 (16 students) included NRT students Paulina Lyskawa and Anouk Dieuleveut, together with other students from UMD and other institutions. This has been a transformative experience for the participating students. The students can do research on understudied languages without traveling to Guatemala, but when they study the languages in context, living with local families, understanding the communities, and working as a part of a larger team of researchers, they develop a broader appreciation of the connection between language and the lives of the communities. The field station has stimulated a collaborative effort between language scientists and a health-focused NGO, looking at measures of child language development. This research has valuable overlap with the developing research theme in language and poverty.

iii. The NRT program helped to stimulate new collaborations between computer scientists and linguists that are creating better tools for evaluating language technologies, and it is also helping our participating programs to recruit talented students who are interested in bridging computer science and linguistics. The “Build It, Break It” workshop at the 2017 EMNLP conference (a top venue for computational linguistics) is the culmination of a project in which linguists use their skills to uncover the weaknesses of language technology systems, which in turn should lead to improved technologies. The two lead students in this project are two UMD NRT students, one from computer science and one from linguistics. In Spring 2017 both the linguistics and computer science programs were able to recruit new students who the individual departments would have been unlikely to attract on their own. Both are sure to be future NRT trainees. It is notable that all four of the students mentioned here are women, given the overall underrepresentation of women in computer science. (Women are not underrepresented in other areas of language science that we cover.

#### EDUCATION AND TRAINING

The revitalization of student leadership has significantly improved students’ investment in the program and sense of community. This has led to several concrete improvements.

i. Many more students contributed to the organization of Winter Storm, our annual 2-week workshop for the language science community. Enthusiasm for planning this complex event had been dwindling in recent years, becoming a heavy burden for a small number of student organizers. This year all three student committees helped with the planning. They were able to see the event as an opportunity to make progress on their goals, rather than just an obligatory annual activity. In total 22 students from 4

departments contributed to planning or running the workshop, and over 50 students from 14 departments/programs attended (in addition to about 50 faculty and staff who attended at least some sessions). Around 60 individuals contributed to putting on the event in some fashion (as organizers, session leaders, etc.) Participants who completed our post-event survey praised the sense of “shared enthusiasm” and the number and diversity of contributors.

ii. To capitalize on the increase in student engagement, we overhauled the NRT program application process. We now provide more mentoring to make it less intimidating and more productive for first- and second-year students (as described below under “opportunities for training and professional development”). We received 11 applications (compared to 4 last year), including several from PhD programs that were previously unrepresented amongst our trainees: Hearing & Speech Sciences and Electrical and Computer Engineering.

iii. At the start of the current reporting period, in May 2016, our program hosted the first meeting of all NRT Teams, with participants from across the country, followed by the Future STEM Leaders workshop in downtown Washington DC. These events allowed many of our trainees and faculty to learn from other NRT teams and from leaders from academia, industry, government and professional societies about innovations in graduate training, making connections across diverse fields, from language science to astrophysics. These meetings were inspiring experiences for our team, and they also helped to strengthen our connections with UMD-wide initiatives and with other groups in Washington DC with an interest in graduate training.

### **\* What opportunities for training and professional development has the project provided?**

#### SUMMARY

Although our overall traineeship model has not changed, this year we have made substantial improvements to several components of it: the initial application process, mentoring, career development, and student leadership of community events and activities. These improvements have contributed to a noticeable increase in student interest in the NRT program. We received 10 new applications this spring, compared to only 4 last year.

The program improvements described here were greatly aided by our recruitment of Dr Shevaun Lewis as our NRT program coordinator. Shevaun holds the position of Research Assistant Professor and is Assistant Director of the Maryland Language Science Center. In her time as a PhD student at UMD she was a pivotal figure in the success of our IGERT program, then spent 3 years as a postdoc and CIRTLL teaching fellow at Johns Hopkins University. Shevaun’s high level of (inter)disciplinary expertise and experience has had a major impact on our students and our program.

#### PROGRAM ELEMENTS

i. Applications. Students apply to the NRT program after they are already enrolled at UMD and typically after they have already been active in a number of program activities. They submit a 5-page proposal detailing an integrated research and training plan, as well as various supporting documents. Although early-stage students find the proposal somewhat intimidating, they acknowledge that the process is extremely useful. This spring we added an extra stage to the application process to provide more support for students. They first submit a letter of intent briefly outlining their research goals and interest in the program. Then they meet with the program coordinator to discuss their plan in more detail. The coordinator helps them to refine their research and career goals, and provides guidance on which courses, collaborations, and other activities might be most beneficial for them. By working with students directly as they write their proposals, we increase the chances that students’ plans are a strong fit to their needs and interests, and we reduce the need for extensive revisions later.

ii. Mentoring. We have also started taking a more hands-on approach to mentoring current trainees. The program coordinator met with each trainee at the beginning of Spring 2017 to discuss their progress toward their research and career goals. These meetings replaced a written document that trainees had previously updated each semester. Students felt more able to discuss their challenges as well as their successes, and appreciated the opportunity to speak frankly about their long-term goals and career plans. This can be particularly useful when students are interested in exploring diverse career pathways.

iii. Career development. This year we developed a more coherent strategy for addressing trainee career development. We adopted a model based on the existing literature, which divides the process into four stages: (i) Self-assessment, in which students identify their interests, skills, and values; (ii) Career exploration, in which students learn about the range of career options available and identify one or more that would fit their skills, interests, and values; (iii) Planning, in which students make a concrete plan to acquire the skills, experience, and professional connections needed for their preferred career; (iv) Job search, in which students identify specific target jobs and communicate their skills and experience to potential employers. This model clarifies how we should be supporting early-stage students, long before the job search. Progress meetings with trainees include extensive discussion of their long-term goals, and how those goals should influence their current priorities. During Winter Storm we offered several sessions that focused on self-assessment, career exploration, and planning. The student committee on Professional Development and Communication is also using this model to choose training activities to offer throughout the year. This semester they have organized sessions on crafting an elevator pitch and conducting an informational interview, skills that are essential for career exploration as well as the job search. We have been working closely with the PhD specialist at the University Career Center, and hope to serve as a model for a new approach to PhD career development at the University of Maryland.

iv. Community events and leadership training. We have a set of student-led community events that have become routine over the years (although they have been updated to reflect NRT goals): Winter Storm (2 weeks, January), Language Science Lunch Talks (weekly), Language Science Day (September), and outreach events (throughout the year). This year we aimed to better integrate these events into ongoing research and training events throughout the year. We made progress toward that goal by restructuring the student organizing committees around training goals (Research Skills and Collaboration, Professional Development and Communication, Outreach) rather than specific events. This allows the committees to consider the role of our signature events in the context of the broader goals that we are trying to achieve.

## COMMUNICATION

Trainees in our program have many opportunities to practice and improve their skills communicating to broad audiences. These include the weekly Language Science Lunch Talks, regular outreach activities (primarily aimed at high school students), advocacy events, and numerous workshops offered during Winter Storm and throughout the year (see the attached table for a full list). We have yet to implement a more structured approach to training opportunities and feedback. We plan to tackle this in the coming year as we did with career development this year, and work with the new student committee on Professional Development and Communication to develop a coherent strategy.

## EVALUATION

We have two ways of evaluating the success of our professional development efforts. One is the regular progress meetings with trainees, where we discuss their efforts and progress on communication, professional skills, and career preparation. Students have reported that these meetings have been very helpful for assessing their own goals and development. They are also helpful as formative assessment for our programming: we are now aware of a few areas where we are not currently meeting students' needs (e.g. grant writing, budgeting, and mentorship).

The second method is through components of our formal evaluation plan. Our annual survey, student and faculty focus groups, and student interviews include questions about professional development. In interviews with our evaluation staff in Fall 2016, students expressed that the NRT program had helped them develop stronger communication skills, especially to non-academic audiences, and learn more about a range of career options. (This, however, was before we had revamped our career development strategy.)

## \* How have the results been disseminated to communities of interest?

Our team has been doing many different things to get the word out about what we are doing, reaching different audiences via multiple channels. There is no clear line between NRT-specific activities and the broader range of activities of the Maryland Language Science Center, and our communications strategy reflects this.

(i) Websites. We have deliberately avoided creating an NRT-specific website, as we believe that it is hard to get broad buy-in to a short-term grant with an obscure acronym. As we did with our earlier IGERT program, we embed NRT materials as a section within the broader Language Science Center website. These materials are primarily aimed at prospective NRT students and their mentors.

We created websites for the NRT Teams' Meeting and Future STEM Leaders meeting in Maryland and Washington DC in May 2016. These sites now include materials from those meetings, making them a valuable resource on the activities of the first two NRT cohorts. These should, in principle, be of interest to prospective NRT applicants, an important and receptive audience.

We would like to engage students more in dissemination. They do a tremendous amount of creative work in organizing and planning community activities and outreach, but there is no publicly accessible documentation of their efforts and strategies. We are beginning development of a wiki for students to post less formal, more detailed updates about their activities, which could be of use to students and faculty at other institutions.

(ii) Blogs. Co-PI Hal Daumé blogs about computational linguistics: not just research, but also commentary on professional and educational practices in the field. For example, in March 2017 he published a series of posts highlighting the contributions of women in computer science, culminating in a post with some suggestions on how to be an effective male ally.

Several trainees have expressed an interest in creating blogs to explain language science research to a broader audience. We plan to support those efforts further in the coming year.

(iii) Social media. LSC's Facebook following grew to about 550 this year. Our posts reach 200-300 people on average, and some as many as a thousand. These are not huge numbers, but our activities have high visibility among language scientists, which increases the impact of our NRT program in our field(s). The social media posts are valuable for reminding people that things are happening. Our Flickr albums are also a great way of keeping people aware of what's going on: when they come looking for pictures of one activity they stumble across pictures of other activities, and an album of interesting pictures is more persuasive than a page of text.

(iv) Meetings with (inter)disciplinary groups. Members of our team, especially PI Colin Phillips, have met with a number of different groups that are interested in developing interdisciplinary programs. For example, Phillips visited the University of Wisconsin, Madison in January 2017 for discussions and a presentation about our team's work. Phillips helped to lead a special committee of the Linguistic Society of America in 2015-2017 that is focused on ways of improving cross-discipline ties. This has led to a special session at the January 2018 meeting, where our team's activities will be highlighted. Phillips also put together a symposium for the 2017 National Humanities Conference in Boston. The theme of the conference is how humanities fields can make themselves more valued by society and by other fields. Our symposium will focus on how language scientists are doing this.

(v) Dissemination to other NRT teams and to broader stakeholders. Our team devoted a great deal of effort in 2015-2016 to organizing the NRT Teams Meeting and the Future STEM Leaders meeting held on May 2-4 2016. The NRT Teams Meeting brought together around 120 participants from 18 NRT teams, including many more than PIs and program coordinators. It created a community of NRT participants, and offered much opportunity for sharing program results. It made it possible to highlight some topics that our team has found to be especially valuable, e.g., student ownership and active formative assessment. The Future STEM Leaders meeting connected NRT Teams to representatives from government, industry, foundations, academia, and professional organizations. The focus of the meeting was on connecting small scale innovations in graduate training to broader change, and on trying to connect independent conversations that have been taking place in different fields and communities. The meeting created a very promising starting point. It remains to be seen whether this will be built upon.

(vi) Dissemination to policy makers. During Winter Storm and at the Language Science Day of Action, students and faculty worked on crafting pitches to policy makers at different levels. In February, three faculty and eight students (including three current NRT trainees) spent two days on Capitol Hill for Language Advocacy Day (organized by the Joint National Committee for Languages). We met with Democratic and Republican staffers from the House Committee on Science, Space, and Technology and the Senate Committee on Commerce, Science, and Transportation. In each meeting, we explained what language science is and why it is important to the national interest, giving examples of research at UMD.

We have hosted two events for senior language authorities in government agencies, especially IC and DOD, showcasing the interdisciplinary research community that was created by our IGERT and NRT programs. The first event, in October 2016 gave a broad research overview, and this led to an invitation from the Office of the Director of National Intelligence for us to host more focused quarterly briefings. These started in April 2017. Although there is limited direct student involvement in these events, these events that directly inform USG language-related activities, build on the research and interdisciplinary community that our students created.

(vii) Dissemination to other (prospective) NRT teams. Aspiring NRT teams at UMD and elsewhere regularly seek out Phillips for advice on developing interdisciplinary programs. Additionally, we make all of our program's materials, including the proposal and reviews, available online. At the 2016 NRT PI orientation at NSF Phillips was approached by a new PI who he had never met before who enthused about how much she had benefited from our materials.

(viii) Integration with university efforts. During the planning of Winter Storm we made connections with the University Career Center and Writing Center. They are now helping us to improve our support of trainees' career development and communication skills, and in turn we provide a testing ground of sorts. Most graduate programs are not as eager to make time for this kind of training. We hope to become a campus model for how to address these needs for PhD students.

**\* What do you plan to do during the next reporting period to accomplish the goals?**

- i. We plan to engage our external advisory board, and to coordinate with the other advisory structures associated with the Language Science Center. Our advisory board was highly effective for our IGERT program, and helped to trigger many improvements. We have been delayed in implementing the NRT group because of the need to effectively integrate with LSC's broader academic and non-academic advisory structures.
- ii. During the current year our program made substantial progress on professional development activities. In the next year we will continue to work on evaluation, and on strategies for fostering team-based research. We also plan to reorganize our existing efforts around communication training and student leadership training so that they are more structured and have clearer benchmarks. We already have the student committee structures in place that we can build upon in order to achieve this.
- iii. During the current year we made progress in broadening participation across department and across demographic groups, and this led to a larger and more diverse student applicant pool than in recent years. In the current year we will build upon these recruiting successes to strengthen ties with existing groups and extend our connections to departments that have been more peripherally involved.

**Supporting Files**

Filename	Description	Uploaded By	Uploaded On
ProfSkillsTable2017.pdf	Table of professional development opportunities	Colin Phillips	06/12/2017
TraineeTable2017.pdf	Table of trainees	Colin Phillips	06/12/2017
NRT_Goals_2017-02-03.pdf	Program goals and logic model	Colin Phillips	06/12/2017

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## Products

### Books

#### Book Chapters

Jeffrey Lidz & Laurel Perkins (2017). Language Acquisition. *The Stevens' Handbook of Experimental Psychology and Cognitive Neuroscience, Fourth Edition* . Status = UNDER\_REVIEW; Acknowledgement of Federal Support = No ; Peer Reviewed = Yes

Lara Ehrenhofer, Adam Roberts, Allison Wetterlin, Sandra Kotzor, & Aditi Lahiri (2017). Asymmetric processing of consonant duration in Swiss German. *Phonetics and Phonology of Geminate Consonants* . Status = AWAITING\_PUBLICATION; Acknowledgement of Federal Support = No ; Peer Reviewed = Yes

### Inventions

#### Journals or Juried Conference Papers

Allyson Ettinger & Tal Linzen (2016). Evaluating vector space models using human semantic priming results. *Proceedings of the First Workshop on Evaluating Vector Space Representations for NLP, ACL 2016* . . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Allyson Ettinger, Ahmed Elgohary, & Philip Resnik (2016). Probing for semantic evidence of composition by means of simple classification tasks. *First Workshop on Evaluating Vector Space Representations for NLP, ACL 2016* . . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Allyson Ettinger, Naomi H. Feldman, Philip Resnik, & Colin Phillips (2016). Modeling N400 amplitude using vector space models of word representation. *Proceedings of the 38th Annual Conference of the Cognitive Science Society* . . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Allyson Ettinger, Philip Resnik, & Marine Carpuat (2016). Retrofitting sense-specific word vectors using parallel text. *Annual Conference of the North American Chapter of the Association for Computational Linguistics: Human Language Technologies* . . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Anton Malko, Lara Ehrenhofer, & Colin Phillips (2016). Theories and frameworks in second language processing. *Bilingualism: Language and Cognition* . . Status = PUBLISHED; Acknowledgment of Federal Support = No ; Peer Reviewed = No

Chris Neufeld, Stephanie E. Kramer, Natalia Lapinskaya, Christopher C. Heffner, Anton Malko, & Ellen F. Lau (2016). The Electrophysiology of Basic Phrase Building. *PLoS ONE* . . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Claudia Felser, Colin Phillips, Matthew Wagers (2017). Editorial: Encoding and navigating linguistic representations in memory. *Frontiers in Psychology*. 8 164. Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = No

Kasia Hitczenko & Naomi Feldman (2016). Modeling adaptation to a novel accent. *Proceedings of the 38th Annual Conference of the Cognitive Science Society* . . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Lars Meyer, Molly Henry, Phoebe Gaston, Noura Schmuck, Angela Friederici (2016). Linguistic Bias Modulates Interpretation of Speech via Neural Delta-Band Oscillations. *Cerebral Cortex* . . Status = ACCEPTED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Laurel Perkins, Naomi Feldman, & Jeffrey Lidz (2017). Learning an Input Filter for Argument Structure Acquisition. *Cognitive Modeling and Computational Linguistics (CMCL) 2017* . . Status = PUBLISHED; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Nick Huang (). Control complements in Mandarin Chinese: implications for restructuring and the Chinese finiteness debate. *Journal of East Asian Linguistics*. . Status = SUBMITTED; Acknowledgment of Federal Support = No ; Peer Reviewed = Yes

Phoebe Gaston, Nick Huang, Colin Phillips (2017). The logic of syntactic priming and acceptability judgments. *Behavioral and Brain Sciences*. . Status = AWAITING\_PUBLICATION; Acknowledgment of Federal Support = Yes ; Peer Reviewed = Yes

Sudha Rao & Hal Daumé III (2017). Are you asking the right questions? Automatically Generating Clarification Questions. *Transactions of the Association for Computational Linguistics*. . Status = SUBMITTED; Acknowledgment of Federal Support = No ; Peer Reviewed = Yes

Sudha Rao, Yogarshi Vyas, Hal Daumé III, & Philip Resnik (2016). Parser for Abstract Meaning Representation using Learning to Search. *NAACL 2016 Workshop on Meaning Representation Parsing*. . Status = PUBLISHED; Acknowledgment of Federal Support = No ; Peer Reviewed = Yes

## Licenses

### Other Conference Presentations / Papers

Laurel Perkins, Angela Xiaoxue He, Alexander Williams, Rachel Dudley, Sigríður Björnsdóttir, & Jeffrey Lidz (2016). *Can intransitive clauses name 2-participant events? A new test of Participant-to-Argument Matching in verb learning*.. Pre-CUNY Workshop on Events in Language & Cognition. Gainesville, FL. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Paulina Lyskawa (2016). *Heritage language change: Separating attrition from language interaction*.. 12th Formal Description of Slavic Languages. Berlin, Germany. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Adam Fishbein, Shelby Lawson, Greg Ball, & Robert Dooling (2017). *How Canaries Listen to Their Song*. Meeting of the Acoustical Society of America. Boston, MA. Status = ACCEPTED; Acknowledgement of Federal Support = Yes

Paulina Lyskawa (2016). *How to turn 'in' into 'w' – phonology vs. suppletion in Set A 1st singular affix*. . Form and Analysis in Mayan Linguistics 4. Universidad de Oriente, México. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Stephanie Antetomaso, Kouki Miyazawa, Naomi Feldman, Micha Elsner, Kasia Hitczenko, & Reiko Mazuka (2017). *Modeling phonetic category learning from natural acoustic data*. Boston University Conference on Language Development. Boston, MA. Status = AWAITING\_PUBLICATION; Acknowledgement of Federal Support = Yes

Shelby Lawson, Adam Fishbein, Nora Prior, Bernie Lohr, Greg Ball, & Robert Dooling (2017). *Relative Saliency of Syllable Order versus Syllable Fine Structure in Zebra Finch Song*. Meeting of the Acoustical Society of America. Boston, MA. Status = ACCEPTED; Acknowledgement of Federal Support = Yes

Nick Huang, Chia-Hsuan Liao, Valentine Hacquard, & Jeffrey Lidz (2016). *Syntactic bootstrapping with minimal morphosyntactic cues: Learning Mandarin Chinese attitude verb meanings*. 6th Annual Mid Atlantic Colloquium of Studies in Meaning. Hunter College, New York, NY. Status = PUBLISHED; Acknowledgement of Federal Support = No

Rachel Adler, Jorge Valdes Kroff, & Jared Novick (2016). *The adjustment of bilinguals' cognitive control in code-switching environments*. 57th Annual Meeting of the Psychonomic Society. Boston, MA. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

Rachel Adler, Jared Novick, & Yi Ting Huang (2017). *Understanding the time course of context integration in verbal irony*. CSLI Workshop on Bridging Computational and Psycholinguistic Approaches to the Study of Meaning. Stanford, CA. Status = ACCEPTED; Acknowledgement of Federal Support = Yes

Adam Fishbein, Shelby Lawson, Greg Ball, & Robert Dooling (2016). *Using Operant Conditioning Methods to Measure Song Perception in Birds*. North American Ornithological Conference. Washington, D.C.. Status = ACCEPTED; Acknowledgement of Federal Support = Yes

Alexander Williams & Jeffrey Green (2016). *Why implicit control cannot be a syntactic or semantic relation between arguments*. Annual Meeting of North East Linguistic Society. University of Massachusetts, Amherst. Status = PUBLISHED; Acknowledgement of Federal Support = Yes

## Other Products

## Other Publications

## Patents

## Technologies or Techniques

## Thesis/Dissertations

## Websites

*Future STEM Leaders*

<http://futurestemleaders.com>

Website for the 2016 NRT Teams Meeting (U of Maryland, May 2-3) and Future STEM Leaders meeting (Washington DC, May 4). Includes extensive materials related to all current NRT programs.

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## Participants/Organizations

### What individuals have worked on the project?

Name	Most Senior Project Role	Nearest Person Month Worked
Phillips, Colin	PD/PI	1
Daume, Hal	Co PD/PI	0
DeKeyser, Robert	Co PD/PI	0
Idsardi, William	Co PD/PI	0
Newman, Rochelle	Co PD/PI	0
Dooling, Robert	Faculty	0
Edwards, Jan	Faculty	0
Feldman, Naomi	Faculty	0
Gor, Kira	Faculty	0
Huang, Yi Ting	Faculty	0
Lasnik, Howard	Faculty	0
Lau, Ellen	Faculty	0

Lewis, Shevaun	Faculty	5
Lidz, Jeffrey	Faculty	0
Mckinnon, Tim	Faculty	5
Novick, Jared	Faculty	0
O'Meara, KerryAnn	Faculty	1
Polinsky, Maria	Faculty	0
Preminger, Omer	Faculty	1
Resnik, Philip	Faculty	0
Uriagereka, Juan	Faculty	0
Williams, Alexander	Faculty	0
Wood, Tess	Faculty	1
Adler, Rachel	Graduate Student (research assistant)	6
Ehrenhofer, Lara	Graduate Student (research assistant)	6
Ettinger, Allyson	Graduate Student (research assistant)	6
Fishbein, Adam	Graduate Student (research assistant)	6
Gaston, Phoebe	Graduate Student (research assistant)	6
Green, Jeffrey	Graduate Student (research assistant)	6
Hall, Stephanie	Graduate Student (research assistant)	3
Hitczenko, Kasia	Graduate Student (research assistant)	6
Huang, Nick	Graduate Student (research assistant)	6
Karatas, Nur Basak	Graduate Student (research assistant)	6
Lyskawa, Paulina	Graduate Student (research assistant)	6
Malko, Anton	Graduate Student (research assistant)	6
Perkins, Laurel	Graduate Student (research assistant)	6

Rao, Sudha	Graduate Student (research assistant)	6
Buffinton, Julia	Non-Student Research Assistant	6
Eaves, Caitlin	Other	1

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**Full details of individuals who have worked on the project:**

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**Colin Phillips****Email:** colin@umd.edu**Most Senior Project Role:** PD/PI**Nearest Person Month Worked:** 1**Contribution to the Project:** PI**Funding Support:** NRT**International Collaboration:** Yes, Germany**International Travel:** No

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**Hal Daume****Email:** hal@umiacs.umd.edu**Most Senior Project Role:** Co PD/PI**Nearest Person Month Worked:** 0**Contribution to the Project:** co-PI**Funding Support:** University**International Collaboration:** No**International Travel:** No

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**Robert M DeKeyser****Email:** rdk@umd.edu**Most Senior Project Role:** Co PD/PI**Nearest Person Month Worked:** 0**Contribution to the Project:** co-PI**Funding Support:** University**International Collaboration:** No**International Travel:** No

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**William J Idsardi****Email:** idsardi@umd.edu**Most Senior Project Role:** Co PD/PI**Nearest Person Month Worked:** 0**Contribution to the Project:** co-PI**Funding Support:** University

**International Collaboration:** No

**International Travel:** No

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**Rochelle Newman**

**Email:** rnewman1@umd.edu

**Most Senior Project Role:** Co PD/PI

**Nearest Person Month Worked:** 0

**Contribution to the Project:** co-PI

**Funding Support:** University

**International Collaboration:** No

**International Travel:** No

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**Robert Dooling**

**Email:** rdooling@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** Mentor

**Funding Support:** University

**International Collaboration:** No

**International Travel:** No

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**Jan Edwards**

**Email:** edwards@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** Mentor

**Funding Support:** University

**International Collaboration:** No

**International Travel:** No

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**Naomi Feldman**

**Email:** nhf@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Kira Gor**

Email: kiragor@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Yi Ting Huang**

Email: ythuang1@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** Yes, Germany

**International Travel:** No

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**Howard Lasnik**

Email: lasnik@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Ellen Lau**

Email: ellenlau@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Shevaun Lewis**

Email: shevaun@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 5

**Contribution to the Project:** NRT program coordinator

**Funding Support:** NSF/University

**International Collaboration:** No

**International Travel:** No

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**Jeffrey Lidz**

**Email:** jlidz@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** Yes, Germany

**International Travel:** No

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**Tim Mckinnon**

**Email:** timm@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 5

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Jared Novick**

**Email:** jnovick1@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**KerryAnn O'Meara**

**Email:** komeara@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 1

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Maria Polinsky**

**Email:** polinsky@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** Yes, Guatemala

**International Travel:** No

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**Omer Preminger**

**Email:** omerp@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Mentor

**Funding Support:** University

**International Collaboration:** Yes, Guatemala

**International Travel:** Yes, Guatemala - 0 years, 0 months, 15 days

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**Philip Resnik**

**Email:** resnik@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Juan Uriagereka**

**Email:** juan@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** Mentor

**Funding Support:** University

**International Collaboration:** No

**International Travel:** No

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**Alexander Williams**

**Email:** alxndrw@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 0

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Tess Wood**

**Email:** ewood1@umd.edu

**Most Senior Project Role:** Faculty

**Nearest Person Month Worked:** 1

**Contribution to the Project:** Helped organize and manage NRT-related events e.g. Language Science Day, Winter Storm, outreach activities.

**Funding Support:** no change

**International Collaboration:** Yes, Guatemala

**International Travel:** No

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**Rachel Adler**

**Email:** radler1@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, co-chair of Professional Development & Communication committee

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Lara Ehrenhofer**

**Email:** ehrenhof@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, Winter Storm organizer

**Funding Support:** no change

**International Collaboration:** Yes, Germany

**International Travel:** Yes, Germany - 0 years, 2 months, 0 days

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**Allyson Ettinger**

**Email:** aetting@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, co-chair of Research Skills & Collaboration committee

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Adam Fishbein**

**Email:** afishbei@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, PULSAR mentor

**Funding Support:** NSF

**International Collaboration:** No

**International Travel:** No

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**Phoebe Gaston**

**Email:** pgaston@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, co-chair of Research Skills & Collaboration committee

**Funding Support:** University

**International Collaboration:** No

**International Travel:** No

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**Jeffrey Green**

**Email:** jgreen88@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Stephanie Hall**

**Email:** halls@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 3

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Kasia Hitczenko**

**Email:** khit@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, co-chair of Outreach committee

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Nick Huang**

**Email:** znhuang@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, co-chair of Professional Development & Communication committee

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Nur Basak Karatas**

**Email:** nkaratas@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Paulina Lyskawa**

**Email:** lyskawa@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, PULSAR mentor

**Funding Support:** University/SSHRC

**International Collaboration:** No

**International Travel:** No

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**Anton Malko**

**Email:** amalko@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** Yes, Russian Federation

**International Travel:** No

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**Laurel Perkins**

**Email:** perkinsl@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Trainee, co-chair of Outreach committee

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Sudha Rao**

**Email:** raosudha@umd.edu

**Most Senior Project Role:** Graduate Student (research assistant)

**Nearest Person Month Worked:** 6

**Contribution to the Project:** no change

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Julia Buffinton**

**Email:** julia.buffinton@gmail.com

**Most Senior Project Role:** Non-Student Research Assistant

**Nearest Person Month Worked:** 6

**Contribution to the Project:** Key LSC staff

**Funding Support:** no change

**International Collaboration:** No

**International Travel:** No

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**Caitlin Eaves**

**Email:** ceaves@umd.edu

**Most Senior Project Role:** Other

**Nearest Person Month Worked:** 1

**Contribution to the Project:** LSC Business Manager

**Funding Support:** University

**International Collaboration:** No

**International Travel:** No

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**What other organizations have been involved as partners?**

<b>Name</b>	<b>Type of Partner Organization</b>	<b>Location</b>
American Association for the Advancement of Science	Other Nonprofits	Washington, DC
Expert Systems	Industrial or Commercial Firms	Rockville, MD
US Dept of Defense	Other Organizations (foreign or domestic)	Washington DC
Wuqu Kawoq Maya Health Alliance	Other Nonprofits	Boston, MA & Guatemala
Linguistic Society of America	Other Nonprofits	Washington DC
Montgomery-Blair High School	School or School Systems	Silver Spring, MD
North American Computational Linguistics Olympiad	Other Nonprofits	Pittsburgh, PA
Northwood High School	School or School Systems	Silver Spring, MD
Paint Branch High School	School or School Systems	Burtonsville, MD
Paul Public Charter School	School or School Systems	Washington DC
Planet Word Museum	Other Nonprofits	Washington DC
Prince George's County Schools	School or School Systems	Maryland

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**Full details of organizations that have been involved as partners:**

**American Association for the Advancement of Science**

**Organization Type:** Other Nonprofits

**Organization Location:** Washington, DC

**Partner's Contribution to the Project:**

Other: Staff expertise, outreach support

**More Detail on Partner and Contribution:** Erin Heath (Associate Director for Govt Relations) participated in our science policy forum, and the Future STEM Leaders meeting. AAAS hosted Family Science Days, where our team was a key contributor to the Language Science for Everyone exhibit.

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**Expert Systems**

**Organization Type:** Industrial or Commercial Firms

**Organization Location:** Rockville, MD

**Partner's Contribution to the Project:**

Other: Career development support

**More Detail on Partner and Contribution:** Dr Scott Fults participated in Winter Storm careers forum

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**Linguistic Society of America**

**Organization Type:** Other Nonprofits

**Organization Location:** Washington DC

**Partner's Contribution to the Project:**

Other: Science policy partner

**More Detail on Partner and Contribution:** Collaborate on science policy and public engagement, consultant to Future STEM Leaders meeting

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**Montgomery-Blair High School**

**Organization Type:** School or School Systems

**Organization Location:** Silver Spring, MD

**Partner's Contribution to the Project:**

Other: Outreach partner

**More Detail on Partner and Contribution:** Bilateral visits for language science outreach

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**North American Computational Linguistics Olympiad**

**Organization Type:** Other Nonprofits

**Organization Location:** Pittsburgh, PA

**Partner's Contribution to the Project:**

Other: Outreach partner

**More Detail on Partner and Contribution:** NACLO is the umbrella organization for a language-focused olympiad. We served as a host site, and also contributed logistical support to the organization.

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**Northwood High School**

**Organization Type:** School or School Systems

**Organization Location:** Silver Spring, MD

**Partner's Contribution to the Project:**

Other: Outreach partner

**More Detail on Partner and Contribution:** Bilateral visits for language science outreach

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### **Paint Branch High School**

**Organization Type:** School or School Systems

**Organization Location:** Burtonsville, MD

**Partner's Contribution to the Project:**

Other: Outreach partner

**More Detail on Partner and Contribution:** Bilateral visits for language science outreach

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### **Paul Public Charter School**

**Organization Type:** School or School Systems

**Organization Location:** Washington DC

**Partner's Contribution to the Project:**

Other: Outreach Partner

**More Detail on Partner and Contribution:** Bilateral visits for language science outreach

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### **Planet Word Museum**

**Organization Type:** Other Nonprofits

**Organization Location:** Washington DC

**Partner's Contribution to the Project:**

Other: Joint planning of museum activities

**More Detail on Partner and Contribution:** Planet Word is the first major US museum dedicated to language. It is due to open in 2019 in downtown Washington DC.

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### **Prince George's County Schools**

**Organization Type:** School or School Systems

**Organization Location:** Maryland

**Partner's Contribution to the Project:**

Other: Science Fair sponsor

**More Detail on Partner and Contribution:** Sponsored ATLAS STEM fair

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### **US Dept of Defense**

**Organization Type:** Other Organizations (foreign or domestic)

**Organization Location:** Washington DC

**Partner's Contribution to the Project:**

Other: Science policy panel

**More Detail on Partner and Contribution:** Erin Fitzgerald participated in Winter Storm science policy panel

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**Wuqu Kawoq Maya Health Alliance**

**Organization Type:** Other Nonprofits

**Organization Location:** Boston, MA & Guatemala

**Partner's Contribution to the Project:**

Collaborative Research

Personnel Exchanges

**More Detail on Partner and Contribution:** Partner on our field station in Sololá, Guatemala, connecting minority languages to health.

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**What other collaborators or contacts have been involved?**

Susan Martin, UMD Career Center, Program Director for Doctoral Students  
- Provided resources and feedback on our career development programming.

Numerous faculty from UMD and CASL contributed to talks, workshops, and panels at Winter Storm.

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## Impacts

**What is the impact on the development of the principal discipline(s) of the project?**

It is difficult to draw a clear line between the grassroots community that hosted an IGERT program (2008-2015), the university-wide center that grew out of that program (2013-) and the NRT program that the center now hosts. They are part of a continuous effort, which has had interdisciplinary graduate training at its heart. These efforts have had clear impacts on the development of language science as an integrated field.

Nationally, the success of Maryland's language science group and its graduates has drawn attention, especially in the field of linguistics. Departments have diversified their hiring, and graduate curricula are starting to evolve to reflect this, and the pace of change is accelerating. Phillips frequently serves as a consultant on graduate program reform, and new programs and initiatives are being formed at other institutions that are modeled on what our team has done. The UMD team's efforts will be highlighted at a symposium at the next Linguistic Society of America conference and at the next National Humanities conference.

Nationally, the success of our outreach programs contributed to the creation of the multi-institution Language Science for Everyone network, which is expanding disciplinary interest in public engagement. This network has coordinated activities that serve thousands of children and families, and it has created an online resource guide for language science outreach.

Globally, the reach of our integrated approach has made important progress in the past year. The Global Research Alliance in Language (GRAIL) is an initiative that makes language science a signature theme of the Universitas 21 alliance of 25 research universities worldwide. This initiative was developed by the Maryland group, in conjunction with the UMD's Office of International Affairs and Vice President for Research, over the course of two years. It was officially approved by the Presidents of U21 institutions in Singapore in May 2016. But even before this, it has led to change at other institutions, such as the U of British Columbia's interdisciplinary Language Sciences Initiative, launched in April 2016, which can be directly

traced back to the development of GRAIL.

### **What is the impact on other disciplines?**

Our training practices and results influence programs in other disciplines at UMD, to a greater degree now that we are more integrated into university-level graduate training initiatives. Nevertheless, these impacts remain limited, as student training models are so strongly influenced by disciplinary peers.

Our training model has some impact on other disciplines via other NRT programs. By making all of our materials publicly available, including our proposal and reviews, our practices are readily visible to teams that are preparing NRT proposals. That is probably the time at which teams are the most receptive to outside suggestions, as they are the most motivated. Also, we were able to influence other disciplines via our hosting of the 2016 NRT Teams meeting at UMD. Both our organization of the meeting and the thematic focus reflect our findings about best practices in graduate training.

### **What is the impact on the development of human resources?**

#### GRADUATE STUDENTS BENEFITTED

There are currently 13 trainees enrolled in our NRT program, 4 of whom received NRT stipends. There are 10 students applying to join the program this year, of which we expect to award stipends to 4-5. Three additional students have already expressed their intention to apply next year.

We serve a much broader group of graduate students through our various events and courses. For example, over 50 graduate students participated in Winter Storm in January 2017. About 70 graduate students participated in Language Science Day in September 2016.

#### TRAINEE ACHIEVEMENTS/OUTCOMES

- i. Laurel Perkins was introduced to computational modeling through participation in our NRT program, and this year she presented a paper at a prominent conference in computational linguistics. Her research focus is on how young children learn the details of human language from the noisy and variable speech in their environment. The computational modeling research adds a valuable dimension to the laboratory based studies with infants that are her mainstay. Laurel's first degree was in literary studies, and she was enrolled in a graduate program in opera performance before transitioning to language science. So her move into computational research provides a strong role model for other students.
- ii. During the current reporting period Lara Ehrenhofer developed her plans for a career in science policy, with support from the NRT program. This led to an internship with the Helmholtz Association in Berlin that she will pursue in summer 2017, where she will work on various topics relating to science diplomacy. Her leadership efforts in our community in 2016-2017 helped to build her profile for a science policy career, and she took advantage of many opportunities during the year to engage with experts in this area, both in the Washington DC area and at the AAAS meeting in Boston.
- iii. In addition to her research accomplishments mentioned elsewhere in this report, Allyson Ettinger gained valuable experience in bridging linguistics and computer science through teaching in two split-enrollment undergraduate courses. In Spring 2016 she was a teaching assistant for a course led by Naomi Feldman, and in Spring 2017 she led an undergraduate seminar of her own. By enrolling an equal mix of linguistics and computer science students, Allyson had to learn how to navigate the different backgrounds of the two constituencies, not only making material accessible, but also making it stimulating to students on both sides.

#### BROADENING PARTICIPATION

i. Women are underrepresented in computer science in general, but they are not a minority in our computational group. It certainly helps that we can offer strong mentorship from successful female faculty, but male faculty also help through their words and deeds. For example, co-PI Hal Daumé published a series of blog articles celebrating the work of female computer scientists and how they influenced his research. The linguistics-CS bridge contributes, as a number of female students from linguistics have joined the computational linguistics research group. And the fact of having strong female students doing computational research becomes a self-fulfilling prophecy, as it helps to attract more female students.

ii. In our community there is now a greater emphasis on and respect for research with direct applications for underserved populations in the US (ToggleTalk, Language Poverty) and internationally (Guatemala). Also, in the current political climate more students are trying to connect their work with social justice issues. These have led to a subtle but noticeable shift in attitudes toward applied research in general, and have contributed to our ability to recruit a more diverse student population.

iii. We continue to make contact with minority students in local high schools through our outreach activities. We do not expect this to lead to direct impact on the diversity of our graduate program. But this does not matter. It is valuable to engage with large numbers of minority students and to contribute to interest in college and science careers. Broadening the base of students who consider science careers contributes to the efforts of all graduate programs to broaden their student body.

In our current group of 13 NRT students 9 of 13 students are women, 6 of 13 students are international. We currently have no trainees from underrepresented minorities. However, one of our new cohort of students is an African American woman, and another of our current students is an African American woman who participated in our IGERT program. Another of our students who is closely involved in many program activities is Hispanic, though not a US citizen (he is Guatemalan).

### **What is the impact on physical resources that form infrastructure?**

In January 2017 the Language Science Center relocated to new space in the fully renovated HJ Patterson Building, in the center of the U of Maryland campus. The 4500 sq. ft. facility has been in development for 2 years, and it would not have been possible without the success of our graduate training efforts and our internationalization plans (the building is being billed as the university's 'global hub'). This facility is much larger and more attractive than our previous temporary home, and it provides ample space for large and small events and group activities. It has already become a hub for language science community activities at UMD, including the NRT program. We have hosted large events like Winter Storm and the workshop on Language and Poverty, as well as the regularly scheduled meetings like the weekly Language Science Lunch Talks, cross-listed courses, lab meetings, and reading groups. Some students utilize the space regularly to meet with collaborators or as a quiet space for writing. It is also an ideal place for meetings with external partners, such as our quarterly briefings with government agencies, or our partners at the in-development Planet Word museum in downtown Washington DC.

To our surprise, an additional benefit of this new space is that it is so attractive that other UMD groups request to use it for events and meetings, or university leaders bring visitors to take a look. This creates unexpected opportunities for sharing the story about what we do and what we have done, and we are in the process of decorating the space with visuals that tell our program's story.

### **What is the impact on institutional resources that form infrastructure?**

Our graduate training efforts have had a major impact on institutional resources that create infrastructure. They have led to new hires across multiple departments, at the junior and senior levels. They have led to staff who provide high level support for interdisciplinary research. And they have fostered diverse new partnerships, locally, nationally, and globally. It is difficult to point to the specific impacts from individual training programs or university initiatives, as their success is so interconnected.

In 2016-2017 alone one senior faculty member, Jan Edwards, joined the Department of Hearing & Speech Sciences and the Language Science Center. She and her students have already had a big impact on connections in our community between fundamental science, health, and education. We also successfully recruited a mid-career faculty member, Jordan Boyd-Graber (a new NSF CAREER awardee) to an interdisciplinary appointment between Computer Science, Information Science, and the Language Science Center. He will improve our efforts to serve NRT students who work across departments.

### **What is the impact on information resources that form infrastructure?**

The primary information resources from our program are the materials that we publicly share about our training efforts and our outreach programs, and the Langscape online portal that aggregates expertise on the world's 6000 languages (langscape.umd.edu).

### **What is the impact on technology transfer?**

Nothing to report.

### **What is the impact on society beyond science and technology?**

We approach language from a science and technology perspective, but language is important for many different aspects of society. Our trainees are engaged in various ways in connecting the science of language to broader societal concerns. They do this via K-12 and public outreach programs, via more targeted efforts to contribute to literacy and other educational efforts, and via research that has direct societal implications. For example, some of our trainees are involved in research on dialect mismatch training in the schools, testing ways to help African American K-1 children navigate the different varieties of language that they need to succeed in different spheres of life.

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## **Changes/Problems**

### **Changes in approach and reason for change**

Nothing to report.

### **Actual or Anticipated problems or delays and actions or plans to resolve them**

- i. We made a key personnel change when we recruited Dr Shevaun Lewis as our NRT program coordinator, and Research Assistant Professor in the Maryland Language Science Center. This has allowed us to address a number of challenges that arose in developing the program in its first year, and led to significant improvements in program management, student mentoring and professional development, and integration with university-wide graduate training efforts.
- ii. We identified that the student leadership structure that served us well during our IGERT program was becoming stale, and it was proving less effective in allowing students to feel ownership of the program. So we worked with students to design a new structure, in which teams of students were more focused on programmatic goals rather than on events and activities. For example, instead of having a student team responsible for organizing our annual 2-week Winter Storm workshop, we instead had different student teams contribute different aspects of programming, according to their focus, e.g., Professional Development, Research Skills and Collaboration, Outreach. This change has already led to clear improvements, but there is more that we need to do in the next reporting period in order to facilitate student leadership. At the time of our IGERT program there was no interdisciplinary infrastructure for language science at UMD aside from that program, and hence students were obviously taking the lead. The success of the IGERT program led to the creation of much greater infrastructure, in the form of the Language Science Center, with a much broader mission. Ironically, this made it harder for students to see the unique contribution that they make to the success of the community.
- iii. We recognized that our professional development efforts were insufficiently systematic, and students were intimidated by the prospect of carrying out the science policy internship that we asked them all to complete. In the current reporting period we made substantial improvements to our approach to student career development, and we also arranged a small number of promising policy internships for students. In the next reporting period we hope to organize our communication training more systematically. We also hope that the success of our initial science policy internships will lead to greater confidence on the part of other students.

### **Changes that have a significant impact on expenditures**

Nothing to report.

### **Significant changes in use or care of human subjects**

Nothing to report.

**Significant changes in use or care of vertebrate animals**

Nothing to report.

**Significant changes in use or care of biohazards**

Nothing to report.