

Language, Experimentation and Computation

Strategic Hiring Proposal, University of Massachusetts, Amherst

This University is poised to seize a position of leadership in the emerging synthesis of theoretical, experimental, and computational approaches to language. We have long led in theoretically driven experimental research on language in the Departments of Linguistics and Psychology, and we also have a great strength in language-related technologies in Computer Science (CS). Recent methodological and theoretical developments in these fields have paved the way for tighter integration of research across the disciplines. This hiring plan will capitalize on our current strengths and these new opportunities to establish a center of excellence in the interdisciplinary study of language. Working together, we can dramatically accelerate scientific progress and ultimately contribute to meeting a range of societal needs, from language education to diagnosis and treatment of language disorders, improved digital information organization and retrieval, and automated translation.

This proposal calls for hiring a total of six faculty members, spaced over three years and evenly distributed among the three departments mentioned above. These new faculty will form the nucleus of a planned Center for Language, Experimentation, and Computation (CLEC), which will provide an institutional framework for the support of new and continuing research and training across these disciplines. The membership of CLEC will also include current faculty from all three hiring departments, as well as from the Departments of Communication Disorders and Languages, Literatures, and Cultures (LLC). (See Appendix 2 on the administrative structure of CLEC, and Appendix 5 for a list of faculty). Success in this interdisciplinary endeavor is assured by the long history of federal grants involving co-PIs in more than one of these departments, which have supported pure and applied interdisciplinary research and training.

The realization of this hiring plan, and the establishment of CLEC, will substantially contribute to the goals outlined in Chancellor Holub's *Framework for Excellence*:

- **Sustaining and expanding excellence.** The Department of Linguistics is one of the very best in the nation. Given recent developments in the discipline, this position can only be maintained by building up the areas of experimentation and computation. By doing so across disciplines, this plan will leverage the current strengths in Linguistics and related areas in CS and Psychology, resulting in world-leading programs in language in all three departments, and a University-wide center of excellence.
- **Interdisciplinarity.** This proposal includes plans for the further development of interdisciplinary training in research on language. The new faculty will collaborate in the creation of "springboard" courses that will prepare graduate students in each of the departments for further training in the others. The research and training supported by CLEC will ultimately bridge not only these disciplines, but more broadly the humanities, social sciences, natural sciences and mathematics.
- **Affordability.** The start-up costs and space requirements for these positions are relatively modest. Since linguistic experimentation and computation have an established track record in federal funding and a high potential for further funding and for new industrial partnerships, the positions will provide a quick return on initial investment.

1. General Background and Position Descriptions

The deep intellectual connections among linguistics, psychology and computer science gave birth to the "cognitive revolution" in the 1950's. The cognitive approach sees language as a

mental object whose properties can be studied through formal analysis and through experimentation. The branch of linguistics founded at that time by Noam Chomsky, which we refer to here as *theoretical linguistics*, has produced a wealth of knowledge about the structure of the world's languages. This research has developed hand in hand with experimental and theoretical research in psychology on the cognitive processes underlying human language use and learning. It has also developed in conjunction with research in computer science on the mathematical formalization of human language, and on computer systems that process written and spoken language. However, even with these deep connections, research on language in each of these disciplines does not yet make full use of the advances in the others. The plan described here will facilitate integrative research on language that breaks new ground in all of the fields.

In the Department of Linguistics, we will hire specialists in experimental and computational approaches to theoretical linguistics, who will bring to CLEC the ability to bridge research in theoretical linguistics with research in the other disciplines. Linguistics is broadly divided into the S-side (syntax and semantics; sentence structure and meaning) and the P-side (phonology and phonetics; structure and use of sounds). In both of these areas we have flourishing programs of interdisciplinary research and training and concrete goals for their expansion. Our proposal thus includes a hire in each area.

In the Psychology Department, we will hire specialists on language into both the Developmental and Cognitive areas, which are currently distinct areas and graduate programs. These hires will provide a new bridge between these areas and existing faculty members in each, as well as to faculty in CS and Linguistics. The aim will be to achieve complementarity in these positions by again hiring one P-side and one S-side specialist. The developmental psychologist will use experimental methods to study language development in children; the cognitive psychologist will use computational methods to develop theories of linguistic cognition.

In the CS Department, the two positions will establish a new concentration in natural language processing (NLP). The department has long been a leader in artificial intelligence: in particular, in machine learning, which focuses on the development of algorithms for learning based on data, and in information retrieval and extraction, which apply language technologies to particular problems. A program in NLP will build a bridge between these strengths in CS and form new connections to related research in the other disciplines. One NLP position will be in computational analysis of syntax and semantics and the other in dialogue systems.

Adding specialists in the computational and experimental study of language to these three departments will also add to long-standing strengths in the experimental study of language in Communication Disorders, and to emerging strengths in the experimental study of second language acquisition and bilingualism and of computer-assisted language learning in LLC.

2. Proven excellence of UMass Amherst in language, experimentation and computation

This proposal builds on excellence across the campus. We focus on documenting the existing strengths in the hiring departments of Linguistics, Psychology, and CS, as shown by external evaluations and the record of sponsored research.

The Department of Linguistics was ranked #1 in graduate education and #4 in research in the most recent National Research Council survey (1995). This assessment was confirmed more recently in the Department's 2006 AQAD report; the external committee stated that "[t]he department has a national and an international reputation for linguistics research of the highest quality" and that it "has an outstanding track record in graduate education." The external report also expresses strong support for proposed growth in the experimental area: "This is an important direction of research in the field at large, and results so far prove the fruitfulness of the blend of

theory and experimental methodologies. UMass is at the forefront of this trend. Indeed, the department has a unique history of research linking theoretical linguistics with the investigative tools provided by experimental methodologies.”

The Psychology Department was one of the pioneers in cognitive psychology, with an established program in psycholinguistics in the mid-1960s. The 2005 AQAD external committee states that “[t]he Department of Psychology at UMass has historically been an extremely strong department...NRC ranked the department 27th of 190 departments. The review committee feels that the department has maintained its high quality in the last 10 years. ... the department is one of the absolute best at UMass....” Recently, it has been recognized as having perhaps the premier laboratory for the experimental study of reading. From the AQAD committee: “The cognitive area has a rich history in the study of the processes underlying language, visual perception, and memory. This group has held special prominence in using eye-tracking systems to monitor the moment by moment processes in aspects of reading...There is clear collaboration across departments at the University, especially in engineering and linguistics.”

The CS Department was ranked in the top 20 by the most recent Computing Research Association Survey and in the top 10 in artificial intelligence. Its research in machine learning and in information retrieval and extraction has a long history of attracting funding from NSF, DARPA, ARL, and ONR, as well as private foundations such as Mellon and Sloan. Most recently, Andrew McCallum and David Smith succeeded in attracting a \$2.5 million DARPA award in the Machine Reading program for computational text analysis.

Appendix 1 provides information about sponsored research awarded to the Linguistics Department and to the primary collaborators in Psychology and CS. Our hiring proposal is aimed specifically at strengthening areas with established track records and strong potential for further success in funding. In CS, researchers in language technologies have received more than \$23 million in grants and industrial partnerships in the last five years. A few more high points: more than two decades of continuous NIH/NSF funding for collaborative research between Lyn Frazier in Linguistics and her Psychology colleagues Charles Clifton and Keith Rayner, with over \$3 million in total costs since 1993; a current \$1.1 million MURI grant on which Chris Potts of Linguistics and Andrew McCallum of Computer Science are co-PIs; \$750K to Peggy Speas and Tom Roeper in Linguistics; \$575K to Rayner, Clifton and Lisa Sanders in Psychology, and \$450K to John McCarthy and Joe Pater in Linguistics. In addition to these research grants, there have also been long-standing NIH training grants in psycholinguistics and human cognition, which form the foundation for a planned proposal based on the areas in this hiring plan.

Importantly, these research activities have provided undergraduates with many opportunities to apply knowledge gained in the classroom to actual cutting-edge research. Research assistantships, theses, publications, and admissions to prestigious graduate schools are the result. The Chancellor’s strategic plan emphasizes research experiences for undergraduates: their availability is one way in which an undergraduate education at a major research university is superior to even the best liberal arts colleges. Support for this proposal will generate many more such experiences (see section 3.2 on attracting out-of-state undergraduates).

3. Interdisciplinary nature of the project

3.1 Interdisciplinary research

Recent developments in these fields have opened up new possibilities for interdisciplinary collaboration on topics such as real-time language comprehension, language acquisition, and the interaction between language and other cognitive systems. For example, we have current and past strengths in behavioral and eye-tracking measures of the cognitive aspects

of language use (Clifton, Frazier, Kingston, Staub). With a shared event-related potential system in Psychology and current expertise in that area (Sanders) we are also now able to make online, real-time measurements of brain activity related to language. With the new hires, we envision being able to build on this research by constructing and experimentally testing computational models of linguistic cognition that are grounded in and contribute to linguistic theory.

In terms of funding, we expect that the hires in Linguistics and Psychology will continue in the current tradition of gaining support from both the NSF and the NIH. New hires in CS will increase opportunities for funding from NSF and DARPA by broadening the range of programs that receive support. In particular, technologies requiring deeper linguistic analysis, such as machine translation and speech understanding, could be energized by the new hires. Development of these technologies would also likely lead to industrial partnerships.

The *psycholinguistics* hire in the Linguistics Department will build on the longstanding collaboration between Linguistics' Frazier and Psychology's Clifton and Rayner. Staub occupies a junior position in this area in Psychology. The new position will provide the counterpart in Linguistics necessary to sustain and expand this tradition of interdisciplinary research and training. This hire would also find a likely collaborator in LLC's recently appointed Wang.

The *phonology* hire in the Linguistics Department will build on newer connections between Linguistics and Psychology or Computer Science. An experimental phonologist would build on recent collaboration between Linguistics' Kingston, Psychology's Sanders, and Communication Disorders' Freyman on perception of speech. A computational phonologist would build on recent collaboration between Linguistics' McCarthy and Pater and Computer Science's McCallum and Smith on modeling phonological knowledge and learning.

The *language development* hire in the Psychology Department will connect the research of at least two of its faculty: Sanders, who studies linguistic cognition in children and adults, and Scott, who studies perceptual development in infancy. Hiring in this area will also create synergy with Linguistics' Green, Pater and Roeper, and with Communication Disorders' Velleman, who study language acquisition across a diverse set of populations.

The *linguistic cognition* hire in the Psychology Department will form a bridge between Psychology's Cohen and Rotello, who specialize in computational modeling of cognition, and members of Linguistics and Psychology who experimentally investigate language use (Frazier, Kingston, Sanders and Staub, amongst others). Computational modeling of linguistic cognition employs many of the same mathematical techniques as computational research in NLP, so this position will connect to research in CS, by McCallum, Smith, and the new hires.

The *NLP-syntax/semantics* hire in CS will connect with the leading-edge research in Linguistics on syntax and semantics (Bhatt, Cable, Green, Harris, Johnson, Kratzer, Speas, and Woolford) and human sentence processing (Frazier and Psychology's Clifton and Staub). Since a large part of computational research in syntax and semantics is on learning grammatical knowledge from data, there will be deep connections to research on acquisition (Pater and Roeper). Computational models also heavily depend on the creation of annotated linguistic resources, such as the Hindi/Urdu treebank project led by Bhatt. With Computer Science, this position would deepen collaborations between machine learning researchers who concentrate on non-linguistic data (e.g., Jensen and Mahadevan) and those working on applied language technologies (Allan, Croft, and McCallum).

The *NLP-dialogue systems* hire in CS will benefit from collaborations at the level of phonology (Kingston, McCarthy, and Pater), prosody (Selkirk), processing (Frazier and Staub), and discourse (Kratzer). The ability of computational systems to integrate these different

language modules will be an exciting focus of experimental research, as will the application of NLP methods to language instruction, as in the work of LLC's Amaral. Within CS, this position would connect strengths in reinforcement learning and bounded reasoning (Barto and Zilberstein) with the field of language technology.

Building the strong interdisciplinary group envisioned in the present proposal would form the basis for expansion in new directions, most notably the cognitive neuroscience of language, which would reinforce ongoing efforts to develop the University's cognitive neuroscience programs and the creation of a dedicated research fMRI facility.

3.2 Interdisciplinary training

It is clear that the field of linguistics is shifting towards the increased use of experimental and computational methods, and that training in their use is needed and desired by graduate students. In the period 1990-1999, out of 57 Ph.D.'s awarded by the UMass Linguistics Department, only 6 had experimental content. In the period 2000-2007, fully half of the dissertations involved experimental methodologies (18 out of 36). A picture of the state of the field as a whole is provided by the graph in Appendix 3, which plots the number of dissertations across different sub-areas in linguistics against the number of advertised positions. These figures strongly suggest that increased training in computation and experimentation (i.e. psycholinguistics) will help our graduate students to continue to find positions upon graduating.

All of the new hires will teach and supervise both undergraduate and graduate students, following the standard practice in each department. The hiring in Linguistics and CS will allow us to establish a new undergraduate joint major, unique in the Northeast (competitors include Stanford and UCLA). A nearly comparable program is the newly established 5-year BA/MA program in computational linguistics at Brandeis, but it lacks an undergraduate focus, and the Brandeis Linguistics program and CS Department are small and lack the strength and prestige of our departments. The joint major, publicized through CLEC, can thus be reasonably expected to increase out-of-state enrollment (Linguistics currently has 33% out-of-state undergraduates).

A special focus of the graduate teaching responsibilities will be the development of "springboard" courses in each department, which will prepare graduate students who want to study in the other departments. This will maximize the use of existing resources in new training initiatives. The new hires and their colleagues will also be encouraged to teach seminars across departments, and CLEC will organize interdepartmental reading groups and lecture series.

PhD students affiliated with CLEC will be admitted to and receive degrees from one of the participating departments (see Appendix 2 on governance and assessment). They will also be eligible for the University's Certificate in Cognitive Science, administered by the three hiring departments, plus Communication Disorders and Philosophy. Although some institutions have a cognitive science department or degree program for this kind of training, we believe that providing the training in the context of the existing departmental PhD programs is a better approach, for three main reasons. First, each of the disciplines has its own program of training that is essential to the development of specialists in each of the theoretical, experimental, and computational approaches to language. Second, most hiring in the areas in which we will be training is done by the traditional disciplinary departments (see the small number of positions in Cognitive Science in Appendix 3); obtaining such a position without the disciplinary PhD is usually extremely difficult. Finally, by focusing on the development of existing strengths and real potential collaborations across this subset of the areas in cognitive science, we will create a uniquely effective and synergistic research and training environment.

Appendix 1: Active external grants 2004-2009

1. Computer Science (Allan, Croft, McCallum and Smith)

PI and Project Title	Sponsor	Span	Total Award
W. B. Croft, J. Allan The Analytic Web	NSF	2003 – 2007	\$ 712,144
J. Allan, W.B. Croft Leading NSDL toward Long-Term Success	NSF/UCAR	2002 – 2004	\$ 523,086
W.B. Croft, J. Allan Supporting Effective Access through User- and Topic-Based Language Models	NSF	2000 – 2004	\$ 351,964
W.B. Croft, J. Allan Formal Frame works and Empirical Evaluations for Information Organization	DARPA	2002 – 2005	\$2,650,389
W. B. Croft Digital Government: A Language Modeling Approach for Cross-Database Linkage and Search	NSF	2000 – 2004	\$ 455,484
W. B. Croft Question Triage for Experts and Documents: Expanding the Information Retrieval Function of the NSDL	NSF	2002 – 2005	\$ 502,309
J. Allan R. Manmatha, A. McCallum Shared Computing Resource for Language and Multimedia Technologies	DARPA	2005 – 2006	\$ 117,321
A. McCallum, W. B. Croft CALO: Cognitive Assistant that Learns and Observes	DARPA/SRI	2003 – 2009	\$2,189,197
A. McCallum Text Classification of Usability Reports	AFOSR/Aptima	2003 – 2004	\$ 29,988
A. McCallum Interactive Text Classification of Usability Reports	AFOSR/Aptima	2004 – 2006	\$ 105,000
A. McCallum, D. Jensen Unified Graphical Models of Information Extraction and Data Mining with Application to Social Network Analysis	NSF	2003 – 2010	\$2,944,718
A. McCallum Machine Learning for Sequences and Structured Data: Tools for Non-Experts	NSF	2004 – 2008	\$ 332,999
R. Manmatha, J. Allan, et al. Cluster Acquisition for Computational Research into Large Scale Data Rich Problems	NSF	2006 – 2008	\$ 350,000
J. Allan, W. B. Croft, A. McCallum	DARPA/SRI	2005 – 2009	\$2,304,519

Supporting Distillation for GALE

W. B. Croft	NSF	2005 – 2006	\$ 99,903
Breaking the Keyword Bottleneck: Towards More Effective Access of Government Information			
W. B. Croft	NSF/CMU	2005 – 2008	\$ 392,538
Developing the Lemur Toolkit into a Community Resource			
W. B. Croft	NSF	2006 – 2010	\$ 398,000
Text Reuse and Information Flow			
A. McCallum	NSF/ITIC	2005 – 2010	\$ 920,700
Aiding Collaboration through Probabilistic Methods on Text and Semi-Structured Data			
A. McCallum	DoI/BBNT	2004 – 2007	\$ 250,603
Statistical Models for Information Extraction for REFLEX			
A. McCallum	DARPA/NGA	2006 – 2008	\$ 239,579
Resource-Bounded Information Gathering for Efficient Entity Resolution and Link Analysis using Probabilistic Reasoning and Discovery			
A. McCallum	NSF	2006 – 2010	\$ 200,000
Improving Experimental Computer Science with a Searchable Web Portal for Data Sets			
A. McCallum	NSF	2008 – 2011	\$ 449,992
Dynamically-Structured Conditional Random Fields For Natural Language Processing			
W. B. Croft	NSF	2007 – 2010	\$ 771,955
Supporting User Data, Privacy, and Evaluation in the Lemur Toolkit			
W. B. Croft	NSF	2007 – 2010	\$ 404,132
Searching Archives of Community Knowledge			
J.Allan, W. B. Croft	NSF	2009 – 2011	\$ 450,000
Learning Word Relationships Using TupleFlow			
A. McCallum, D. Smith	DARPA/SRI	2009 – 2014	\$2,572,052
A Universal Machine Reading System			
A. McCallum	AFRL/Lockheed	2007 – 2009	\$ 290,000
Information Integration Seedling			
A. McCallum	DARPA/IBM	2005 – 2005	\$ 67,622
The KDD Evaluation Problems: Conditional Random Field, Topic Models and Relational Methods			
A. McCallum, C. Potts	Army/UPenn	2007 – 2012	\$1,074,997

Situation Understanding Bot through Language and Environment

J. Allan Research Award	Google	2007 –	\$ 65,000
J. Allan Research Award	UpToDate	2008 –	\$ 77,710
W. B. Croft Research Award	Google	2007 –	\$ 55,000
W. B. Croft Research Award	Microsoft	2006 –	\$ 42,000
W. B. Croft Research Award	Yahoo	2008 –	\$ 25,000
A. McCallum Research Award	Monster	2007 –	\$ 400,000
A. McCallum Research Award	Google	2009 –	\$ 90,000

2. Linguistics

Rajesh Bhatt Multi-Representational and Multi-Layered Treebank for Hindi/Urdu	NSF	2008 – 2011	\$ 130,000
Lyn Frazier and Charles Clifton (Psychology) Language Comprehension: Mechanisms of Co-Variation	NIH	2008 – 2013	\$ 530,000
Lyn Frazier and Keith Rayner (Psychology) Eye Movements in Reading	NIH	2005 – 2007	\$ 103,613
John Kingston Context Effects on Sensitivity, Bias and Parsing Phonetic Information	NIH	2004 – 2007	\$ 817,929
John McCarthy and Joe Pater Investigations in Optimality Theory: Typology, Learning, and Modeling	NSF	2008 – 2012	\$ 462,989
Christopher Potts Expressive content and the semantics of contexts	NSF	2007 – 2010	\$ 217,938
Christopher Potts and Andrew McCallum (Computer Science) SUBTLE: Situation Understanding Bot Through Language and Environment	MURI, Army	2007 – 2010	\$1,074,997

Elisabeth Selkirk The Reflexes of Focus in Phonology	NSF	2001 – 2005	\$ 184,925
Margaret Speas and Thomas Roeper Recursion: Structural Complexity in Language and Cognition	NSF	2008 – 2009	\$ 64,737
Margaret Speas and Thomas Roeper The Project on Epistemology and Indexicality in Navajo, Tibetan and English	NSF	2006 – 2010	\$ 753,000

3. Psychology (Clifton, Cohen, Rayner, Rotello, and Sanders)

Charles Clifton (see Frazier in Linguistics)

Andrew Cohen Inducing features from visual noise using statistical machine learning techniques	NSF	2006 – 2009	\$ 149,980
Keith Rayner, Charles Clifton and Lisa Sanders The nature and time course of phonological representation in reading	NIH	2006 – 2009	\$ 563,731
Keith Rayner and Alexander Pollatsek Foveal and parafoveal codes in reading	NSF	2004 – 2008	\$ 473,923
Caren Rotello and Evan Heit Computational models of word retrieval	NIH	2006 – 2010	\$ 152,353
Lisa Sanders Selective attention deficits contribute to language processing disorders	Merck	2008 – 2012	\$ 300,000
Lisa Sanders Auditory temporally selective attention	NIH	2007 – 2012	\$ 224,746
Caren Rotello (with other co-Pis) Training in Applied and Basic Cognition and Development	NIMH	1982 – 2009	\$ 160,252

Appendix 2: The Administrative Structure of CLEC

Governance

CLEC will be led by a Steering Committee consisting of department chairs or their designees. The chairs of the following departments have agreed to participate:

- Communication Disorders (SPHHS)
- Computer Science (CONS)
- Languages, Literatures, and Cultures (CHFA)
- Linguistics (CHFA)
- Psychology (CONS)

Eventually, governance may be transferred to the individuals hired in this cohort, as they ascend to more senior professorial ranks.

A member of the Steering Committee from a different department will be a voting member of the search committee for every faculty position described in this proposal. In addition, the Steering Committee will have responsibility for the following items, and others as it may see fit to consider from time to time:

- (i) Assisting the new faculty in obtaining support and facilities for their research.
- (ii) Encouraging and advising them on grant applications.
- (iii) Ensuring that interdisciplinary teaching and research are properly recognized by the home department.
- (iv) Considering requests from other faculty who wish to affiliate with this project.
- (v) Balancing the needs of the project with departmental needs in research and teaching by faculty and graduate students.
- (vi) Informally adjudicating disputes and complaints that touch on this project.

Since the intention is to hire new faculty who are already proven innovators with active research programs, the Steering Committee's role is more in the nature of offering assistance and guidance than providing direction.

The Steering Committee will make its decisions by consensus whenever possible. In the absence of consensus, a majority of those present at the meeting will be sufficient to pass a motion.

The Steering Committee will normally meet monthly. The members of the Committee will be expected to accommodate this responsibility within their normal service obligations, without additional release time.

Assessment

The Steering Committee will report annually to the Chancellor, the Provost, and the Vice-Chancellor for Research and Outreach on the project's contributions in the areas of teaching and research (and outreach if appropriate). Five years after all of the new faculty are in place, the Steering Committee will arrange for a review of the project by a group of non-UMass scholars with expertise in the relevant areas.

The Steering Committee's annual reports and the quinquennial review will focus on the following measures of success:

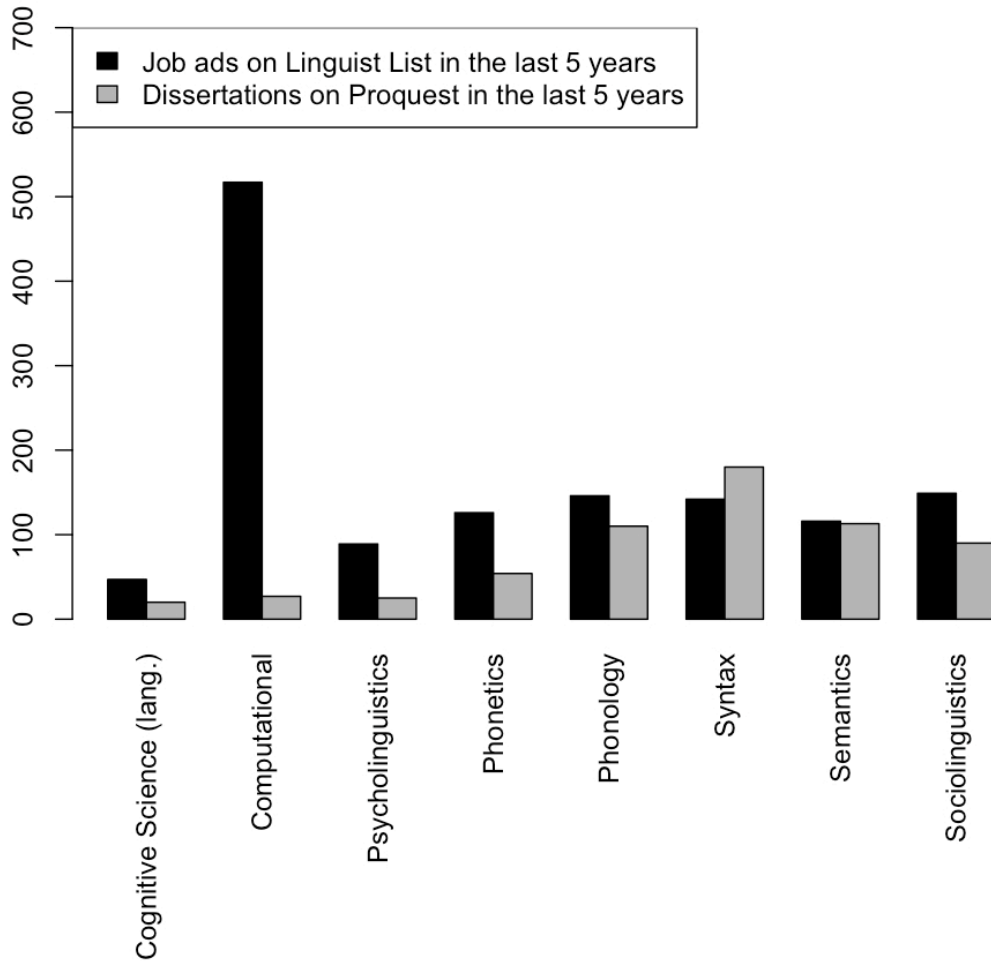
- (i) Dollar value of sponsored research by new faculty and other affiliated faculty.

- (ii) Publications and citations of publications by new faculty, other affiliated faculty, and student affiliates.
- (iii) Placement of affiliated doctoral students in appropriate academic or industry positions.
- (iv) Placement of affiliated undergraduate students in relevant graduate programs or employment.

The Steering Committee is charged with monitoring these outcomes, with particular attention to sponsored research dollars. The Committee is empowered to take corrective action, up to and including disaffiliation of a faculty member or student.

Appendix 3: Hiring prospects for trainees in linguistic experimentation and computation

Linguistics jobs and dissertations, 2004-2008



Appendix 4: Facilities

Computer science

The new faculty will require only office space, which is available in the Computer Science Building.

Linguistics

In addition to an office, each of the new faculty members will require his/her own grant headquarters/lab of about 150 square feet.

The psycholinguist will need an additional room, also about 150 square feet, for “running subjects” (that is, conducting experiments on four to six people at a time in a single room). A phonologist who uses a similar research methodology could share this space.

Our Phonetics Lab has acoustic and electromagnetic shielded rooms that could be used to house any specialized apparatus required by the psycholinguist or phonologist.

Psychology

The Psychology Department has several active laboratory facilities, including an eye-tracking laboratory (three eye-trackers plus several additional computers, approximately 600 sq ft), three ERP laboratories, a laboratory with several powerful computers for computational modeling, and several suites of experimental test rooms. Given recent retirements, together with the Department's tradition of making laboratories available to colleagues, adequate office space and minimally adequate subject-testing space currently exists. However, as mentioned elsewhere, the addition of a dedicated, on-campus, fMRI laboratory would be an extremely valuable additional asset.

Appendix 5: Current faculty in Language, Experimentation and Computation

The following list provides the full names and positions of all of the faculty mentioned in the proposal. Asterisks indicate faculty in the hiring departments whose areas are closest to that of the proposed positions. Their curricula vitae are included in a separate document.

Communication Disorders

Richard Freyman, Professor
Shelley Velleman, Associate Professor

Computer Science

James Allan, Professor
Andrew Barto, Professor and Chair
*W. Bruce Croft, Distinguished University Professor
David Jensen, Associate Professor
Sridhar Mahadevan, Associate Professor
R. Manmatha, Research Associate Professor
*Andrew McCallum, Associate Professor
*David Smith, Research Assistant Professor
Shlomo Zilberstein, Professor

Languages, Literature and Cultures

Luiz Amaral, Assistant Professor
Zhijun Wang, Assistant Professor

Linguistics

Rajesh Bhatt, Associate Professor
Seth Cable, Assistant Professor
*Lyn Frazier, Professor
Lisa Green, Associate Professor
Alice Harris, Professor
Kyle Johnson, Professor
*John Kingston, Professor
Angelika Kratzer, Professor
*John McCarthy, Distinguished University Professor and Chair
*Joe Pater, Associate Professor
Christopher Potts, Associate Professor (at Stanford as of 2009-10)
*Thomas Roeper, Professor
Elisabeth Selkirk, Professor (Emerita as of 2009-10)
Margaret Speas, Professor
Ellen Woolford, Professor

Psychology

*Charles Clifton, Emeritus Professor and Research Professor

Andrew Cohen, Assistant Professor

Keith Rayner, Emeritus Professor (now at UCSD)

Caren Rotello, Professor

*Lisa Sanders, Assistant Professor

Lisa Scott, Assistant Professor

*Adrian Staub, Assistant Professor