Grantsmanship: Mechanics of Grant Writing

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The University of Arizona

Mario Svirsky
New York University

With contributions from
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University of Texas at Dallas
Karen Kirk
University of Iowa
Kris Tjaden,
University at Buffalo, SUNY
Steve Barlow
University of Kansas

Getting Started: Preliminary Planning

- Planning begins long before writing!
- Consider institutional priorities
- Define the scope of the problem to be addressed
- Get relevant papers in press
- Identify additional areas of expertise as needed
  - Co-Investigators vs. Consultants
  - Internal vs. external
- Determine whether additional resources are needed
  - From your institution
  - Through collaborations (local or distant)

1. Getting started

- People who get grants write lots of grants
  - We also rewrite lots of grants
  - Make it a standard activity rather than special event

- Find funding source and related submission date
  - Funding information is available from program officers here
  - Most resources are provided on line.
- Check schedule for commitments relative to due date
- Inform students, administrative staff and colleagues of your deadlines
- Allow time for University process

Getting started

- Follow the instructions exactly
- Understand the review process
  http://grants1.nih.gov/grants/peer/peer.htm
  - Help reviewers advocate for your grant
  - Consider who will review
- Write to the review criteria
  - Use the review criteria as headers
  - Use the terminology in the instructions

Getting started

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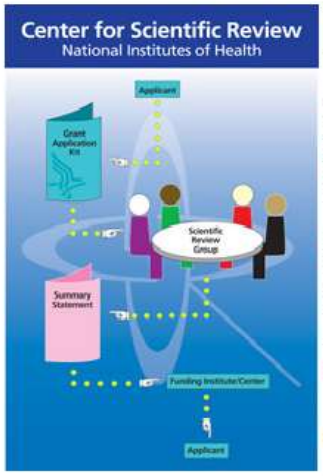
"The Peer Review Process"



What Happens to Your Grant Application: A Primer for New Applicants

Your application is assigned to a review group and an NIH Institute or Center

One or more CSR Referral Officers examine your application and determine the most appropriate Integrated Review Group (IRG) to assess its scientific and technical merit. Your application is then assigned to one of the IRG's study sections. A study section typically includes 20 or more scientists from the community of productive researchers. Your application also will be assigned to the NIH Institute or Center (IC) best suited to fund your application should it have sufficient merit. (More than one IC may be assigned if appropriate.)

Referral Officers follow established guidelines that define the **review boundaries** of each study section. These boundaries frequently overlap, and more than one study section may have the expertise to review your application. You may request in a cover note with your application that it be assigned to a particular study section or IC. The CSR referral office seriously considers such requests.

The combined expertise of the scientists in a study section is intended to span the breadth and diversity of the science it covers. CSR may recruit temporary reviewers or secure mail reviews from outside consultants.

Checking the status of your application

As soon as your application is received and assigned to a study section, notices are posted to your online NIH Commons account. Information on the Commons and how to register is available via the **Commons Web page**. You may question either your study section or IC assignment by contacting the **Scientific Review Officer** (SRO) named in your notification or the CSR referral office (301-435-0715). It usually takes weeks to refer the thousands of applications submitted each round. If a notice is not posted in your Commons account within 3 weeks of the submission date, you should contact the referral office.

Reviewers are identified

Your SRO will analyze the content of your application, check for completeness, and decide which reviewers can best evaluate it. Reviewers receive a copy of your application approximately 6 weeks before their meeting. Each application is assigned to three reviewers, and at least two of them provide written critiques. These assigned reviewers lead the discussions at the meeting.

Because of the multi-month period between submission and review, applicants often wish to submit additional materials. Before you do, you should contact your SRO to see if this is possible and what kinds of limitations apply.

Before the study section meets, reviewers confidentially submit preliminary critiques and scores to CSR. Reviewers are then given a list of applications that were initially scored in the lower half. If all reviewers agree, these applications are "streamlined," which means they will not be discussed at the meeting. "Streamlining" is not equivalent to disapproval, so applicants may resubmit a better application after considering the critiques they receive.

The review meeting is convened

Study sections convene for about 2 days. One member serves as **chair** and conducts the meeting with the SRO. Relevant NIH extramural staff are encouraged to attend, but they may not participate in the evaluation. Assigned reviewers and discussants present

printer friendly

Home
- About CSR
- News and Reports
- Peer Review Meetings
- Resources for Applicants

Peer Review Policies & Practices

On This Page:

Peer Review News

- NOT-OD-09-054 - Recovery Act of 2009: NIH Review Criteria, Scoring System, and Suspension of Appeals Process
- NOT-OD-09-033 - The NIH Implements New Registration Process for Reviewer Reimbursement for Participation in NIH Peer Review Meetings
- NOT-OD-09-023 - Enhancing Peer Review: The NIH Announces Updated Implementation Timeline
- NOT-OD-09-024 - Enhancing Peer Review: Enhancing Peer Review: The NIH Announces New Scoring Procedures for Evaluation of Research Applications Received for Potential FY2010 Funding
- NOT-OD-09-025 Enhancing Peer Review: The NIH Announces Enhanced Review Criteria for Evaluation of Research Applications Received for Potential FY2010 Funding
- Enhancing Peer Review at NIH - On February 28, 2008, the Final Draft of the NIH 2007-2008 Peer Review Self-Study was submitted to Dr. Elias Zerhouni, Director of NIH, marking the end of the diagnostic phase of the peer review enhancement effort.

Guidelines for Reviewers

- Guidelines
  - General Guidelines for Study Section Reviewers and Chairs
  - R Awards (Research Projects)
  - Small Business R Awards
  - F Awards (Fellowship)
  - K Awards (Career Development)
  - P Awards (Program Projects)
  - S10 Awards (Shared Instrumentation)
  - T Awards (Training)

Peer Review Practices

NATIONAL INSTITUTES OF HEALTH
Office of Extramural Research

SPECIAL EMPHASIS PANELS

Study Section	Panel Name	Meeting Rosters
ZDC1 SRB-R(40)	NIDCD LOAN REPAYMENT	04/28/09
ZDC1 SRB-R(38)	R03 HEARING AND BALANCE SMALL GRANTS REVIEW	03/19/09
ZDC1 SRB-C(21)	R03 VOICE, SPEECH, LANGUAGE REVIEW	03/18/09
ZDC1 SRB-Q(62)	R03 CHEMICAL SENSES REVIEW	03/17/09
ZDC1 SRB-L(41)	CLINICAL TRIALS	03/12/09
ZDC1 SRB-C(22)	CLINICAL TRIALS	03/12/09
ZDC1 SRB-Q(63)	CLINICAL TRIALS	03/12/09

Last Update:04/07/09

IC's Rosters Index
OER: Peer Review and Policy Issues
Webmaster

NATIONAL INSTITUTE ON DEAFNESS AND OTHER COMMUNICATION DISORDERS SPECIAL EMPHASIS PANEL

ZDC1 SRB - C(21)

R03 VOICE, SPEECH, LANGUAGE REVIEW

03/18/09 - 03/18/09

Meeting Roster

Important Notice Of NIH Policy To All Applicants: All rosters are provided for information purposes only. **Applicant investigators must not communicate directly with any review group member about an application either before or after the review**. Failure to observe this policy strictly will create serious breaches of confidentiality and conflicts-of-interest in the peer review process. All questions must be directed to the Scientific Review Administrator in charge of the review group. **The roster below is a working document and should not be considered as complete until the meeting date.** A final and complete roster will be provided with the summary statement.

MEMBERS

BERRY DAVID, A. PHD,
ASSOCIATE PROFESSOR
DIVISION OF HEAD AND NECK SURGERY
UNIVERSITY OF CALIFORNIA, LOS ANGELES
LOS ANGELES, CA, 90095-179

BROWNELL HIRAM, H. PHD,
PROFESSOR
DEPARTMENT OF PSYCHOLOGY
BOSTON COLLEGE
CHESTNUT HILL, MA, 02467

BLUMSTEIN SHEILA, E. PHD,
ALBERT B. MEAD PROFESSOR
DEPARTMENT OF COGNITIVE
AND LINGUSITIC SCIENCES
BROWN UNIVERSITY
PROVIDENCE, RI, 02912

CHATTERJEE ANJAN, K. MD,
ASSOCIATE PROFESSOR
DEPARTMENT OF NEUROLOGY
UNIVERSITY OF PENNSYLVANIA
PHILADELPHIA, PA, 19104

CONNOR NADINE, P. PHD,
ASSISTANT PROFESSOR
DEPARTMENT OF OTOLARYNGOLOGY/COMMUNICATIVE
DISORDERS
UNIVERSITY OF WISCONSIN
MADISON, WI, 537927375

KOBLER JAMES, B. PHD,
ASSISTANT PROFESSOR

Getting started

- Follow the instructions exactly
- Understand the review process
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  - Help reviewers advocate for your grant
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  - Use the terminology in the instructions
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Getting started

- Review Points (NIH)
  - Significance
  - Innovation
  - Investigators
  - Approach
  - Environment
  - Overall Impact
- Administrative Matters
  - Human Subjects protection adequacy
  - Gender, minority and children representation
  - Budget (red flags)

Overall Impact Score

"…assessment of the likelihood for the project to exert a sustained, powerful influence on the research field(s) involved"

This score determines whether your grant is discussed.

Writing

- Establish individual roles in grant writing
  - Write in "one voice"
  - Use consultant expertise up front
- Allow enough time for writing!
  - Set timelines for your writing
  - Give collaborators and others time to read and edit
  - Get an outside review
    - Can get reviews section by section
    - Include your Specific Aims with each review request.
    - Have your students review your grants

2. Overall Layout

- Get a model from a funded researcher
  - Caution: requirements changed in 2010
- Format for readability
  - Adhere to font requirements
  - Use headers & spacing
  - Avoid abbreviations and acronyms
- Format for skim-ability
  - Tables & figures are good
  - Highlight critical elements

Overall Layout

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- Format for skim-ability
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  - Highlight critical elements

AVOID ACRONYMS!

- Good Acronyms are ones EVERYONE uses
  - dB SPL
  - ADHD
  - NIH
- Bad acronyms are specific to your field
  - NWR
  - IFG
- REALLY bad acronyms are specific to your grant
  - YCs
  - VWM-HL
- Reviewers do not want to search for your acronym definitions as they read.

Overall Layout

- Get a model from a funded researcher
  - Caution: requirements changed in 2010
- Format for readability
  - Adhere to font requirements
  - Use headers & spacing
  - Avoid abbreviations and acronyms
- Format for skim-ability
  - Tables & figures are good
  - Highlight critical elements

Style Hints

Use Headings

C. QUALITY OF PROJECT PERSONNEL

The Callier Center for Communication Disorders and the University of Texas at Dallas have a long history of…….

A caution on Appendices

Provide helpful labels

APPENDIX A

A
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3. Project Description (Abstract)

- It may be the only thing read by many reviewers
- Often sets the first impression
- It should reflect the long term goals
- It should highlight nature of the proposed research
- It should make a strong case for the importance of the work

Abstract for Research Proposal from Pre-Doc Application

Cochlear implants are commonly recommended as an option for children and adults with severe-to-profound hearing loss who do not benefit from traditional hearing aids. These implants allow for significant improvements in speech recognition, but these listeners continue to have difficulty hearing speech in noise. During audiologic evaluations, speech recognition in noise is often tested in adults and older children with cochlear implants, but it is rarely included in evaluations for young children because of the lack of standardized testing materials. The purpose of this study is to develop and determine the effectiveness of a SR test in noise for young children with CIs. Speech stimuli will be common words and phrases equated for intelligibility. Noise stimuli will be recorded from classrooms and equated for intensity. Following validation of the test procedure in young children with normal hearing, speech recognition in noise will be evaluated for young children with cochlear implants. Findings may lead to the development of a new clinical SR test for children that can be used to evaluate changes in cochler implant mapping and benefit of devices to improve speech recognition in noise such as FM systems.

RATIONALE

GOAL

NATURE

IMPORTANCE

Abstract for Research Proposal from R-series

The long term goal of our research is to develop an acoustically-based, explanatory model of the communication deficit in dysarthria that can be used to guide and justify treatment decisions. The proposed Phase I treatment project will investigate the relationship among phonatory and supralaryngeal acoustic measures of speech, intelligibility, and speaking conditions used as intervention strategies for dysarthria secondary to Parkinson disease and Multiple Sclerosis. Studies from the first funding cycle indicated that vowel distinctiveness was maximized in a Slow condition while consonant distinctiveness and intelligibility were maximize in a Loud condition. Supralaryngeal acoustic measures also accounted for only a portion of the variance in intelligibility. Whether a speech mode encouraging a slowed rate and increased intensity would yield improvements in acoustic phonetic distinctiveness and intelligibility above those associated with rate reduction or increased loudness alone is unknown, although contemporary speech production theory (Perkell et al., 2000) predicts such an outcome. The proposed project tests this and other predictions of the Perceptual-Acoustic Theory by extending the study of speech mode effects in dysarthria to Clear speech, a speech mode encouraging a slowed rate and increased intensity. The contribution of acoustic measures of phonatory behavior to intelligibility as well as measures of acoustic-phonetic distinctiveness also will be studied. Loud, Slow, Clear, and even Fast speech modes are used therapeutically to maximize intelligibility in dysarthria, yet comparative group studies are lacking. Research that improves our understanding of acoustic-perceptual changes associated with these speech modes would strengthen the scientific bases of treatment techniques and may reveal acoustic perceptual advantages of a given speech mode that will determine preferred therapies – key considerations for evidence based practice.

GOAL

NATURE

IMPORTANCE

4. Biosketch

- Convinces the reviewer that key personnel
  - Can do independent research
  - Have a track record in the grant area
  - Are important for the work proposed

Personal statement

- Use to describe how you are uniquely qualified to do the work
  - Based on your experience with the method
  - Based on your experience with the population
- Document a history of collaboration with other key personnel
- Keep it brief

- DO NOT
  - Recapitulate the other sections of the grant here
  - Include information that is not relevant to the grant at hand

New as of 2010

Principal Investigator/Program Director (Last, First, Middle): Plante, Elena

BIOGRAPHICAL SKETCH

Provide the following information for the key personnel and other significant contributors in the order listed on Form Page 2.
Follow this format for each person. **DO NOT EXCEED FOUR PAGES.**

NAME	POSITION TITLE
Elena Plante	Principle investigator
eRA COMMONS USER NAME eplante	

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
Loyola College, MD	BA	1984	Speech Pathology
Loyola College, MD	MS	1985	Speech Pathology
University of Arizona	PhD	1990	Speech & Hearing Sci.
University of Arizona	Post-Doc.	1992	Speech & Hearing Sci.

A. Personal Statement

I have been working as a researcher in the area of specific language impairment for the last 20 years. My background as a licensed and certified speech-language pathologist has afforded a clinical perspective on the problems encountered by clinicians who serve children with specific language impairment. In the last five years, my lab has produced an average of 7 publications a year, which have included work on assessment of SLI, and studies of learning by children and adults with normal and impaired language. The child studies have used the same computer-based methods proposed for this grant. In addition, my more recent work has been grounded in the Learning Mechanisms framework, which provides the theoretical structure for this grant. I was also awarded an ARRA supplement, which provided an opportunity to develop the treatment methods, the most successful of which serves as the basis of the treatment design for the current grant. The planned statistical treatments across the range of proposed studies are ones that I have experience in applying in previous studies. In addition, I have had significant advanced statistical coursework as part of both my doctoral and post-doctoral training and have continued to take statistical courses throughout my career.

B. Positions and Honors.

Positions

1985-86 Speech-Language Pathologist, Frederick County Board of Education, Maryland

1992- Faculty: Dept. of Speech, Language, & Hearing Sciences, University of Arizona, Tucson AZ

1992-1997 Assistant Research Scientist
1998-2004 Associate Professor
2004- Professor, Department of Speech, Language
2006-2011 Department Head

Honors

2006 Editor's Award for Article of Highest Merit, *Language, Speech, & Hearing Services in Schools*

2004 Fellow--American Speech, Language, Hearing Association

2003 Galileo Circle Fellow--UA Science, The University of Arizona

2000 Mortar Board Faculty Award (awarded by the undergraduate honors association)

Publications limited to 15

Funding history

Principal Investigator/Program Director (Last, First, Middle): Plante, Elena

C. Selected peer-reviewed publications (Out of 98 publications total)

Most relevant to the current application

1. Krassowski, E. & Plante, E. (1997). IQ variability in children with SLI: Implications for use of cognitive referencing in determining SLI. *Journal of Communication Disorders,30,* 1-10.
2. Plante, E. (1998). Criteria for SLI: The Stark and Tallal Legacy and Beyond. *Journal of Speech, Language, and Hearing Research, 41,* 951-957.
3. Spaulding, T.J., Plante, E., & Farinella, K.A. (2006). Eligibility criteria for language impairment: Is the low end of normal always appropriate? *Language, Speech, & Hearing Services in Schools, 37,* 61-72. (PMID: 16615750)
4. Pankratz, M., Plante, E., Vance, R., Insalaco, D. (2007). The Diagnostic and Predictive Validity of The Renfrew Bus Story. *Language, Speech, & Hearing Services in Schools*, *38*, 390 – 399. (PMID: 17890518)
5. Greenslade, K.J., Plante, E., & Vance, R. (2009). The Diagnostic Accuracy and Construct Validity of the Structured Photographic Expressive Language Test – Preschool: Second Edition (SPELT-P2) *Language, Speech, and Hearing Services in Schools, 40,* 150-160. **(**PMC2720527**)**

Additional recent publications of importance to the field (in chronological order)

6. Plante, E., Gómez, R., & Gerken, L.A. (2002). Sensitivity to word order cues by normal and language/learning disabled adults. *Journal of Communication Disorders, 35,* 453-462.
7. Alt, M., Plante, E., & Creusere, M., (2004). Semantic Features in Fast-Mapping: Performance of Preschoolers with Specific Language Impairment versus Preschoolers with Normal Language. *Journal of Speech-Language-Hearing Research, 47,* 714-20. (PMID: 15157140)
8. Grunow, H., Spaulding, T.J., Gómez, R.L., & Plante, E. (2006). The Effects of Variation on Learning Word Order Rules by Adults with and without Language-based Learning Disabilities. *Journal of Communication Disorders, 39,* 158-170. (PMID: 16376369)
9. Richardson, J., Harris, L., Plante, E., & Gerken, L.A. (2006). Subcategory Learning in Normal and Language Learning-Disabled Adults: How much information do they need? *Journal of Speech, Language, & Hearing Research, 49,* 1257-1266. (PMID: 17197494)
10. Plante, E., Ramage, A., Maglöire, J. (2006). Processing Narratives for Verbatim and Gist Information by Adults with Language Learning Disabilities: A Functional Neuroimaging Study. *Learning Disabilities Research and Practice, 21*, 61-76.
11. Spaulding, T.J., Plante, E., & Vance, R.B. (2008). Sustained selective attention skills of preschool children with specific language impairment: Evidence for separate attentional capacities. *Journal of Speech, Language, & Hearing Research, 51,* 16-34. (PMID: 18230853)
12. Isaki, E., Spaulding, T.J., & Plante, E. (2008). Contributions of verbal and memory demands to verbal memory performance in language-learning disabilities. *Journal of Communication Disorders, 41,* 512-530.(PMID: 18482731)
13. Plante, E., Bahl, M., & Gerken, LA. (2010). Children with specific language impairment show rapid, implicit learning of stress assignment rules. *Journal of Communication Disorders, 43,* 397-406. (PMC2922431)
14. Plante, E., Bahl, M., Vance, R., & Gerken, LA. (2011). Beyond Phonotactic frequency: Presentation Frequency Effects on Word Productions in Specific Language Impairment. *Journal of Communication Disorders, 44,*91-102. (PMC3010444)
15. Torkildsen, J.V-K., Dailey, N., Aguilar, J., Gómez, R. (in press). Exemplar variability facilitates rapid learning of an otherwise unlearnable grammar. *Journal of Speech, Language, & Hearing Research. (PMC in process)*

Principal Investigator/Program Director (Last, First, Middle): Plante, Elena

D. Relevant Research Support.

R01 DC04726 Plante, E. (PI) 4/1/02-12/31/12.
Receptive skills in developmental language disorder. The project explored factors that facilitated or inhibited learning by adults with language learning disability and children and adults with SLI. Several studies produced under this grant serve as preliminary studies for the proposed work.

R01DC004726-S1 Plante, E. (PI)
ARRA supplement to *Receptive skills in developmental language Disorder.* This supplement supported studies designed to translate factors associated with rapid learning to a therapy context. In addition, several therapy delivery models (daily vs. every other day, sequential goal attack, cycled goal attack, field-based and clinic-based.) were piloted to determine feasibility.

R01 HD42170-05 Gerken, LA. (PI), R. Gómez 5/1/04-4/30/10
Learning Mechanisms in Language Acquisition. The project explores factors that facilitate and inhibit learning in normal and impaired learners. This grant included studies of infants and of adults with language-based learning disabilities.

These are grants for which you were a PI or co-investigator. They are not grants that provided you funding as student or post-doc.

PHS 398/2590 (Rev. 09/04) Page ___ **Biographical Sketch Format Page**

Biosketch continued

- Add consultants
  - When you are new to an area
  - Make sure their biosketches warrant their role
- Do Not Pad
  - Follow the instructions
  - Leave relevant "submitted" manuscripts for the preliminary studies section
- F31/F32 biosketches have different rules for what to include

5. Resources

- Gives the impression that most necessary resources are already available
  - space
  - major equipment
  - some or all minor equipment
- Think about ‘soft’ resources
  - Core facilities
  - Statistical consulting
- Leave off resources that are not relevant

Facilities & Other Resources

Laboratory:

The Plante laboratory is located in the Speech & Hearing Sciences building on the main campus. It includes a large workroom (12'x15'), three offices, and two rooms dedicated to behavioral testing. Images are acquired on a 3 Tesla GE magnet with an 8 channel head coil that is sited at the University medical center. It is available for research half time during the work week and full time on weekends. The MRI suite also includes a separate room for consenting subjects, and completing pre-scan behavioral training.

Animal: N/A

Computer:

Within the Plante laboratory: (6) Desktop PCs to be used for stimulus development, stimulus presentation, database functions, and word processing. A Macintosh server and four MacG5s support image analysis. Image data is stored on a RAID array connected to the server. One terabyte offsite backups are used as well. Some funds are budgeted for equipment refresh of hardware needed for image analysis and storage over the lifetime of this grant.

All computers have ethernet connections and CD writers for archiving stimuli, programs, and data. Computers include a variety of resident and removable storage media (e.g., CD burners, flash drives, removable hard drives). Three inkjet and two laser jet printers are available.

Software available include programs for audio recording and editing (SoundForge, Wave, CoolEdit), experimental software (EPrime, Direct RT), statistical analysis (SPSS, SAS, Statistica, Winsteps). Software used for MRI analysis includes AFNI, and FSL. In addition, the lab has Matlab and IDL licenses for developing custom applications. Microsoft Office supports word processing, data management, and presentations.

Office:

The Plante laboratory includes individual office space for the Plante (PI), Patterson, and Vance, and a group office for doctoral-level research assistants. These are all on the same floor of the Speech & Hearing building. Drs. Gerken and Gómez have offices in a separate building that is a 5 minute walk away.

Clinical:

The lab owns over 20 current norm-referenced clinical tests including those specified in this proposal.

Other:

Statistical support and specialized computer and media support are available through the Campus Computer Instructional Technology Center.

Specific Aims

- States the goals of the grant
  - Aims are not necessarily hypotheses
  - One Aim may cover multiple studies
  - Reviewers hold to the Aims
    - Show how background relates to aims
    - Link each study to an aim
    - Bold these points in the text
  - Aims should be short and skim-able

The Distinction

- **Aims:** What the goals of the grant are.
- **Hypotheses:** How we think things will come out.

Aim vs. Hypothesis

Aim 1: To determine how segmental timing in dysarthria and neurologically normal speech differ in terms of systematic and random variability, and in the effects (weights) of individual, systematic factor parameters.

Hypothesis: Segmental timing models for dysarthria will be characterized by greater random variability compared with models for normal controls.

Integrated Aim-Hypothesis

Specific Aim 1 is to measure the extent and time course of adaptation to frequency-to-electrode tables in postlingually hearing impaired cochlear implant users.

Specific Aim 2 is to test the hypothesis that incomplete adaptation to a frequency table (measured with each one of the four methods listed above) is more likely in cases of large cochleas, shallow electrode insertion, low verbal learning skills, low levels of working memory and may be affected by the presence of usable residual hearing.

Specific Aims

- The Aims
  - Aims are not necessarily hypotheses
  - One Aim may cover multiple studies
  - Reviewers hold to the Aims
    - Show how background relates to aims
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    - Bold these points in the text
  - Aims should be short and skim-able

The **specific aims** are:

1. To determine the sensitivity to cues for decoding language structure by individuals with poor language skills. This will be tested in **Studies 1-4**

2. To determine whether impaired learners rely on memory rather than cues to language structure as a basis for learning. This will be tested in **Studies 1, 3, & 5.**

Specific Aims

- The Aims
  - Aims are not necessarily hypotheses
  - One Aim may cover multiple studies
  - Reviewers hold to the Aims
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    - Link each study to an aim
    - Bold these points in the text
  - Aims should be short and skim-able

Approach Section:

Study 4. The Influence of Acoustic Salience on Word Learning

The purpose of this experiment is to determine whether acoustic salience influences children's ability to learn novel lexical labels. Levels of acoustic salience will be contrasted through the use of voiced/voiceless cognates. This is relevant to **Specific Aim 2**.

Specific Aims

- The Aims
  - Aims are not hypotheses
  - One aim may cover multiple studies
  - Reviewers hold to the Aims
    - Show how background relates to aims
    - Link each study to an aim
    - Bold these points in the text
  - Aims should be short and skim-able

Specific Aims

- Typically has several components
  - Lead-in that orients reader to
    - The problem addressed
    - The theory or model the work relates to
    - The general methods
    - The importance
  - Actual aims
  - General hypotheses

(1) Specific Aims

Although the relationship between phonological awareness and early reading is well documented, language skills that facilitate the emergence of phonological awareness are not well understood. Two theories present opposing views of the emergence of this skill. The *phonological deficit hypothesis* focuses on the influence of phonological (sound) processing as a precursor to phonological awareness. In contrast, the *lexical restructuring model* posits a link between lexical (word) processing and the emergence of phonological awareness. This study will investigate both of these claims by examining phonological and lexical processing in children differing in phonological awareness. A word-learning paradigm will be used so that phonological and lexical processing of the same stimuli can be compared. The specific aims of the proposed research project address the following questions:

1. Do children differing in phonological awareness show differences in the **phonological processing** of nonwords prior to word learning?
2. Do children differing in phonological awareness differ in **lexical processing** during word learning?
3. D children differing in phonological awareness exhibit different **lexical representations** of newly learned words?

Need

Theory (key terms italicized)

Approach

Methodologic-al innovation

Aims
Note bolding of key terms from theory

T. Hogan

Specific Aims

- Most common mistakes
  - Aims are “a wall of words”
  - Aims are too long
  - Aims are too long (really, they are)
  - Aims don’t tie together theory, importance, with goals
  - Aims and hypotheses are confused
  - Aims are not formatted for skim-ability

7. Research Strategy

- Components
  - Significance
  - Innovation
  - Approach

Significance/Innovation

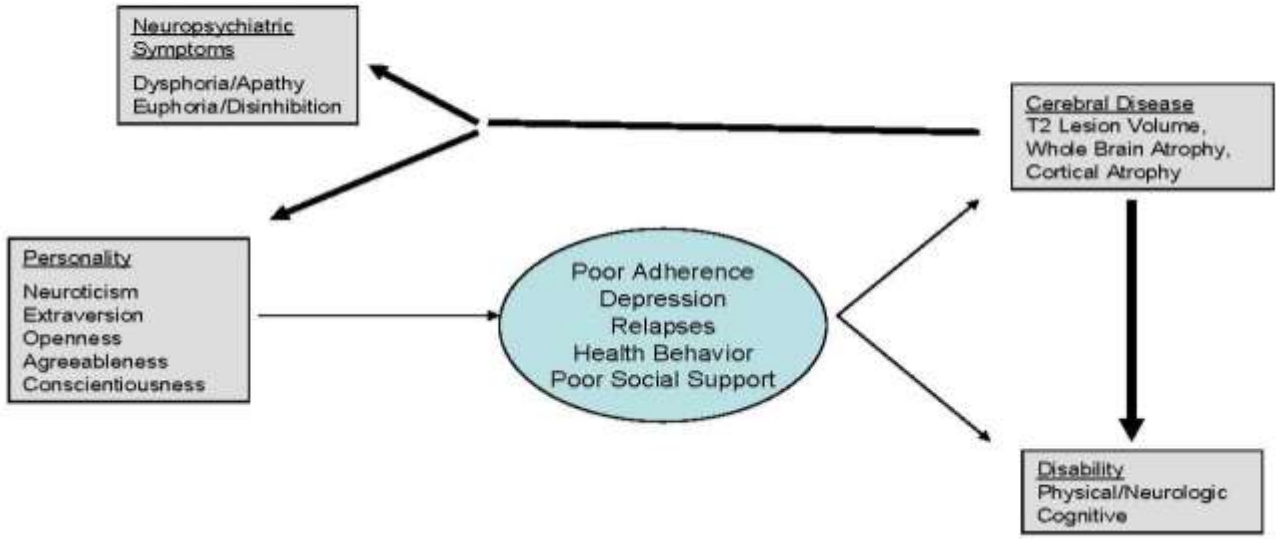
- Couches work within a broader theoretical framework or model (figure opportunity)
- Emphasizes why the work is important
- Tightly written to aims/studies rather than exhaustive

Theory:

The central problem of learning a language is generalizing beyond the input to which we are exposed to the appropriate level of abstraction. **Triggering accounts** posits that the language is not learned but that input simply serves to activate the specific grammar to be used (Chomsky, 1981). In contrast to this position, **non-triggering accounts** indicate that principles of language organization are learned from limited input in ways that permit generalization.

A Model:

Figure 1



Significance/Innovation

- Couches work within a broader theoretical framework or model (figure opportunity)
- Emphasizes why the work is important
  - Identifies the critical gaps in the literature
  - Shows why the work is interesting
  - Shows why the findings will be important
  - Gives a sense that the work is needed now
- Tightly written to aims/studies rather than exhaustive

Interest/Importance Statements

The proposed experiments will investigate basic aspects of adaptation to different frequency tables after cochlear implantation in postlingually hearing impaired listeners. These experiments will also have an important translational aspect, as they will try to predict (based on anatomical, cognitive, and psychophysical measures) which listeners may have most difficulty adapting to frequency mismatch. Even more importantly from a translational perspective, we will investigate a possible way to mitigate the effect of such frequency mismatch. In so doing, the present studies will provide important basic knowledge about perceptual learning as well as useful and specific guidance to the clinicians who are in charge of fitting cochlear implantss.

What will the project do?

Why the work is needed: I

Why the work is needed: II

Summary of Importance

Significance/Innovation

- Couches work within a broader theoretical framework or model (figure opportunity)
- Emphasizes why the work is important
  - Identifies the critical gaps in the literature
  - Shows why the work is interesting
  - Shows why the findings will be important
  - Gives a sense that the work is needed now
- Tightly written to aims/studies rather than exhaustive

Tightly written to studies

- Strategies
  - Develop a laser-sharp focus on your problem
    - Put the problem to be solved up front
    - An exhaustive literature review is unnecessary
    - Key references for your project are necessary
  - Divide literature review
    - Show where important gap is under **Significance**
    - Show what your work will add under **Innovation**
  - Consider figures that capture the essence of the issue being addressed
  - Consider charts that summarize where we are as a field.

The first 20 years of research on learners from birth to about 12 months documented the role of experience on language learners developing their native language(s). Much of what we learned from this 'first wave' of research concerned what infants could do when, outlined in A1-7.

A.1 Infants 4 months and younger discriminate speech categorically (Eimas, Siqueland, Jusczyk, & Vigorrito, 1971).

A.2 Infants can discriminate speech sounds that occur in languages other than their own, but lose this ability for many (but not all) speech sounds over the first year of life (Best, McRoberts, & Sithole, 1988; Polka & Werker, 1994; Werker & Tees, 1984).

A.3 Infants at birth discriminate their mother's voice, her language, and specific language passages that their mother produced in the third trimester (DeCasper & Fifer, 1980; DeCasper & Spence, 1986; Mehler et al., 1988).

A.4 Infants recognize the typical stress pattern of their native language at 9 months, but not at 6 months (Jusczyk, Cutler, & Redanz, 1993).

A.5 Infants at 9 months but not at 6 months discriminate frequent from infrequent phonotactic sequences (Jusczyk, Luce, & Charles-Luce, 1994).

A.6 7.5-month-olds cannot recognize a newly familiarized word if it is spoken in a different voice, while 10.5-month-olds can (Houston & Jusczyk, 2000).

A.7 Infants fail to show their earlier demonstrated ability to discriminate speech sounds when the sounds are paired with a referent (Stager & Werker, 1997).

From this work**,** a new theory emerged, referred to here as the **"Learning Mechanisms Theory".** However, the work to date has failed to… **[statement of what the important next step is]**

Chart for relevant studies

Modality	Learning Task	General Method	ROI Increases	ROI Decreases
Auditory	Phonological contrast discrimination in Hindi (Golestani et al. 2004)[32]	Learned outside the scanner Pre- and post-training scans	anterior insula	temporal-parietal junction
Auditory-Visual	Word-picture pair learning (Raboyeau et al. in press)[96]	Learned outside the scanner Tested outcome at 2 time points	L premotor R SMA Cerebellum Pons	anterior insula Cingulate IFG, DPFC premotor
Auditory	Finite state artificial grammars (McNealy et al. 2006)[69]	Learned in the scanner (one scan) Tested offline		DPFC, STG, SMG
Auditory	Finite state artificial grammar (Newman-Norland et al. 2006)[78]	Learned outside the scanner Tested learning outcome in scanner at 4 time points (over 6 weeks)	IFG, STG	premotor cortex putamen
Visual	Finite state artificial grammar (Fletcher et al. 1999)[24]	Correct/incorrect judgment of item strings with feedback to promote learning (2 scans, single session)	DPFC R Cerebellum	

Use Quick Synopses

Several consistent patterns have emerged from the studies to date that will provide the basis of all treatment paradigms. They include:

- **Principle 1**: Children need to formulate a mental representation of the target.
- **Principle 2**: Variation in all non-target parameters makes the target salient.
- **Principle 3**: Children need high density target representation to learn.
- **Principle 4**: Input alone can affect the child's speech output.

Approach

- Not the place to gloss over important details
- Show innovation and justify it!
- Justify methodological decisions from the literature
- Write to counter possible objections or mistaken assumptions

Orient the reader

The purpose of this experiment is to equate intelligibility across the words and across the phrases. This will be achieved by measuring percent correct speech recognition for each word and phrase and comparing this score to the overall mean for the words combined and phrases. It is hypothesized that percent correct scores among the words and among the phrases will not differ by more than 10% after the fourth equalization step. This study addresses **Specific Aim 1.**

Give the reader a template

Table 6 Experimental Design

Group 1	Exposure	Phrase structure A + prosodic cues Phrase structure B (no prosody)
	Test	Generalization items that contrast phrase structure and prosody
Group 2	Exposure	Phrase structure A (no prosody) Phrase structure B + prosodic cues
	Test	Generalization items that contrast phrase structure and prosody

During the experiment, half of the subjects will hear Phrase Structure A sentences presented with prosodic cues to sentence structure and Phrase Structure B sentences presented without these cues (see **Table 6**). The other half heard the…

Make details accessible

The experiment will be conducted over two days. On Day 1, the paradigm will be designed to replicate and extend the results of the earlier studies of Russian subcategory learning. Subjects will hear words paired with single-marked and double-marked inflections, each set of which is attached to three root word exemplars (see **Table 7 Subcategories A & B**). The use of both single- and double-marked forms will allow us to determine whether the advantage of multiple morpho-phonological cues found in Richardson et al., (in press) replicates in a second sample of adults with LLD and extends this to children with SLI.

Table 7. Stimuli for study 3

Subcategory A words + inflections		
3 root words	+oi	+u
3 root words+ka	+oi	+u
Subcategory B words + inflections		
3 root words	+ya	+yem
3 root words+tel	+ya	+yem
Subcategory C words + inflections		
15 root words	+ad	+ev
15 root words +ul	+ad	+ev
Subcategory D words + inflections		
15 root words	+ra	+tae
15 root words +di	+ra	+tae

We will also look at generalization of the subcategory markers. For the inflections listed in **Table 7**, it is always the case that root words that take one inflection of a pair (e.g., +oj) will always be able to take the other (+u) as well. During an exposure period, subjects will hear 2 of the root words paired with both of its legal inflections (4 inflected exemplars). The third root will only be heard with one of its two possible inflections, permitting a test of the generalization of the inflection pattern to the untrained pairing (i.e., given radya, and radyem, then if pelya, then pelyem is correct; pelyem never having been heard during exposure). Each of the root+inflection pairings heard during exposure (20 items) and each of the generalization items (4

Approach

- Space savers
  - Summarize common elements separate from specific studies
    - subject selection methods
    - data acquisition
    - common design elements
    - statistical approach

Approach

APPROACH

All of the infant studies in this proposal employ the same design, as do all of the adult studies. In interest of avoiding redundancy over the descriptions of the studies, we will describe in detail here the designs used in the populations.

Infant studies will each have two groups of infants ... Adult studies will each include adults with and without language impairment...

Approach

- Timelines can be helpful
  - establishes investigator is realistic about the work
  - reassures reviewer that there is a logical plan

	Biochemical Studies	**MRI Study**
Year 1	Recruit Subjects Confirm behavioral status through standardized testing Project-specific training of research specialist (to assure accuracy of biochemical analysis) Start biochemical analysis	Select appropriate subjects for MRI study
Year 2	Continue with the biochemical & behavioral analysis Begin preliminary statistical analysis (to confirm power) Begin manuscript preparation	Begin MRI data collection Begin analysis of MR images
Year 3	Complete biochemical analysis Complete detailed statistical analysis Submit manuscript Prepare R01 submission to continue work	Finish MRI data collection Finish analysis of MR images Complete statistical analysis Prepare manuscript and submit

Example of Timeline

Anticipated Timeline

- Months 1-6: Recruit speaker participants and collect data; perform acoustic segmentation (Aim 1)
- Months 6-12: Finish segmentation; quantitative modeling; manuscript submission (Aim 1)
- Months 13-18: Magnitude estimates of intelligibility and naturalness (Aim 2); manuscript submission
- Months 18-24: Prepare synthetically-altered stimuli for perceptual study (Aim 3); manuscript and R01 submission.

Approach

- Recommendations (Ogden & Goldberg, 2002)
  - Do not assume reviewers are familiar with your methods
  - Use tabular data to summarize design
  - Use flowcharts to summarize procedures
  - Anticipate problems and present potential alternatives

Potential Challenges and Alternatives

The adaptive, speech recognition in noise test may be difficult for the younger children in terms of the task and attention. Children will be give frequent breaks and snacks between conditions to help with attention and focus. If necessary, the children may need to be scheduled for two testing sessions. If children are only able to complete one or some of the conditions in the study, their data will be included in the analysis. If children cannot participate in any conditions because of inattention or frustration they will be dismissed from participating in the study with no consequence.

Potential problem #1

Solutions

Potential problem #2

Solution

Approach

- Statistics
  - Provide a power analysis for each study
  - Link the analyses to the hypotheses
  - Provide alternative approaches to proposed approach

8. Preliminary Studies

- Can be its own section
- Can be integrated into other sections
- Answers the following:
  - How do reviewers know you can do the proposed work?
  - How do reviewers know the proposed methods are likely to be successful?

8. Preliminary Studies

- Preliminary studies vs. pilot data vs. feasibility data
- Preliminary studies are directly relevant to proposed studies
- Pilot data are clean, robust, and convincing
- Tables, Graphs, & Images are appreciated
- Can be placed anywhere in the grant

McGurk (Auditory-Visual Integration)

Studies designed to examine the McGurk effect in language disorders are based on studies by Drs. Boliek and Norrix[8,19,20]. We have adjusted the response requirements to be more appropriate for younger children by training all possible responses, prior to the experimental trials. We also tested these associations in an auditory-only condition to be sure the associations were learned. Table 1 presents performance by normal and SLI children ages 4-5 years during pilot work.

	Auditory-Only Presentation				Auditory-Visual Presentation		
	/bi/	/di/	/ði/	/gi/	/bi/	fusion	/gi/
SLI	3 (0)	2.5 (0.5)	2.3 (0.5)	2.8 (0.4)	11.8 (0.4)	1.7 (1.0)	11.5 (0.5)
NL	2.7 (0.8)	2.0 (0.9)	1.7 (1.0)	3.0 (0)	11.8 (0.4)	6.5 (3.8)	11.3 (1.2)

Preliminary Studies

Pilot data

Summary of Preliminary Studies

The data thus far present a paradox. Performance on the auditory enhancement tasks suggests no difference between those with reduced speech recognition in noise (RSRN) and those with normal speech recognition in noise. Yet, when the masker duration was increased, the groups did not show similar results. The data suggest the need for further study with more subjects to verify, and more completely describe the differences in adaptation of suppression in listeners with RSRN relative to a control group.

Identifies the problem

What is needed next to address the problem

Preliminary Studies

- Recommendations (Ogden & Goldberg, 2002)
  - Be planning the preliminary studies section for the next grant as you are doing current studies
  - Write after writing the Approach
  - Provide examples that show technical expertise

Figure 4. Structural Equation Model for a Story Listening Task (from Karunanayaka et al., 2007). *Each block is a region of significant activation detected through the ICA analysis. Lines and arrows indicate connectivity between regions of interest. Path coefficient are calculated for each line. The magnitude of the activation within regions and the path coefficients can be tested for change with time, change with performance accuracy and differences between groups.*

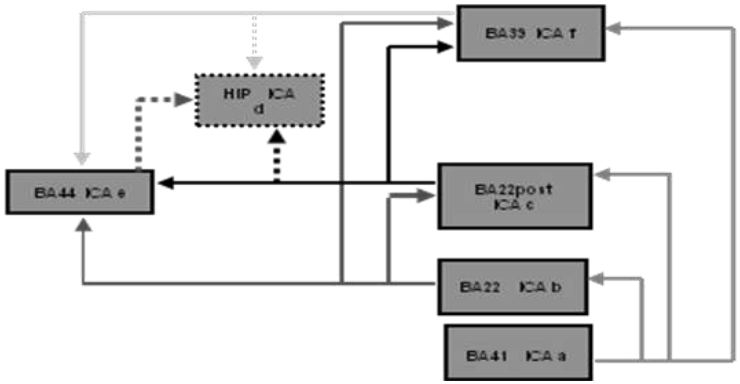
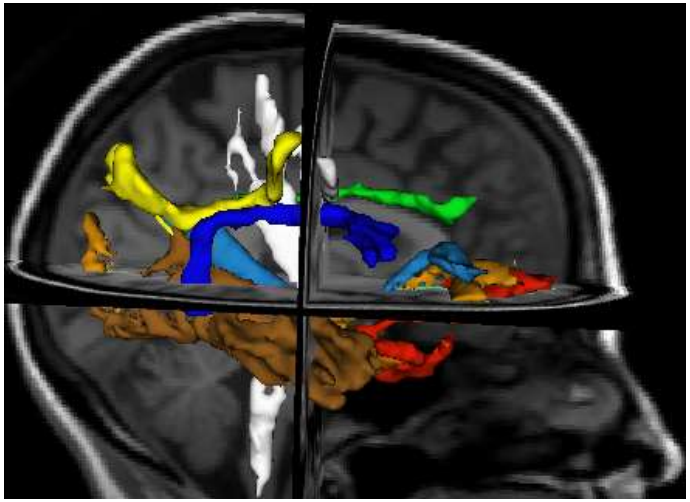


Figure 6. White matter tracts. *White matter tracts in a young adult subject. Blue: Arcuate Fasciculus, Light Blue: External Capsule, Yellow: Superior Longitudinal Fasciculus, Green: Cingulate, Brown: Inferior & Middle Longitudinal Fasciculus; Light Brown: Inferior Occipital Fasciculus, Red: Uncinate Fasciculus, White: Corona Radiata to Cortical Spinal Tract. Note that Callosal fibers are also typically segmented, but are not shown here for image clarity.*



Preliminary Studies

- Recommendations (Ogden & Goldberg, 2002)
  - Make points visually obvious with charts/graphs

Previous Study	Finding	Question for proposed studies
Studies addressing Specific Aim 1 of the current proposal		
1a	15-month-olds can use frequent frames for category induction (Gómez, 2002; Gómez & Maye, 2005).	
1b	Adults can make more complex generalizations after exposure to simpler forms (Lany, Gómez, & Gerken,2007)	Do adults with language/learning impairment show the same effect?
1c	12-month-olds can make more complex generalizations after exposure to simpler forms (Lany and Gómez, in press).	
1d	The effects of the reliability of prior exposure on later category induction are non-linear. (Lany, Gómez, & Gerken, 2007; Lany & Gómez, in preparation)	Are the non-linear effects seen in normal adults also found in infants of different ages and in adults with language/learning impairment?
1e	Adults can benefit from prior exposure to a language-like system whose surface similarities are very different but the category structure of which is the same (Lany and Gómez, in press).	
1f	Adults fail to generalize based on underlying lexical stress principles that are easily learned by 9-month-olds. (Gerken and Bollt, 2008)	Can different types of cue highlighting and test structure reveal more abstract generalization in adults (see Study 3b)?

Preliminary Studies

- Recommendations (Ogden & Goldberg, 2002)
  - Establish history of prior collaboration for interdisciplinary efforts

Preliminary Studies

This grant proposal rests on the combined expertise of two investigators, each of whom have established records of research in their respective fields…In order to establish a collaboration between the investigators, and to explore the feasibility of the proposed work, we have collected pilot data on a total of ten subjects.

8. Additional Resources

- Make use of the program liaisons
- New investigator resources
  http://grants1.nih.gov/grants/new_investigators/index.html
- Proposal writing short course
  http://fdncenter.org/learn/shortcourse/prop1.html
- NIH tip page http://grants1.nih.gov/grants/grant_tips.htm
- Video on new grant format
  http://enhancing-peer-review.nih.gov/application_changes_video.html
- Review process http://grants1.nih.gov/grants/peer/peer.htm
- Goldberg, I.A. & Ogden, T.E. (2002). *Research Proposals: A Guide to Success. 3rd Edition*. San Diego: Academic Press
- Gerin, G., Kinkade, C.H., Itinger, J., & Spruill, T (2011). Writing the NIH Grant Proposal: A Step-by-Step Guide. Thousand Oaks, CA: Sage Publications.
- Yang, O. (2012). Guide to Effective Grant Writing: How to Write a Successful NIH Grant Application 2nd Edition. NY: Springer.

Words of Advice From a Seasoned Investigator

- "The only reason to write a grant is to get the money to do the research. Sending in less than your very best is a waste of your time and everyone else's."

  David B. Pisoni, Ph.D.

  Chancellor's Professor of Psychological and Brain Sciences

  Indiana University, Bloomington