

PROGRAM CONTACT: **SUMMARY** *Release Date:* **10/31/2012**
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Application Number: **1 R21 HD076112-01**

Principal Investigators (Listed Alphabetically):

ALLEN, JONT BRANDON PHD

JOHNSON, CYNTHIA (Contact)

Applicant Organization: **UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN**

Review Group: **LCOM**

Language and Communication Study Section

Meeting Date: **10/15/2012**

RFA/PA: **PA11-261**

Council: **JAN 2013**

PCC: **CDB -BM**

Requested Start:

04/01/2013

Project Title:

Aural Confusions of Consonants and Vowels in Children with Reading Disabilities

SRG Action:

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Next Steps:

Visit http://grants.nih.gov/grants/next_steps.htm

Human Subjects:

30-Human subjects involved - Certified, no SRG concerns

Animal Subjects:

10-No live vertebrate animals involved for competing appl.

Project

Direct Costs

Year

Requested

1

125,000

2

150,000

TOTAL

275,000

++NOTE TO APPLICANT: Members of the Scientific Review Group (SRG) were asked to identify those applications with the highest scientific merit, generally the top half. Written comments, criterion scores, and preliminary impact scores were submitted by the assigned reviewers prior to the SRG meeting. At the meeting, the more meritorious applications were discussed and given final impact scores; by concurrence of the full SRG, the remaining applications, including this application, were not discussed or scored. The reviewers' comments (largely unedited by NIH staff) and criterion scores for this application are provided below. Because applications deemed by the SRG to have the highest scientific merit generally are considered for funding first, it is highly unlikely that an application with an ND recommendation will be funded. Each applicant should read the written critiques carefully and, if there are questions about the review or future options for the project, discuss them with the Program Contact listed above.

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1R21HD076112-01 Johnson, Cynthia

DESCRIPTION (provided by applicant)

For not discussed applications, descriptions may not be included.

CRITIQUE 1:

Significance: 7

Investigator(s): 3

Innovation: 8

Approach: 7

Environment: 3

Overall Impact: The Principal Investigators propose to test whether reading disabled 8-12 year old children experience difficulties with poor auditory perception of speech sounds, rather than phonological awareness per se. They propose to test whether auditory deficits for speech sounds and short term auditory memory problems are important components of reading disability. Although issues surrounding reading disabilities are significant in general, the impact of this research is diminished due to a lack of innovation in the theoretical ideas that are proposed, and the fact that this approach has been taken in quite a bit of previous research. There also appear to be issues with the approach itself, and the manner in which the studies line up with the main hypothesis.

1. Significance:

Strengths

Understanding the mechanisms underlying poor performance in reading disabled children is an important area of study in general.

It is important to understand the reasons why phonological awareness is a strong predictor of reading performance.

Weaknesses

The significance of the proposed research is undercut by the fact that the hypotheses have been described and tested in previous research in much the same way as is proposed here.

[See weaknesses in innovation.]

The main goal of the proposed research is stated as investigating abilities that are less central and less linguistic than phonological awareness. However, all of the tasks are quite linguistic in nature in that they focus on perception of spoken syllables, or matching spoken and written syllables, and they appear to be quite central to reading.

[The reviewer says this task is quite central to reading: This appears to be positive, not a weakness. The reviewer says the tasks are quite linguistic in nature: We feel that our task is phonetic not linguistic. In our experiments, we intended to bridge the continuum from phonetic to linguistic, by design.]

2. Investigator(s):

Strengths

Principal Investigator Johnson has a great deal of experience with language disorders research. She has published a number of articles on various aspects of children with language disorders.

Principal Investigator Allen is an expert in acoustics and speech perception, and is highly prolific.

The two Principal Investigators have collaborated and are capable of conducting the proposed research.

Weaknesses

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No major weaknesses noted.

3. Innovation:

Strengths

The use of real speech from professionally-recorded talkers is an innovative aspect of this application.

Weaknesses

The application generally lacks in innovation and novelty. In terms of R21 criteria, the proposed research does not appear to break new ground or to be exploratory in nature.

[We not aware of anyone in the past who has studied phonetic detail in the deficits of developing speech perception in later-elementary school children with RD. We feel that the development of phonetic awareness measured at the utterance level (i.e., individual CV and VCs) is novel.]

The ideas put forth in the application have been discussed in quite a bit of previous research. The tasks have also been used by a number of researchers. For example, Cornelissen, Hansen, Bradley, and Stein (1996, Cognition) measured confusions in dyslexics and controls on the basis of the same underlying logic. Others such as Brady have used these (e.g., repetition of syllables) and similar tasks with reading disabled children to address the same hypotheses.

[The only study mentioned by the reviewer is with adults with dyslexia. Our study examines children. The Cornelissen's study is only with 9 consonants with only 1 vowel, whereas our study examines open set CVs and VCs with multiple speakers. The Brady study mentioned by the reviewer is with children, but it does not examine all English speech sounds (it is closed set), with only 1 speaker.]

4. Approach:

Strengths

The studies as a set are capable of providing interesting information regarding the perception of speech sounds.

Weaknesses

It seems somewhat odd to state that consonant or vowel perception is being uniquely studied when CVs or VC are the stimuli. For example, when presented with "da da fa" and a subject selects the second "da" as the oddball, that could be due to poor perception of the consonant in "fa", or confusion caused by hearing 3 different CVs due to misperception of the vowel in one of the two "da"s. It is unclear how these possibilities would be disentangled.

[The control subjects very seldom made any errors, therefore, they were able to make these judgments based on the targeted sound change (i.e., the consonant) and not based on any untargeted sound change (i.e., the vowel). On any one trial, the reviewer could be right, that the child misperceived the vowel, however, none of the RD children performed this task anywhere close to chance (i.e., 33% correct) and all had some consonants on which they were highly accurate (with the same set of speakers). Therefore, even the RD children showed that they could often detect the targeted phonetic difference. If this were an issue, we would have seen it in the NSCM task, where the children simply imitated the syllables.]

The most convincing argument, however, is that with “da da fa” if the child chooses the second da (by Speaker 2), and misperceived the vowel as a schwa, he still failed to perceive the d-f difference. Therefore, he has made a consonant error, even if he has also made a vowel error.]

Other tasks (NSCM) mix perception and production, so that it may be difficult to disentangle the two in these studies.

[The point was to use two different tasks with very different characteristics. The SCO is purely perceptual, whereas the NSCM entails both perception and production.]

In addition, it is also unclear whether the auditory-visual integration task is solely about speech sound perception, given that the children have to read stimuli and match what they read to the sounds that they hear.

We need to add a sentence at the beginning that explains the big picture: that we will gradually add in elements beyond speech perception (including visual print elements) as we progress through the experiments, in order to approach the complex task of reading.

It is not entirely apparent whether CVCV patterns are actually sufficient to strain memory. At times, the Principal Investigators use the term “memory” which typically means longer term memory, and this is presumably not what they are talking about. Sometimes it sounds like working memory, although the short stimuli would not seem to be an issue for working memory. In general, this is somewhat unclear.

Clarify in the Introduction (rebuttal section) that we did mean working memory and use this term consistently throughout the document (get references from Pam Souza at Northwestern and Lynn Bielski’s dissertation. Also, Baddeley’s work.) Suggest that we can create longer stimuli, to tax working memory. Point out (stress) that we have data that reveal that even CVs and VCs are taxing. We should not explicitly say CVCV, but rather describe that we will extend duration so that we find the point where participants become confused. We can say, “such as” CVCVs.

The Principal Investigators focus on reading disability, rather than dyslexia or specific language impairment. Given an assumed mixture of children at The Reading Group, a clear plan for distinguishing among these populations should be included.

Add a sentence that our only criterion for inclusion in the reading disabilities group is that the child has trouble reading, based on referral by the Reading Group (because the child was currently receiving reading intervention) and our assessment battery of reading tests. If we find subgroups on our experimental tasks, we will see if those error patterns can be explained by the child’s reading profile.

The training component consists of telling a subject what they did wrong following an error. This does not appear to be particularly sophisticated or novel.

This is a really stupid comment! (JBA). We will come up with something more sophisticated later. This is a task that is dramatically higher in error than normal reading. So, it is a matter of the degree of error. We need to emphasize the degree of error among the RDs and near perfect performance of the controls. Say that the controls, with better speech perception, may be able to take advantage of simple feedback to improve their scores, whereas the RDs, with poorer speech perception, may not be able to benefit from even simple intervention, such as feedback about the accuracy of their response. The latter could be a hypothesis that we float.

There appears to be an issue regarding whether the experiments have sufficient power to detect effects. The studies include a total of only 39 reading disabled and 30 control subjects, and with

the current overall design, there will be only 13 reading disabled and 10 controls per experiment.

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The Principal Investigators should explain why they plan from the outset to test unequal numbers of reading disordered and control subjects.

5. Environment:

Strengths

The environment at the Beckman Institute provides all of the necessary facilities to conduct the proposed research.

Weaknesses

No letter of support from The Reading Group is included in the application.

Protections for Human Subjects:

Acceptable Risks and/or Adequate Protections

Risks to human subjects are minimal, and all consent and data protections are in place.

Data and Safety Monitoring Plan (Applicable for Clinical Trials Only):

Not Applicable (No Clinical Trials)

Inclusion of Women, Minorities and Children:

G1A - Both Genders, Acceptable

M1A - Minority and Non-minority, Acceptable

C2A - Only Children, Acceptable

Subjects will be equally split between genders, which are appropriate.

A substantial number of minority subjects are expected based on past experience, and this is acceptable.

Subjects will consist of children 8-12 years old. Given that the application deals specifically with the development of phonological abilities in children, this is scientifically acceptable.

Vertebrate Animals:

Not Applicable (No Vertebrate Animals)

Biohazards:

Not Applicable (No Biohazards)

Budget and Period of Support:

Recommend as Requested

CRITIQUE 2:

Significance: 3

Investigator(s): 3

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Innovation: 4

Approach: 6

Environment: 2

Overall Impact: This application focuses on measuring phonetic perception and plasticity in children 8-12 years old with and without RD. Given that the underlying processes of phonological awareness are still not well understood, understanding more about a potential role for phonetic perceptual deficits in RD is important. Ascertaining a more refined profile of phonetic perceptual errors, especially one that is individualized, is an interesting idea, and has the potential for more tailored intervention, should impaired phonetic perception prove to be a

driving factor in phonological awareness development. Weaknesses include a lack of clarity in terms of which aspects of and how the application adds to the current literature, as well as recruitment, definition of dyslexia, and questions about the relationship between the experiments and the regular intervention the children receive at the clinic.

1. Significance:

Strengths

Reading disability is debilitating and can result in life-long barriers to education and employment. Phonological awareness is known to be a cause of RD, and understanding the underlying processes that contribute to phonological awareness is therefore important. Phonetic perception/categorical discrimination in RD and dyslexia has long been an area of interest but findings are inconsistent, so understanding more about how deficits in this area contribute to phonological awareness could contribute important knowledge about our understanding of how to develop better interventions for RD.

Weaknesses

No major weaknesses noted.

2. Investigator(s):

Strengths

Together the investigative team of Allen and Johnson has the expertise and knowledge to carry out the proposed experiments.

Weaknesses

Although Dr. Allen brings great expertise to the application, and Dr. Johnson has clinical and research expertise for the proposed set of experiments, either the expertise in reading disabilities of the current investigative team needs to be made more explicit in the application, or a consultant with expertise in this area should be considered. These comments are particularly related to the issue of classification/definition of RD (see below).

3. Innovation:

Strengths

Ascertaining a more refined profile of phonetic perceptual errors, especially one that is individualized, is an interesting idea, and has the potential for more tailored intervention, should impaired phonetic perception prove to be a driving factor in phonological awareness development.

Weaknesses