

RESEARCH

Guide to Research with Dr. Sandage

Research Involvement Guide

DEPARTMENT OF SPEECH, LANGUAGE & HEARING SCIENCES

Voice Physiology Lab

Auburn University
1199 Haley Center
Lab 1129
Office 1108

Contact:
Email: sandamj@auburn.edu
Phone: (334) 844-9646

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What is Research?

“The common facts of today are the product of yesterday’s research.” –Duncan Macdonald

Research is the diligent systematic investigation that targets exploration of current information to examine posed questions, reach new conclusions and/or ask new questions. This detailed means of study supports new discoveries via formally gathering, analyzing, and reporting data findings.

Why is Research Important?

Research discoveries are important because they can contribute or decrease common public beliefs, further explain a phenomenon, or inspire future questions. Research often encourages solutions to problems, provides evidence/information, and/or explores a cause-and-effect situation.

Dr. Sandage’s Research Philosophy

“Scientists can be as dogmatic as anyone else – but their dogma is always wilting in the hot glare of new research. In science it’s not a sin to change your mind when the evidence demands it. For some people, the tribe is more important than the evidence; for the best scientists, the truth is more important than the tribe.” –Nationalgeographicmagazine.com, March 2015

Why are *you* interested in research?

Participation in research contributes to the development of knowledge. But, it is important to explore why you are interested in research. In other words, what are your motives for initiation of a project or experience in lab? Take some time to think about what you hope to learn about and set some goals/plans!

Important First Meetings

Meet your Team!

While this manual provides textual guidance in the start of your research endeavor, the richest support you will receive is from your professors, mentors, and colleagues. Your relationship with the researchers in the Voice and Speech Physiology Lab are important! Creating a positive, rich work environment that builds up all fellow colleagues is a priority!

Get to know the team: Take initiative and set up an appointment with Dr. Sandage. Following this appointment, it is likely necessary that you schedule a meeting with Dr.

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Sandage's current Graduate Research Assistant and Adelia Grabowsky, Library Scientist. Listed below are the descriptions of these individuals and their positions.

Research Professor: Dr. Sandage is a Professor and Dean's Distinguished Research Fellow with a Ph.D in Exercise Science (Auburn University), M.A. in Speech Language Pathology (the University of Iowa), and a B.A. in English and minor in Linguistics (Iowa State University). She teaches lectures to undergraduate and graduate students at Auburn University, treats patients in the Auburn University Speech and Hearing Clinic, and is heavily involved in research. Prior to scheduling a meeting with Dr. Sandage, it would be beneficial to learn about her research interests and experiences.



<https://cla.auburn.edu/directory/mary-sandage>

An initial “research interest” meeting is likely to consist of research topic brainstorming while getting to know each other. If continued appointments are made, always arrive prepared!

Graduate Research Assistant: Dr. Sandage's GRA is responsible for engagement, support, and investigative efforts in professional level research in the Voice Physiology Lab. This position rotates every three semesters. It is encouraged to email and schedule appointments with the GRA, as they are likely involved in coordinating multiple research endeavors. The GRA will likely guide you in the lab, provide research advice, and serve as a mentor in your project. The GRA could be involved in data collection and editing manuscripts.

Using University Resources

Auburn University provides exceptional resources aimed to support educational endeavors, including research!

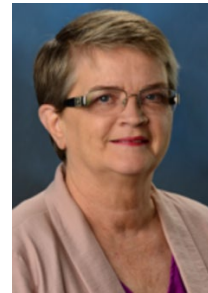
Listed and defined below are 4 University supported Resources that are beneficial and likely necessary to complete:

- **Librarian Services**

Adelia Grabowsky is Auburn University's Health Sciences Librarian. Her expertise are research journal investigation, citation instruction, and a detailed understating of multiple research search engines. An initial meeting with Adelia Grabowsky will likely consists of discussion of research topic, selection of key words to investigate, and introduction to Library Resources and research journal engines.

[Contact Adelia Grabowsky](#)

She provides valued guidance that will be useful in the research process. It is beneficial to continue to use her services throughout the writing process. Meeting with Adelia Grabowsky is encouraged throughout the entire project timeline.



- **Collaborative Institutional Training Initiative (CITI) Training**

CITI training consists of multiple modules that provide information and corresponding quizzes related to compliance and research ethics. The specific facets of your project will determined which modules are necessary for you to complete. To assure you complete all applicable modules, check with Dr. Sandage and/or the current GRA. Also, when creating an account to complete CITI training, be sure to register as an Auburn student so that the fees will be waived. [CITI Program Page](#).

- **EndNote Training**

EndNote is a software program that is free to students via association with Auburn University. This program stores and organizes citation information and aids in insertion of citations and creation of bibliographies. Auburn offers very informative training sessions about EndNote. [EndNote Auburn University Home Page](#)

- **Miller Writing Center**

Located on the second floor Learning Commons in RBD Library, the Miller Writing Center offers one-on-one consultations with undergraduate and graduate peer tutors to aid you in the writing process. This resource is available for an array of writing assignments, courses, and styles. When making an appointment, be sure to clarify that your writing goals are related to scientific research. [Miller Writing Center Information](#)

Lab Equipment Familiarity

After posing a research question and creating planned methods, learning the appropriate lab equipment will further prepare you for upcoming data collection (if your specified project calls for this). Coordinate with Dr. Sandage and/or her GRA about times that you can gain access to the Lab to gain familiarity to the technology that will eventually collect your data.

Data Collection Equipment in the Lab

Practice makes Perfect = Trial and Error

1. Vocal Distance Measure

Ambulatory Phonation Monitor Model 3200 (APM) measures vocal dose in meters, fundamental frequency, and phonation time.

2. Laryngeal Imaging

Endoscopy obtains the overall appearance and function of larynx to observe laryngeal tissue pliability and glottis closure patterns. Both the oral rigid endoscope and flexible laryngoscopic techniques can be coupled with videostroboscopic to visualize the oscillation of the vocal folds.

Oral Rigid Endoscope: placed into the back of the mouth to visualize vocal folds. This examination cannot assess palate function or tolerate swallowing.

Transnasal Flexible Laryngoscopy: passed through the nasal cavity to allow assessment of vocal fold function during complex vocal tasks. This can be completed during connected speech, song production, and swallowing.

3. Acoustics

PRAAT software can be used to take multiple data on a person's voice such as vocal range, perturbations (jitter/shimmer), maximum phonation time, diadochokinesis, and much more. This freeware application is widely used for

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capturing voice tasks that are used for objective acoustic measures for documentation and research purposes.

Nasometry is an acoustic measure that calculates a nasalance score (ratio of nasal energy/(oral + nasal energy)). This aids in identification of hypernasality and nasal emissions of specific phonemes.

4. Aerodynamics

Phonatory Aerodynamic System (PAS) by PENTAX Medical measures airflow, pressure, pitch, and intensity with the production of a syllable train, typically /pi/, through a pneumotachograph mask. This is typically used to assess vocal efficiency during speech production.

Spirometry is a common pulmonary function test that measures the amount of air inhaled, exhaled, or both through a mouthpiece. It can be helpful for assessing breathing patterns and diagnosing lung conditions such as asthma, pulmonary fibrosis, of COPD.

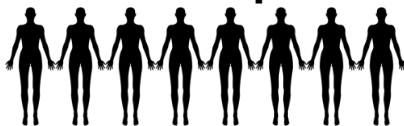
5. Upper Airway Temperature (UAT)

What is the best way to practice the equipment?

While reading the manual and visually observing the technology will be extremely helpful, actual trial and error of the entire procedures is crucial. First, read the directions of the equipment. Then, (if possible), observe another trained individual as they use the technology. After observing, practice the techniques on classmates and/or yourself. Running through the steps multiple times will allow you to make more mistakes when practicing in hopes that errors decrease in the future real data collection scenarios. [Auburn University IRB Home Page](#)

What to know about IRBs!

Human Participants Involved?



The Institutional Review Board (IRB) is a committee responsible for review process and the approval of projects that plan to conduct research involving human participants. When starting a project, you need to submit an IRB before collecting data on any human participants. This should happen early in your research process, after a project plan and aim are set, to allow time for revisions and approval.

Funding Guidance & Opportunities

- Auburn University offers an **Undergraduate Research Fellowship**, which provides an opportunity for undergraduate students to pose a research question, conduct an experiment, and collaborate with a faculty mentor. This program requires various submissions throughout the completion of the project at hand. Types of fellowships vary by timeline: year-long, two-semester, one-semester, and summer fellowships. All fellowship opportunities are offered upon acceptance based off of a detailed application. Funding is provided, specific to the type of fellowship offered.

[Undergraduate Research Fellowship Program](#)

- Each year, American Speech-Language-Hearing Association (ASHA) offers an array of scholarships. Grants, scholarships, and fellowships are often intended for professionals, PhD students, and/or graduate students. Some support may be provided for undergraduate researchers. Familiarity with any ASHA opportunities (proposals, grants, awards, scholarships) is advised!

[ASHA Award Programs for Students](#)

Manuscript Preparation

Writing a manuscript includes multiple revisions, typically over an extended amount of time. Prior to writing a manuscript, recall and use any previous articles you have read when determining a project aim. These will likely show strong examples of the format and flow of a manuscript. Also, it is advised to read published articles by Dr. Sandage to familiarize yourself with her writing *preferences and styles*.

[List of Publications \(Google Scholar\)](#)

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Below is a table that describes the general sections within a manuscript journal.

	What to include:
Introduction	<ul style="list-style-type: none">- Introduce topic- Address questions, nature of problem, and purpose.- State rationale, hypothesis, and purpose.- This needs to “make it (your subject) matter.”- Avoid wordiness.
Materials and Methods	<ul style="list-style-type: none">- Describe the study design.- Identify, define, and describe the measurement parameters.- Provide enough details so that the project could be replicated.
Results	<ul style="list-style-type: none">- Present data results.- Tables and Figures often incorporated here! Record results in the same manner they are presented in methods.- Do not include any interpretations of data (yet).
Discussion	<ul style="list-style-type: none">- Explore and explain meaning of results.- Strengths and limitations of this study- Future directions and suggests questions
Conclusion	<ul style="list-style-type: none">- Concise summary of findings and related assumptions.- Provide any last recommendations or comments.
References	<ul style="list-style-type: none">- List of resources used in the creation of your project.- Follow guidelines specific to the journal you plan to submit to.- Insert references into EndNote (or another software program).

Additional Resources for Manuscript Formatting

[APA format guidelines for Figures and Tables](#)

Poster Preparation

Many conferences host poster presentations during convention weekends. ASHA (National Convention) and Speech and Hearing Association of Alabama (State Convention) are two examples of organizations that host annual conferences with application poster presentation opportunities. A poster provides a visually pleasing image with key components of the project (listed below):

Abstract, Hypotheses, Data Results & Analyses, Discussion, Key Findings, References

Title

University Logo

Numbering & Bullets

References

Images

Awards

Tables & Figures: tables often provide detailed numerical data. Figures often reveal results in a visual manner. Both should have captions that explain the image in full, while remaining concise.

Contact Information & Disclosure: At the bottom of the poster, contact information

Vocal Dose for a Rhythm-Based Indoor Cycling Instructor: With and Without Amplification
 Lauren H. Allison & Mary J. Sandage, Ph.D., CCC-SLP
 Department of Communication Disorders, Auburn University

ABSTRACT

Fitness instructors are at high risk for occupational-based voice disorders.¹ This risk often leads to vocal trauma.² Voice habilitation and rehabilitation programs require an understanding of the voice demands for fitness instructors and evidence to support use of amplification. In a single participant design, vocal fold distance dose and upper airway temperature were quantified in a cycling instructor with and without amplification while conducting realistic cycling classes.

HYPOTHESES

- Vocal dose will be lower in the amplified voice versus the unamplified voice.
- Perceived phonatory effort (PPE) will be lower in the amplified condition.
- Upper airway temperature (UAT) will increase secondary to high intensity exercise despite having an increase secondary to high intensity exercise despite having an increase in respiratory rate.

KEY FINDINGS

- Vocal dose was similar in both conditions
- PPE was lower following the trial with the microphone.
- UAT was generally the same for both trials.

REFERENCES

1. DeGroot, K., & Brouwer, A. F. (2016). Vocal Performance of Group Fitness Instructors Before and After a Single Session of High-Intensity Interval Training. *Journal of Voice*, 30(1), 1-10.
2. The American Speech-Language-Hearing Association. (2016). *ASHA Practice Guide: Occupational Voice Disorders*. Retrieved from <https://www.asha.org/practice-portal/practice-guides/occupational-voice-disorders/>
3. Sandage, M. J. (2015). The conditions of group fitness instructors: prevalence of self-reported voice and hearing symptoms and the need for prevention education and training. *Journal of Voice*, 29(1), 1-10.
4. Day, T. E., Day, J. C., & Bandy, S. L. (2002). Vocal Dose Measures Quantify Acoustic Vocal Production. *Journal of Speech, Language, and Hearing Research*, 45(1), 91-102.

DATA ANALYSES

Data	MIC	No MIC
Vocal Dose	2,514 km	2,492 km
Phonation Time	15:45	19:06
Phonation %	25%	22%
FD Mode	253 Hz	253 Hz
FD Average	281.19 Hz	254.73 Hz
Cycles of Vibration	264747	290731
UAT Average	34.2° C	34.0° C
UAT Max	35.9° C	36.3° C
UAT Min	32.4° C	30.9° C
PPE	59%	73%

The dB SPL level remained consistent for both trials. Both trials exceeded the vocal dose safety standard of 1,500 km. (Tolan, Kaye & Peeples, 2003)

DISCUSSION

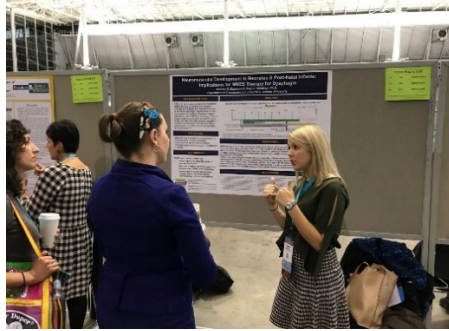
Findings do not strongly represent the hypothesis that amplification will cause a decrease in vocal dosage and aid in voice efforts. This could suggest that cycling instructors do not benefit from the provided amplification system, due to incorrect usage. Further, a follow-up study is currently being conducted to find additional vocal dosage of multiple male and female cycling instructors, which considers the norms: room temperature/humidity, amount of participants, and time of day. Following this additional research, vocal therapy options for cycling instructors will be investigated.

For Author Information Contact:
 Lauren H. Allison, Auburn University, laallison@auburn.edu
 Mary J. Sandage, Auburn University, sandage@auburn.edu
 Ms. Allison has no financial or non-financial disclosures to share.
 Dr. Sandage is employed by Auburn University and has no non-financial disclosures.

Rhythm Based Indoor Cycling Instructor conducting amplified trial while UAT and vocal dose are being measured.

Presentation Preparation

Poster Presentation



Also, some researchers present their poster digitally, often through a power point presentation. This would require coordination, approval, and provided technology from the convention.

Many conventions offer paper poster presentation opportunities to accepted abstracts, submitted by the researcher. At the convention poster presentations, the researcher can present their project to colleagues. Observers often pose questions to the researcher and partake in conversation. It is advised to be prepared to explain your project in about 2 minutes or less, allowing opportunity for organic conversation progression with potential observers.

How to print a poster

Auburn University offers printing services on the bottom floor of the library. When printing a poster, make sure to look up the specific measurements that are appropriate for your convention.

[Printing in the Innovation & Research Commons](#)

Oral Seminar Presentation

An oral presentation is seminar-like. Researchers present a prepared presentation, often using audiovisual equipment to a room of observers. At the conclusion of the oral presentation, the lecturer/researcher often allows for questions.



Looking Ahead: Thesis Talk

What is a Thesis? → A thesis is a research paper written by a candidate for a college degree that provides results of original research.

University Options → For many universities, there is an option to complete a thesis. The M.S. in Speech-Language Pathology program at Auburn University offers a thesis track and non thesis track. The thesis-track degree includes course requirements including CMDS Thesis. This allows 4-6 hours allotted for thesis preparation and completion.

Thesis Steps (at Auburn) → Early in the graduate program, the student should select an investigative topic and professor to support and facilitate this endeavor. Two additional faculty members are selected to serve as committee members. Preparation of the prospectus includes an in depth review of literature, statement of problem, and procedures of the study. An IRB is necessary for projects investigating human participants. After writing is complete with the chairperson/lead professors approval, this document is submitted for a group review meeting. After the formal meeting, the committee approves or disapproves the prospectus. With approval, data collection, data analyses, and further writing can begin. The oral final defense is scheduled as thesis is completed. Approved theses are required to be submitted through the Auburn University Electronic Thesis and Dissertation library (AUETD).

References:

Joel, A. (2015, March 1). Why Do Many Reasonable People Doubt Science? Retrieved n.d., from <https://www.nationalgeographic.com/magazine/2015/03/science-doubters-climate-change-vaccinations-gmos/>

November 21-23, 2019: Orlando, Florida. (n.d.). Retrieved November 15, 2019, from <https://convention.asha.org>