FINAL SCRIPT: APPROVED FOR FILMING

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Scriptwriter Name: Pallavi Sharma
Project Page Link: https://review.jove.com/account/file-uploader?src=20526548

Title: Sound Source Localization Testing in Single-Sided Deafness Following Bone Conduction Intervention

Authors and Affiliations:

Xiao Zhang[1*], Jie Bai[1*], Zhihan Lin[1], Ying Li[1], Haihong Liu[1,2], Yang Yang[1]

[1]Department of Otolaryngology, Head and Neck Surgery, Beijing Children's Hospital, Capital Medical University, National Center for Children's Health
[2]Beijing Key Laboratory for Pediatric Diseases of Otolaryngology, Head and Neck Surgery, Ministry of Education (MOE) Key Laboratory of Major Diseases in Children, Beijing Pediatric Research Institute, Beijing Children's Hospital, Capital Medical University, National Center for Children's Health

***These authors contributed equally**

Corresponding Authors:

Haihong Liu	haihongliu6@aliyun.com
Yang Yang	yangyang@bch.com.cn

Email Addresses for All Authors:

653394580@qq.com
baijieccmu1998@163.com
zhihanlin2502@163.com
2622050048@qq.com
haihongliu6@aliyun.com
yangyang@bch.com.cn

Author Questionnaire

1. **Microscopy**: Does your protocol require the use of a dissecting or stereomicroscope for performing a complex dissection, microinjection technique, or something similar? **No**

2. **Software:** Does the part of your protocol being filmed include step-by-step descriptions of software usage? **Yes, all done**

3. **Filming location:** Will the filming need to take place in multiple locations? **No**

Current Protocol Length
Number of Steps: 15
Number of Shots: 27

Introduction

Videographer: Obtain headshots for all authors available at the filming location.

1.1. **Yang Yang:** We study whether bone conduction hearing aids improve sound localization in single-sided deafness and, if so, how much improvement they provide for communication and navigation.

1.1.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B.roll:3.1*

What are the most recent developments in your field of research?

1.2. **Yang Yang:** The most recent developments in our field include advancements in bone conduction technology, offering more options and improved sound quality for individuals with hearing loss.

1.2.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera.

What technologies are currently used to advance research in your field?

1.3. **Yang Yang:** Current technologies used to advance research in our field include sound-treated rooms, specialized software for testing sound localization, and bone conduction hearing aids.

1.3.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B.roll:2.2.1*

What are the current experimental challenges?

1.4. **Yang Yang:** A key challenge is ensuring participants understand the task, give accurate responses, and remain comfortable while maintaining appropriate sound levels.

1.4.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B.roll:2.2.2*

What significant findings have you established in your field?

1.5. **Yang Yang:** Bone conduction hearing aids improve sound localization in single-sided deafness, though the degree varies. Overall, they show promise in addressing related challenges.

1.5.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera. *Suggested B.roll:3.2*

Videographer: Obtain headshots for all authors available at the filming location.

Testimonial Questions :

What motivated you to choose JoVE for publishing your research?

1.6. **Yang Yang:** We chose JoVE because it offers a unique platform to showcase our research methodology through video, making it more accessible and understandable to a wider audience.

1.6.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera.

How does the research community benefit from video publications as compared to standard text publications?

1.7. **Yang Yang:** Video publications benefit the research community by providing a visual and interactive way to learn about new methods, allowing for easier replication and understanding of complex procedures.

1.7.1. INTERVIEW: Named Talent says the statement above in an interview-style shot, looking slightly off-camera.

Videographer: Please capture the testimonials in both Chinese and English

Protocol

2. Assessing the Impact of Bone Conduction Intervention on Sound Localization Ability in Patients with Single-Sided Deafness (SSD)

Demonstrator: Yang Yang

2.1. To begin, ensure that a Windows personal computer with a compatible audio driver and a multi-channel soundcard is available **[1].** Then, using balanced cables, connect actively powered speakers to the soundcard **[2]**.

2.1.1. WIDE: Talent with a Windows PC setup on a table, showing the soundcard connected. *Videographer: In addition to this video shot, please also take a photograph of talent performing this action. Make sure that it is at least a half-body shot with the talent's face visible and zoom out so we have room for cropping.*

2.1.2. Talent plugging balanced cables into the soundcard and connecting them to the speakers.

2.2. Configure the audio hardware following the manufacturer's instructions to ensure glitch-free playback and adequate channel separation **[1]**. Then, position the speakers in a circular setup, ensuring the subject is placed in the center of the semicircle facing the frontal loudspeaker **[2]**.

2.2.1. Talent configuring settings on the soundcard.

2.2.2. Talent arranging the speakers in a semicircular pattern and placing a chair at the center, oriented towards the frontal speaker.

2.3. For calibration, choose the appropriate audio driver in the software. Select the ASIO *(A-S-I-O)*-compatible soundcard from the list of available devices **[1]**. Review and configure the necessary parameters in the setup menu **[2].**

2.3.1. SCREEN: 2.3.1.mp4 00:00-00:17

2.3.2. SCREEN: 2.3.2.mp4 00:05-00:25

2.4. Then, review the driver settings of the sound device **[1-TXT]**.

2.4.1. SCREEN: 2.4.1.mp4 00:03-00:12 **TXT: Refer to software instructions to calibrate using CCITT noise and SPL meter**

2.5. To start the calibration procedure, click **Extras** followed by **Calibrate** in the software **[1]**. Verify the loudspeaker-to-soundcard channel output mapping **[2].** Then, assign

response-only dummy speakers to channel 0 **[3].**

2.5.1. SCREEN: 2.5.1.mp4 00:01-00:13

2.5.2. SCREEN: 2.5.2.mp4 00:01-00:10

2.5.3. SCREEN: 2.5.3.mp4 00:03-00:10

2.6. Click on a speaker button in the software to play the calibration noise for 10 seconds on the selected loudspeaker **[1]**.

2.6.1. SCREEN: 2.6.1.mp4 00:01-00:22

2.7. Next, using the sound pressure level meter, measure the sound pressure level at the virtual head position of the test subject, pointing the meter tip towards the active speaker **[1]**. Adjust the loudspeaker and system gains to achieve a noise level of approximately 70 decibels A-weighted, allowing a range of 67 to 75 decibels A-weighted **[2-TXT]**.

2.7.1. Talent holding the SPL meter at the virtual head position, pointing its tip directly at the active loudspeaker.

2.7.2. Talent adjusting the system gain controls on the soundcard interface or speaker controls. **TXT: Repeat this process for each of the remaining loudspeakers**

2.8. Click on the **Done** button in the software to complete the calibration process **[1]**.

2.8.1. SCREEN: 2.8.1.mp4 00:00-00:08

2.9. Now, click the calibration verification button in the software to validate the setup **[1]**.

2.9.1. SCREEN: 2.9.1.mp4 00:01-00:10

2.10. Specify metadata in the software **[1]**. During the calibration, assign any response-only dummy speakers to channel 0 **[2]**. Choose the study folder where the experiment results will be saved **[3]**.

2.10.1. SCREEN: 2.10.1.mp4 00:05-00:26

2.10.2. SCREEN: 2.10.2.mp4 00:00-00:05

2.10.3. SCREEN: 2.10.3.mp4 00:04-00:17

2.11. Then, click the **Start** button in the software to begin the experiment **[1]**. View the experiment results in real-time using the live mode, or after the experiment is completed using the final mode **[2-TXT]**.

2.11.1. SCREEN: 2.11.1.mp4 00:01-00:07

2.11.2. SCREEN: 2.11.2.mp4 00:00-00:12 **TXT: Load mat files and generate summary tables and figures for all individual results; Use Rotate summary to scan files**

~~2.12. Select **Menu, File,** and **Load & Analyze**, then load the MAT *(Mat)* file of a past measurement **[1]**. Generate summary tables and figures for all individual results in the study folder by clicking **File** and **Create Summary [2]**.~~

~~2.12.1. SCREEN: Navigation to Menu > File > Load & Analyze, selecting a MAT file from the file browser.~~

~~2.12.2. SCREEN: Selection of File > Create Summary, with a dialog confirming the generation of summary tables and figures.~~
NOTE: Authors did not provide files. Step has been converted to on-screen text

~~2.13. To visualize the dataset, use the **Rotate Summary** option to scan all mat and spreadsheet files **[1]**.~~

~~2.13.1. SCREEN: 2.13.1.mp4 00:00-00:09~~
NOTE: Authors did not provide files. Step has been converted to on-screen text

~~2.14. Export the summarized data as spreadsheets, including raw data and calculated statistics **[1]**. Export scatterplots and boxplots for root mean square error, bias, and standard deviation of angular errors, grouped by clinical visit tag and clinical visit number **[2]**.~~

~~2.14.1. SCREEN: Spreadsheet export dialog showing options to include raw data and calculated statistics.~~

~~2.14.2. SCREEN: Scatterplots and boxplots generated and displayed, showing the desired grouping criteria.~~
NOTE: Step skipped

2.15. Finally, perform batch analysis of all MAT files in the study folder **[1]** and export confusion matrices as PNG *(P-N-G)* images **[1]**.

2.15.1. SCREEN: 2.15.1.mp4 00:00-00:09

2.15.2. SCREEN: 2.15.2.mp4 00:00-00:05, 00:24-00:31

Results

3. Representative Results

3.1. Without bone conduction device intervention, the child with left-sided deafness demonstrated a significant rightward localization bias and poor localization accuracy **[1].**

3.1.1. LAB MEDIA: Figure 2.

3.2. With bone conduction device intervention on the right side, the child's localization bias was reduced to some extent, and localization accuracy also improved **[1].**

3.2.1. LAB MEDIA: Figure 3.

Pronunciation Guide:
Otolaryngology
Pronunciation link:
https://www.merriam-webster.com/dictionary/otolaryngology
IPA: /ˌoʊtoʊˌlærənˈgɑːlədʒi/
Phonetic Spelling: oh-toh-lair-uhn-gah-luh-jee

Decibels
Pronunciation link:
https://www.merriam-webster.com/dictionary/decibel
IPA: /ˈdɛsəˌbɛl/
Phonetic Spelling: deh-suh-bel
Confusion
Pronunciation link:
https://www.merriam-webster.com/dictionary/confusion
IPA: /kənˈfjuːʒən/
Phonetic Spelling: kuhn-fyoo-zhun
Matrix
Pronunciation link:
https://www.merriam-webster.com/dictionary/matrix
IPA: /ˈmeɪtrɪks/
Phonetic Spelling: may-triks
A-weighted
A-weighted is a technical term relating to sound measurements; "weighted" is key:
Pronunciation link (for "weighted"):
https://www.merriam-webster.com/dictionary/weighted
IPA: /ˈweɪtɪd/
Phonetic Spelling: way-tid