Samuel D. Bellows, Ph.D.

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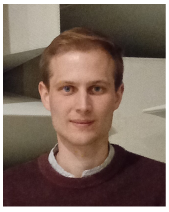

Academic Appointments

2023-2024 **Post-doctoral Researcher**, Sorbonne University, Paris, France.

Education

2023 **Ph.D., Brigham Young University** Physics.
Dissertation title: *Acoustic Directivity: Advances in Acoustic Center Localization, Measurement Optimization, Directional Modeling, and Sound Power Spectral Estimation.*

2019 **B.Sc., Brigham Young University** Applied Physics. Minors: Music and Italian.
Thesis title: *Analysis of Directivity Factors and Indices of Human Speech*.

Publications

Journal Articles

1. S. D. Bellows, "Comparing the end correction of a spherically baffled piston to infinitely baffled and unbaffled circular radiators (Letter to the Editor)," *J. Acoust. Soc. Am.*, vol. 155, no. 5, pp. 3302–3305, May 2024. DOI: 10.1121/10.0026023.
2. S. D. Bellows and B. F. G. Katz, "Combining multiple sparse measurements with reference data regularization to create spherical directivities applied to voice data," *Acta Acustica*, vol. 8, no. 14, pp. 1–12, Mar. 2024. DOI: 10.1051/aacus/2024006.
3. S. D. Bellows and T. W. Leishman, "Application of Chebyshev quadrature rules to equiangular spherical and hemispherical directivity measurements," *J. Audio Eng. Soc*, vol. 72, no. 1/2, pp. 44–58, Jan. 2024. DOI: https://doi.org/10.17743/jaes.2022.0119.
4. S. D. Bellows and T. W. Leishman, "Low-frequency radiation from a vibrating cap on a rigid spherical shell with a circular aperture," *J. Acoust. Soc. Am.*, vol. 154, no. 6, pp. 3883–3898, Dec. 2023. DOI: 10.1121/10.0023936.
5. S. D. Bellows, D. T. Harwood, K. L. Gee, and M. R. Shepherd, "Directional characteristics of two gamelan gongs," *J. Acoust. Soc. Am.*, vol. 154, no. 3, pp. 1921–1931, Sep. 2023. DOI: 10.1121/10.0021055.
6. S. D. Bellows and T. W. Leishman, "On the low-frequency acoustic center," *J. Acoust. Soc. Am.*, vol. 153, no. 6, pp. 3404–3418, Jun. 2023. DOI: 10.1121/10.0019750.
7. S. D. Bellows and T. W. Leishman, "Optimal microphone placement for single-channel sound-power spectrum estimation and reverberation effects," *J. Audio Eng. Soc*, vol. 71, no. 1/2, pp. 20–33, Jan. 2023. DOI: 10.17743/jaes.2022.0052.
8. T. W. Leishman, S. D. Bellows, C. M. Pincock, and J. K. Whiting, "High-resolution spherical directivity of live speech from a multiple-capture transfer function method," *J. Acoust. Soc. Am.*, vol. 149, no. 3, pp. 1507–1523, Mar. 2021. DOI: 10.1121/10.0003363.

Refereed Conference Proceedings

1. S. D. Bellows, M. R. Shepherd, K. L. Gee, and T. W. Leishman, "Modeling the sound radiation of gamelan gongs using analytic rigid spherical models," in *Proc. Meet. Acoust. 51, 035003*, (*Editor reviewed*), Oct. 2023. DOI: 10.1121/2.0001754.
2. S. D. Bellows, D. T. Harwood, K. L. Gee, and T. W. Leishman, "Low-frequency directional characteristics of a gamelan gong," in *Proc. Meet. Acoust. 50, 035003*, (*Editor reviewed*), Mar. 2023. DOI: 10.1121/2.0001722.
3. S. D. Bellows and T. W. Leishman, "A spherical-harmonic-based framework for spatial sampling considerations of musical instrument and voice directivity measurements," in *Proceedings of Forum Acusticum*, Turin, Italy, Sep. 2023, pp. 4747–4754. DOI: https://doi.org/10.61782/fa.2023.0427.
4. S. D. Bellows and D. Nakayama, "Modeling and measurements of the f-hole shape's influence on the bending modes of a fractional-size violin," in *Proceedings of Forum Acusticum*, Turin, Italy, Sep. 2023, pp. 1193–1200. DOI: https://doi.org/10.61782/fa.2023.0768.
5. J. E. Avila, S. D. Bellows, T. W. Leishman, and K. L. Gee, "Directivity analysis of the muted trumpet," in *Proc. Mtgs. Acoust. 50, 035005*, (*Editor reviewed*), Dec. 2022. DOI: 10.1121/2.0001738.
6. S. D. Bellows and T. W. Leishman, "Modeling musician diffraction and absorption for artificially excited clarinet directivity measurements," in *Proc. Mtgs. Acoust. 46, 035002*, (*Editor reviewed*), 2022. DOI: 10.1121/2.0001586.
7. S. Bellows and T. W. Leishman, "Effect of head orientation on speech directivity," in *Proceedings of Interspeech 2022*, Sep. 2022, pp. 246–250. DOI: 10.21437/Interspeech.2022-553.
8. S. Bellows and T. Leishman, "Single-channel sound power estimation for reverberation effects," in *Audio Engineering Society Convention 149*, Oct. 2020.
9. S. D. Bellows and T. W. Leishman, "Acoustic source centering of musical instrument directivities using acoustical holography," in *Proc. Mtgs. Acoust. 42, 055002*, (*Editor reviewed*), 2020. DOI: 10.1121/2.0001371.
10. S. D. Bellows and T. W. Leishman, "Obtaining far-field spherical directivities of guitar amplifiers from arbitrarily shaped arrays using the Helmholtz equation least-squares method," (*Editor reviewed*), 2020. DOI: 10.1121/2.0001410.
11. S. D. Bellows and T. W. Leishman, "High-resolution analysis of the directivity factor and directivity index functions of human speech," in *Audio Engineering Society Convention 146*, (*Peer-reviewed abstract and precis*)., Mar. 2019.
12. S. D. Bellows and T. W. Leishman, "Spherical harmonic expansions of high-resolution musical instrument directivities," in *Proc. Mtgs. Acoust. 35, 035005*, (*Editor reviewed*), 2018. DOI: 10.1121/2.0001274.

Conference Proceedings

1. S. D. Bellows and T. W. Leishman, "Compariative analysis of the sogeum and danso directivity patterns," in *Procceedings of the Fall 2022 Korean Acoustical Society Meeting*. Nov. 2022, pp. 67–69.
2. S. D. Bellows and T. W. Leishman, "Modeling and measurements of organ pipe sound radiation," in *Proceedings of the 24th International Congress on Acoustics*. Gyeongju, South Korea, Oct. 2022.
3. S. D. Bellows and T. W. Leishman, "A spherical beamforming algorithm for acoustic centering and phase correction of source directivities," in *Proceedings of the 24th International Congress on Acoustics*. Gyeongju, South Korea, Oct. 2022.

Presentations

1. S. D. Bellows and B. F. G. Katz, "Human versus manikin HRTF preferences: How 'generic' are dummy-head HRTFs," in *16th Aural Assessment by Means of Binaural Algorithms (AABBA) General Meeting, Vienna, Austria, February 15-16, 2024*.

2. S. D. Bellows and T. W. Leishman, "A spherical-harmonic-based framework for spatial sampling considerations of musical instrument and voice directivity measurements," in *10th Convention of the European Acoustics Association, Forum Acusticum, Turin, Italy, September 11 - 15, 2023*.

3. S. D. Bellows and D. Nakayama, "Modeling and measurements of the f-hole shape's influence on the bending modes of a fractional-size violin," in *10th Convention of the European Acoustics Association, Forum Acusticum, Turin, Italy, September 11 - 15, 2023*.

4. S. D. Bellows and T. W. Leishman, "An investigation of rooms with reflection-free zones using finite-difference methods in curvilinear coordinates," in *184th Meeting of the Acoustical Society of America, Chicago, Illinois, May 8-12, 2023. J. Acoust. Soc. Am.*, vol. 153, no. 3, A109, 2023. DOI: 10.1121/10.0018331.

5. S. D. Bellows, D. T. Harwood, M. Shepherd, K. L. Gee, and T. W. Leishman, "Modeling the sound radiation of gamelan gongs using closed-form rigid spherical models," in *184th Meeting of the Acoustical Society of America, Chicago, Illinois, May 8-12, 2023. J. Acoust. Soc. Am.*, vol. 153, no. 3, A322, 2023. DOI: 10.1121/10.0019001.

6. S. D. Bellows, D. T. Harwood, K. L. Gee, and T. W. Leishman, "Low-frequency directional characteristics of a gamelan gong," in *183rd Meeting of the Acoustical Society of America, Nashville, Tennessee, December 5-9, 2022. J. Acoust. Soc. Am.*, vol. 152, no. 4, A82, 2022. DOI: 10.1121/10.0015617.

7. J. E. Avila, S. D. Bellows, T. W. Leishman, and K. L. Gee, "Directivity of the muted trumpet," in *183rd Meeting of the Acoustical Society of America, Nashville, Tenessee, December 5-9, 2022. J. Acoust. Soc. Am.*, vol. 152, no. 4, A82, 2022. DOI: 10.1121/10.0015619.

8. D. T. Harwood, S. D. Bellows, J. E. Avila, and K. L. Gee, "A comparative study of the directional characteristics of two gamelan gongs," in *183rd Meeting of the Acoustical Society of America, Nashville, Tenessee, December 5-9, 2022. J. Acoust. Soc. Am.*, vol. 152, no. 4, A82, 2022. DOI: 10.1121/10.0015618.

9. S. D. Bellows and T. W. Leishman, "Comparative analysis of the directivity of the sogeum and danso," in *Fall 2022 Korean Acoustical Society Meeting, Seoul, South Korea, November 17-18, 2022*.

10. S. D. Bellows and T. W. Leishman, "Modeling and measurements of organ pipe sound radiation," in *24th International Congress on Acoustics, Gyeongju, South Korea, October 24-28, 2022*.

11. S. D. Bellows and T. W. Leishman, "A spherical beamforming algorithm for acoustic centering and phase correction of source directivities," in *24th International Congress on Acoustics, Gyeongju, South Korea, October 24-28, 2022*.

12. S. Bellows and T. W. Leishman, "Effect of head orientation on speech directivity," in *23rd Interspeech, Incheon, South Korea, September 18-22, 2022*.

13. R. C. Edelman, B. E. Anderson, S. D. Bellows, and T. W. Leishman, "Measured high-resolution directivities of guitar amplifiers," in *182nd Meeting of the Acoustical Society of America, Denver, Colorado, May 23-26, 2022. J. Acoust. Soc. Am.*, vol. 151, no. 4, A157, 2022. DOI: 10.1121/10.0010961.

14. S. D. Bellows and T. W. Leishman, "Modeling musician diffraction for artificially excited clarinet directivity measurements," in *182nd Meeting of the Acoustical Society of America, Denver, Colorado, May 23-26, 2022. J. Acoust. Soc. Am.*, vol. 151, no. 4, A157, 2022. DOI: 10.1121/10.0010960.

15. S. D. Bellows and T. W. Leishman, "An investigation of sound radiation from the double bass using acoustical holography," in *180th Meeting of the Acoustical Society of America, June 8-10, 2021*, 4. *J. Acoust. Soc. Am.*, vol. 149, no. 4, A70, 2021. DOI: 10.1121/10.0004546.

16. S. Bellows and T. W. Leishman, "Acoustic source centering of musical instrument directivities using acoustical holography," in *179th Meeting of the Acoustical Society of America, December 7-11, 2020. J. Acoust. Soc. Am.*, vol. 148, no. 4, pp. 2794–2794, 2020. DOI: 10.1121/1.5147778.

17. S. Bellows and T. W. Leishman, "Obtaining far-field spherical directivities from arbitrarily shaped arrays using the Helmholtz equation least-squares method," in *179th Meeting of the Acoustical Society of America, December 7-11, 2020. J. Acoust. Soc. Am.*, vol. 148, no. 4, pp. 2794–2794, 2020. DOI: 10.1121/1.5147777.

18. S. Bellows and T. Leishman, "Single-channel sound power estimation for reverberation effects," in *149th Audio Engineering Society Convention, October 21-24, 2020.*

19. S. Bellows and T. W. Leishman, "Application of Hilbert space operators on the sphere to directivity measurements," in *178th Meeting of the Acoustical Society of America, San Diego, California, December 2-6, 2019. J. Acoust. Soc. Am.*, vol. 146, no. 4, p. 2803, 2019. DOI: 10.1121/1.5136708.

20. R. C. Edelman, S. Bellows, and T. W. Leishman, "An archival database of high-resolution directivities," in *178th Meeting of the Acoustical Society of America, San Diego, California, December 2-6, 2019. J. Acoust. Soc. Am.*, vol. 146, no. 4, p. 2803, 2019. DOI: 10.1121/1.5136709.

21. T. W. Leishman and S. D. Bellows, "Musical instrument directivity measurements," in *178th Meeting of the Acoustical Society of America, San Diego, California, December 2-6, 2019. J. Acoust. Soc. Am.*, vol. 146, no. 4, p. 2822, 2019. DOI: 10.1121/1.5136777.

22. S. D. Bellows and T. W. Leishman, "High-resolution analysis of the directivity factor and directivity index functions of human speech," in *146th Audio Engineering Society Convention, Dublin, Ireland, March 20-23, 2019.*

23. S. D. Bellows and T. W. Leishman, "Spherical harmonic expansions of high-resolution directivity data," in *176th Meeting of the Acoustical Society of America, Victoria, Canada, November 5-9, 2018. J. Acoust. Soc. Am.*, vol. 144, no. 3, pp. 1890–1891, 2018. DOI: 10.1121/1.5068289.

Research Experience

2023-2024 **Postdoctoral Researcher** Institut Jean le Rond d'Alembert, Sorbonne University
- Modeling acoustics in virtual reality, including HRTF preferences and voice directivity.
- Studies in room acoustics including geometrical acoustics calibration and coupled volume rooms.

2017-2023 **Research Assistant** Acoustics Research Group, Brigham Young University
- High-resolution spherical directivity measurements of musical instruments.
- Theoretical modeling of sound radiation from vibrating structures.
- Development of acoustic source centering algorithms.
- Single-channel sound power spectral estimation using known directivity functions.

Professional Experience

2023 **Consultant** Institute for Scientific Research in Music
- Physical modeling of the trombone using a FDTD implementation of the Horn equation.

2022 **Intern** Yamaha Corporation
- SLDV and radiativity measurements of violins to compare modal behavior.
- Developed parameterized CAD model of violin f-hole to study impact of f-hole shape on structural modes and radiated sound power.

Professional Experience (continued)

2019-2022 **Intern and Consultant** Ahnert Feistal Media Group (AFMG)
- Developed real-time binaural convolver with head-tracking in C++ for room auralizations based on echograms created in EASE.
- Room acoustic measurements and creation of CAD models.

2017 **Intern** Siena Jazz
- Developed a web-based ear-training tool for musicians using Javascript and PHP.

Teaching and Mentoring

2019-2023 **Undergraduate Mentor** Acoustics Research Group
Assisted in mentoring six undergraduates with research projects including three with the research necessary for their senior thesis.

2019 **Graduate Teaching Assistant** Acoustical Measurement Methods (PHSCS 513)
Teaching assistant for a graduate-level course on acoustical measurement techniques.

2017 **Undergraduate Teaching Assistant** Introductory Physics Courses (PHSCS 105, PHSCS 121)
Assisted in lectures, grading, and labs for introductory undergraduate physics courses.

Skills

Coding	MATLAB, Python, C++, Mathematica
Software	Comsol, Ansys, SolidWorks
Languages	English (Fluent), Italian (C1), French (B1), Japanese (JLPT3), Korean (TOPIK 3)

Awards and Achievements

2021-2023 **William James Strong and Charlene Fuhriman Strong Family Musical Acoustics Endowed Fellowship Fund**, Recipient.

2023 **Best Student Presentation, 2nd Place**, Acoustical Society of America Spring 2023 Meeting.

2022 **Best Student Paper**, POMA Student Paper for Acoustical Society of America Spring 2022 Meeting.

2013 **Heritage Scholarship**, Recipient.

Service and Society Involvement

2022-2023 **Signal Processing Student Council Representative**, Acoustical Society of America.

2023 **Acoustical Society of America**, Member.

Audio Engineering Society, Member.