Hiroko Terasawa

Associate Professor
Faculty of Library Information and Media Science
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Education

2002-2009   Department of Music, Stanford University, Stanford, CA, USA.

Ph.D. in Computer Based Music Theory and Acoustics, December 2009
M.A. in Music, Science and Technology, June 2003

1995-2002   Department of Electronic Engineering,
University of Electro-Communications, Tokyo, Japan.

M.E. in Electronic Engineering, March 2002
B.E. in Electronic Engineering, March 2000

1998-1999   École Nationale Supérieure des Télécommunications, Paris, France.

Exchange Student/Research Assistant

Research Interests

Acoustics; Sound Synthesis; Computer Music; Music Psychology.

I research timbre perception, timbre-based data sonification, musical emotion, interaction in music, and assistive technology with sounds. I aim for the theorization and modeling of the multimodal human communication that uses sound as a primary medium, so that we can strategically approach sound design and musical expression based on the knowledge of auditory perception and music cognition.

Professional Experience

- **Associate Professor.** Faculty of Library Information and Media Science, University of Tsukuba, Ibaraki, Japan. (March 2020 - present.)

- **Assistant Professor.** Faculty of Library Information and Media Science, University of Tsukuba, Ibaraki, Japan. (April 2013 - February 2020.)

- **Researcher.** "Information Environment and Humans," PRESTO, Japan Science and Technology Agency, Tokyo, Japan. (October 2011 - November 2015.)

- **Postdoctoral Fellow.** Life Science Center of Tsukuba Advanced Research Alliance, University of Tsukuba, Ibaraki, Japan. (January 2010 - March 2013.)

- **Lecturer (Part-Time).** Art Media Center, Tokyo University of the Arts, Tokyo, Japan. (Spring 2011, Fall/Winter 2012 - 2013.)

- **Research Associate.** Communication, outreach tasks, and event management. CCRMA, Stanford University. (June 2008 - September 2009.)

- **Consulting.** Supervised psychoacoustic experiment design. Sennheiser Palo Alto Research Center. (Spring - Fall 2008.)

- **Consulting.** Applied acoustics, psychoacoustics, and product quality assessment. iKoa Corporation. (Spring 2008.)

- **Scientific Research Residency.** The Banff Centre, Alberta, Canada (Spring 2008.)

- **Visiting researcher.** Timbre modeling research. IRCAM (Institut de Recherche et Coordination Acoustique/Musique), Paris, France. (Spring - Summer 2007.)

- **Artist in Residence.** Cité Internationale des Arts, Paris, France (Spring - Summer 2007.)

- **Researcher/Project coordinator.** Supervised psychoacoustic experiments in Yamaha Masking Ambient Speech Sounds Project. CCRMA, Stanford University. (Summer 2006.)

- **Trainee.** Computer music research. NTT Communication Science Laboratories, Kanagawa, Japan. (Spring 2002.)

- **Intern.** Digital signal processing engineer, with marketing and product design training. Sony Corporation, Tokyo, Japan. (Summer 2000.)

- **Research assistant.** École Nationale Supérieure des Télécommunications, Paris, France. (1998 - 1999.)

Teaching Experience

Courses taught at University of Tsukuba

- Speech and Audio Processing (Graduate level), 2014 - present.

- Fundamentals of Acoustics and Speech Communication (Undergraduate level),
  2014 - present.

- Signals and Systems (Undergraduate level), 2015 - present.

Lecturership at Art Media Center, Tokyo University of the Arts

- Introduction to Electronic Music, Spring Semester 2011 and Fall Semester 2012-2013.

Teaching Assistantship at Stanford University

- Stanford Graduate Summer Institute: Music and Human Behavior, Summer 2007.

- Music 151: Psychophysics and Cognitive Psychology for Musicians,
  Spring 2006 and 2005.

- Music 150: Musical Acoustics, Winter 2006 and 2005.

- Music 19: Fundamentals of Music Theory, Fall 2005.

- Music 220A: Foundations of Computer-Generated Sound, Fall 2004.

Teaching Assistantship at University of Electro-Communications

- Electronic Circuit Theory. Spring 2001.

Publications

Journal and Book Articles

1. Masaki Iguchi, Ryosuke Nakagawa, Hiroko Terasawa: "Sound Design for Auditory
   Biofeedback and Motor Performance in Participants with Stroke: a Pilot Study."
   Topics in Stroke Rehabilitation, Vol. 26, No. 6, pp. 418-422 (2019)

2. Masaki Iguchi, Masaki Matsubara, Hideki Kadone, Hiroko Terasawa, Kenji Suzuki:
   "Comparative Effects of Auditory Electromyographic Biofeedback for Participants
   who are Blind and Sighted." Perceptual and Motor Skills, No. 125-4, pp. 732-748.
   (2018)

3. Yuki Nakayama, Yuji Takano, Masaki Matsubara, Kenji Suzuki, Hiroko Terasawa:
   "The Sound of Smile: Auditory Biofeedback of Facial EMG Activity." Displays, Vol.
   47, pp. 32-39. (2017)

4. Masaki Matsubara, Naoya Kano, Hiroko Terasawa, Rumi Hiraga: "Short-term
   Learning Effect on Rhythm Cognition in a Tapping Game with Visual Cues by
   Hearing-impaired People." Journal of Information Processing Society of Japan, Vol.
   57, No. 5, pp. 1331-1340. (2016) [In Japanese with English Abstract]

5. Masaki Matsubara, Takahiro Oba, Hideki Kadone, Hiroko Terasawa, Kenji Suzuki, Masaki Iguchi: "Wearable Auditory Biofeedback Device for Blind and Sighted Individuals." IEEE Multimedia, Vol. 22, No. 1, pp. 68-73. (2015)

6. Sungyoung Kim, Teruaki Kaniwa, Hiroko Terasawa, Takeshi Yamada, Shoji Makino: "Inter-subject differences in personalized technical ear training and the influence of an individually optimized training sequence." Acoustical Science and Technology, Vol. 34, No. 6, pp. 424-431. (2013)

7. Hidefumi Ohmura, Takuro Shibayama, Hiroko Terasawa, Reiko Hoshi-Shiba, Ai Kawakami, Miwa Fukino, Kazuo Okanoya, and Kiyoshi Furukawa: "Review of Musical Emotion Studies" The Journal of the Acoustical Society of Japan, Vol. 69, No.9, pp. 467-478. (2013) [In Japanese]

8. Hiroko Terasawa, Reiko Hoshi-Shiba, Takuro Shibayama, Hidefumi Ohmura, Kiyoshi Furukawa, Shoji Makino, and Kazuo Okanoya: "A Network Model for the Embodied Communication of Musical Emotions" Cognitive Studies, Vol.20, No.1, pp.112-129. (2013) [In Japanese with English Abstract]

9. Hiroko Terasawa, Jonathan Berger, and Shoji Makino: "In Search of a Perceptual Metric for Timbre: Dissimilarity Judgements among Synthetic Sounds with MFCC-derived Spectral Envelopes." Journal of Audio Engineering Society, vol. 60, No. 9, pp. 674-685. (2012)

10. Hiroko Terasawa: "Timbre perception." In Encyclopedia of Perception, E. Bruce Goldstein (Ed), SAGE Publications. (2009).

Refereed Conference Proceedings

1. Hiroko Terasawa, Reiko Hoshi-Shiba, Kiyoshi Furukawa: "Embodiment and Interaction as Common Ground for Emotional Experience in Music." Proceedings of the 14th International Symposium on Computer Music Multidisciplinary Research, pp. 777-788, Marseille, France (2019.10)

2. Hiroko Terasawa, Kenta Wakasa, Hideki Kawahara, Ken-Ichi Sakakibara: "Investigating the Physiological and Acoustic Contrasts between Choral and Operatic Singing." Proceedings of INTERSPEECH 2019, pp. 2025-2029, Graz, Austria (2019.9)

3. Kazuma Shamoto, Hiroko Terasawa, Hiroshi Itsumura: "The Effect of Reverberated Speech on Working Memory: Toward an Optimal Balance of Calmness and Liveliness in Libraries." Proceedings of the 23rd International Congress on Acoustics, pp. 4537-4544, Aachen, Germany. (2019.9)

4. Ryosuke Nakagawa, Hideki Kadone, Masaki Matsubara, Kenji Suzuki, Hiroko Terasawa: "Real-Time EMG Sonification System for Gait." Proceedings of the 24th International Conference on Auditory Display, pp.241-244, Houghton, USA (2018.6)

5. Megumi Sato, Tetsuro Kitahara, Hiroko Terasawa, Masaki Matsubara: "Relationships between Abdominal and Around-Lip Muscle Activities and Acoustic

Features when Playing the Trumpet." Proceedings of the 2017 International Symposium on Musical Acoustics, pp. 114-117, Montreal, Canada. (2017.6)

6. Kenta Wakasa, Masaki Matsubara, Yuzuru Hiraga, Hiroko Terasawa: "Acoustic Characteristics of Pressed and Normal Phonations in Choir Singing by Male Singers." Proceedings of the 2017 International Symposium on Musical Acoustics, pp.136-139, Montreal, Canada. (2017.6)

7. Rumi Hiraga, Yu Kato, Masaki Matsubara, Hiroko Terasawa, Kei Tabaru: "Perception of Music of Hearing-impaired Persons with Focused on One Test Subject." Proceedings of the Conference Universal Learning Design, pp. 31-34, Linz, Austria. (2016.7)

8. Rumi Hiraga, Kjetil Hansen, Naoya Kano, Masaki Matsubara, Hiroko Terasawa, Keiji Tabuchi: "Music Perception of hearing-Impaired Persons with Focus on One Test Subject." Proceedings of 2015 IEEE international conference on Systems, Man, and Cybernetics (SMC), pp. 2407-2412, Hong Kong, China. (2015.10)

9. Hiroko Terasawa, Yota Morimoto, Masaki Matsubara, Akira Sato, Makoto Ohara, Masatoshi Kawarasaki: "Guiding auditory attention toward the subtle components in electrocardiography sonification." Proceedings of International Conference on Auditory Display 2015 (ICAD2015), pp. 231-235, Graz, Austria. (2015)

10. Yuki Nakayama, Yuji Takano, Masaki Matsubara, Kenji Suzuki, Hiroko Terasawa: "Real-time smile sonification using surface EMG signal and the evaluation of its usability." Proceedings of International Conference on Auditory Display 2015 (ICAD2015), pp. 152-156, Graz, Austria. (2015)

11. Takayuki Hamano, Hidefumi Ohmura, Ryu Nakagawa, Hiroko Terasawa, Reiko Hoshi-Shiba, Kazuo Okanoya, Kiyoshi Furukawa: "Creating a Place as a Medium for Musical Communication Using Multiple Electroencephalography." Proceedings of the 40th International Computer Music Conference, pp.637-642, Athens, Greece. (2014)

12. Teruaki Kaniwa, Hiroko Terasawa, Masaki Matsubara, Shoji Makino, and Tomasz M. Rutkowski: "Electroencephalogram Steady State Response Sonification Focused on the Spatial and Temporal Properties." Proceedings of the 20th International Conference on Auditory Display (ICAD-2014), Lecture session no. 7, Paper no. 1, pp. 1-7, New York, USA. (2014)

13. Masaki Matsubara, Hiroko Terasawa, Rumi Hiraga: "The effect of musical experience on rhythm perception in hearing-impaired undergraduates." IEEE Conference on System, Man and Cybernetics, pp.1666-1669, San Jose, USA. (2014)

14. Masaki Matsubara, Hideki Kadone, Masaki Iguchi, Hiroko Terasawa, and Kenji Suzuki: "The Effectiveness of Auditory Biofeedback on a Tracking Task for Ankle Joint Movements in Rehabilitation" Proceedings of ISon 2013, pp. 81-86. Erlangen, Germany. (2013)

15. Shogo Matsukata, Hiroko Terasawa, Masaki Matsubara, and Tetsuro Kitahara:

"Muscle activity in playing trumpet: the dependence on the playable pitch region and the experience of a non-trumpet brass instrument player." Proceedings of Stockholm Musical Acoustics Conference 2013, pp. 529-533. Stockholm, Sweden. (2013)

16. Masaki Iguchi, Masaki Matsubara, Hideki Kadone, Hiroko Terasawa, Kenji Suzuki: "How is auditory EMG biofeedback effective for blind people?" Proceedings of International Conference on Auditory Display 2013 (ICAD2013), pp. 307-310. (2013)

17. Takayuki Hamano, Tomasz Rutkowski, Hiroko Terasawa, Kazuo Okanoya, and Kiyoshi Furukawa: "Generating an Integrated Musical Expression with a Brain Computer Interface." Proceedings of the International Conference on New Interfaces for Musical Expression, pp. 49-54. Daejeon, Korea (2013)

18. Teruaki Kaniwa, Hiroko Terasawa, Masaki Matsubara, Tomasz M. Rutkowski, and Shoji Makino: "EEG Steady-State Synchrony Patterns Sonification." Proceedings of APSIPA Annual Summit and Conference, OS.6-BioSPS.1.5, pp. 1-6. California, USA. (2012)

19. Masaki Matsubara, Hiroko Terasawa, Hideki Kadone, Kenji Suzuki, Shoji Makino: "Sonification of muscular activity in human movements using the temporal patterns in EMG." Proceedings of APSIPA Annual Summit and Conference, OS.6-BioSPS.1.2, pp. 1-5. California, USA. (2012)

20. Hiroko Terasawa, Josef Parvizi, and Chris Chafe: "Sonifying ECoG Seizure Data with Overtone Mapping: a Strategy for Creating Auditory Gestalt from Correlated Multichannel Data." Proceedings of the International Conference on Auditory Display 2012 (ICAD2012), pp. 129-134. Georgia, USA. (2012)

21. Hidefumi Ohmura, Takayuki Hamano, Tomasz Rutkowski, Hiroko Terasawa, Kazuo Okanoya, and Kiyoshi Furukawa: "Structural Analysis of Responses to Musical Tonality: Commonality with the Neural Processing of Emotion in Language." Proceedings of the 9th International Conference (EVOLANG9). World Scientific, pp. 510-511. (2012)

22. Zhenyu Cai, Hiroko Terasawa, Shoji Makino, Takeshi Yamada, and Tomasz Rutkowski: "Spatial Location and Sound Timbre as Informative Cues in Auditory BCI/BMI - Electrodes Position Optimization for Brain Evoked Potential Enhancement." Proceedings of APSIPA ASC 2011, Wed-PM.SS4, pp. 1-6. Xi'an, China. (2011)

23. Hiroko Terasawa, Yuta Takahashi, Keiko Hirota, Takayuki Hamano, Takeshi Yamada, Akiyoshi Fukamizu, and Shoji Makino: "C. Elegans Meets Data Sonification: Can We Hear its Elegant Movement?" 8th Sound and Music Computing Conference, Padova, Italy. (2011)

24. Teruaki Kaniwa, Sungyoung Kim, Hiroko Terasawa, Masahiro Ikeda, Takeshi Yamada, and Shoji Makino: "Towards a Personalized Technical Ear Training

Program: An Investigation of the Effect of Adaptive Feedback." 8th Sound and Music Computing Conference, Padova, Italy. (2011)

25. Takuro Shibayama, Hiroko Terasawa, Hidefumi Ohmura, Reiko Hoshi-Shiba, Takayuki Hamano, Miwa Fukino, Kazuo Okanoya, and Kiyoshi Furukawa: "What We Listen to with Music: Seeking a General Theory of Musical Emotion with the Aid of the Humanities Perspectives." The Asian Conference on Arts and Humanities 2011, Osaka, Japan. (2011)

26. Tomoko Yonezawa, Hirotake Yamazoe, and Hiroko Terasawa: "Portable Recording/Browsing System of Voice Memos Allocated to User-relative Directions." Proceedings of the Seventh International Conference on Pervasive Computing (Pervasive 2009), Nara, Japan. (2009)

27. Patty Huang, Jonathan Abel, Hiroko Terasawa, and Jonathan Berger: "Reverberation Echo Density Psychoacoustics." Proceedings of the 125th Audio Engineering Society Convention, San Francisco, CA. (2008)

28. Mark Cartwright, Matt Jones and Hiroko Terasawa: "Rage in Conjunction with the Machine." Proceedings of the 2007 Conference on New Interfaces for Musical Expression (NIME07) New York, NY. (2007)

29. Hiroko Terasawa, Malcolm Slaney and Jonathan Berger: "A statistical model for timbre." ISCA Tutorial and Research Workshop on Statistical And Perceptual Audition–SAPA2006, Pittsburgh, PA. (2006)

30. Hiroko Terasawa, Malcolm Slaney and Jonathan Berger: "Determining the Euclidean distance between two steady-state sounds." International Conference on Music Perception and Cognition (ICMPC), Bologna, Italy. (2006)

31. Hiroko Terasawa, Malcolm Slaney and Jonathan Berger: "The Thirteen Colors of Timbre." Proceedings of IEEE Workshop on Applications of Signal Processing to Audio and Acoustics, Mohonk, NY. (2005)

32. Hiroko Terasawa, Malcolm Slaney and Jonathan Berger: "A Timbre Space for Speech." Proceedings of Interspeech 2005–Eurospeech, Lisbon, Portugal (2005)

33. Hiroko Terasawa, Jonathan Berger and Julius Smith: "Using A Perceptually Based Timbre Metric for Parameter Control Estimation in Physical Modeling Synthesis." Proceedings of International Computer Music Conference 2005, Barcelona, Spain (2005)

34. Hiroko Terasawa, Malcolm Slaney and Jonathan Berger: "Perceptual Distance in Timbre Space." Proceedings of ICAD 05 - Eleventh Meeting of the International Conference on Auditory Display, Limerick, Ireland (2005)

35. Hiroko Shiraiwa, Rodrigo Segnini and Vivian Woo: "Sound Kitchen: Designing a Chemically Controlled Musical Performance." Proceedings of the 2003 Conference on New Interfaces for Musical Expression (NIME-03), Montreal, Canada (2003)

Thesis and Technical Reports

1. Hiroko Terasawa: "A Hybrid Model for Timbre Perception: Quantitative Representations of Sound Color and Density" Ph.D. Thesis. Stanford University, CA, USA. *Thesis committee: Jonathan Berger, Chris Chafe, and Julius O. Smith.* (2009)

2. Hiroko Shiraiwa: "Synthesis of Performance Nuance of Violin Sounds Using Sinusoidal Model Synthesis." Technical Report, 2002. NTT Communications Science Laboratories.

3. Hiroko Shiraiwa: "Physical Model Synthesis of Baroque Recorder." Master's Thesis. University of Electro-Communications, Tokyo, Japan. (2002)

4. Hiroko Shiraiwa: "Measurement of Young's Modulus by Comparing Frequency Analysis of Struck Sound to Finite Element Analysis of Vibration Modes." Senior Thesis. University of Electro-Communications, Tokyo, Japan. (2000)

5. Nacer Hamzaoui, Hiroko Shiraiwa, Natasha Topalovic, Jean-Louis Guyader, Antoine Chaigne, and Stephen McAdams: "Prediction of Noise Radiated by Structures in View of Perceptive Evaluation." Technical report. French Ministry of Environment. (1999)

Artistic Works and Performances

- **Brain dreams Music:** A collaborative project for the development of the new musical instrument using Electroencephalography (EEG) with concert performances. My contribution is timbre generation using data sonification of brain waves. (2011-ongoing)

- **The Elements Music:** Commissioned for a PLAYBUTTON album "The Wonder of Elements" released from AVEX club label, in corporation with National Museum of Nature and Science, Japan. (2012)

- **Kita-Senju Voice Workshop:** Performed Participatry Vocal Improvisations. Tokyo, Japan. (2010)

- **In Green:** Electroacoustic sounds, 4 channels, with high definition video based on Japanese calligraphy drawing scans. Screened at Intermedia Performance Concert, and CCRMA Spring Concert. Presented as a dance performance with Karen Wissel at "Computer Music with Dance from the USA and Japan." (2009)

- **Stanford Laptop Orchestra:** Performed vocal improvisations for "Rumi Smash" by Visda Goudarzi as a solo soprano. (2009)

- **SoundWire Ensemble:** Participated in online improvisation concerts in real time via Internet2 with RPI and Princeton Universiy as a soprano. (2007-2008)

- **Pan-Asian Music Festival:** Moderated the network performance of "Tuning Meditation" by Pauline Oliveros for the performers and audiences in Stanford, CA, and Beijing, China. (2008)

- **Turning Point:** Musique concrète with video. Selected for the screening at International Computer Music Conference, Copenhagen, Denmark. *Juried.* (2007)

- **Behind the Door:** Video art. Presented at "Art at Speed of Light" exhibition, Department of Art and Art History, Stanford University. (2006)

- **Colors:** Interactive light sculpture for three people with color control. Installation presented at CCRMA Colloquium. (2006)

- **Origami:** Concert piece based on sonification of Japanese paper folding art process, for two performers and computer with four channel speaker setting. Collaboration with Grace Leslie. Performed in class recital. (2005)

- **Sound Kitchen:** Chemically driven, interactive music performance system. Collaboration with Rodrigo Segnini and Vivian Woo. Performed in CCRMA–CNMAT (UC Barkley Center for New Music and Audio Technologies) Exchange Concert. (2003)

Fellowship and Awards

- Best Faculty Member, University of Tsukuba (2016)

- Best Speaker Award, Japan-America Frontiers of Engineering Symposium (2015)

- Young Faculty Award, University of Tsukuba (2014)

- Young Investigator's Award, Japanese Cognitive Science Society (2014)

- Super Creator Award, Mitoh Program, Information-Technology Promotion Agency, Japan (2009)

- John M. Eargle Memorial Award, Audio Engineering Society Educational Foundation (2008-2009)

- Best Student Paper Award in Musical Acoustics, the 156th Meeting of Acoustical Society of America (2008)

- Student Conference Travel Grant, Acoustical Society of America. (2008)

- Conference Travel Grant, Society of Education, Music and Psychology Research (2008)

- Internship Grant, France-Stanford Center for Interdisciplinary Studies (2007)

- Centennial Teaching Assistant Award (the university-wide award for outstanding teaching), Stanford University (2006)

- Chair's Award for Excellence in Teaching, Music Dept. Stanford University (2005)

- Graduate Fellowship, Dept. of Music, Stanford University (2003 - 2004)

- Scientific Research Fellowship, French Ministry of Environment (1998 - 1999)

- University of Electro-Communications, Alumni Association Scholarship (1998)

Professional Activities

- **Board member** (2008 - present)
  Japanese Society for Sonic Arts.

- **Committee member** (2015-present)
  Editorial Committee for Acoustics Lecture series, Acoustical Society of Japan.

- **Committee member** (2014-present)
  Research Committee for Sound Design, Acoustical Society of Japan.

- **Board member** (2013-2018)
  International Community for Auditory Display.

- **Organizer** (2010–2015)
  Musical Emotion Study Group, Japanese Society for Sonic Arts.

- **Organizer** (2006–2007)
  Stanford Japanese Women's Seminar Series.

- **Co-organizer** (2005–2007)
  CCRMA Colloquium.

- **Research representative** (2005–2007:)
  CCRMA affiliate program promotion for Japanese industries.

Professional Affiliations

Acoustical Society of America, Acoustical Society of Japan, Audio Engineering Society, Information Processing Society of Japan, International Community for Auditory Display, International Computer Music Association, Japanese Society for Sonic Arts.

Languages

Japanese (native), English (fluent), French (upper intermediate), and German (basic).