Ask an Acoustician: Kelsey Hochgraf

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Welcome to the first installment of our new *Sound Perspectives* series "Ask an Acoustician." The purpose of this series in *Acoustics Today* is to introduce members of the Acoustical Society of America (ASA) to a member of the Society who will talk about his/her career. These people will be from a variety of fields and at various time points in their careers. The acoustics discipline is wide ranging, and we hope to highlight some of the ways people got their start, what their job entails, and some of the ups and downs of their careers. Every member of the ASA is very cognizant of the fact that one of the great strengths of the Society is that its members represent an extremely diverse range of scholarly interests and disciplines. So just as *Acoustics Today* strives to have scholarly articles that inform all members about the diversity of scholarly activity, this new series in *Sound Perspectives* shares the diversity of people making up the Society.

Meet Kelsey Hochgraf

Kelsey Hochgraf embodies someone in the "up-and-coming" category of acousticians, in her first position since obtaining her master's degree. Kelsey represents the architectural acoustics field and works as an acoustical consultant for Acentech (http://www.acentech.com/). She is associated with the ASA, having won second place in the Best Student Presentation competition in 2015 in Pittsburgh. She also recently played piano at the Society's tour of Boston Symphony Hall and presented two papers at the spring 2017 meeting in Boston: "Auralization as a Tool for Acoustical Design of Restaurants and Public Spaces" (http://acousticstoday.org/aural) and "The Model vs. The Room: Parametric and Aural Comparisons of Modeled and Measured Impulse Responses" (http://acousticstoday.org/model).

Kelsey was born and raised in Bow, New Hampshire. She obtained her BSE from Princeton University in mechanical and aerospace engineering and her MS in architectural acoustics from Rensselaer Polytechnic Institute. She also interned at Bose before starting her position at Acentech. Kelsey recently answered a series of questions designed to get to know more about her and her field.

A Conversation with Kelsey Hochgraf, in Her Words

Tell us about your work.

My job is to design spaces that enhance communication, comfort, and artistic expression. Acoustical design is an extremely collaborative process, often including the owners and users of a building, architects, and a variety of other engineers and consultants. Projects vary widely in size and type. I have consulted on the design of performing arts venues, schools, corporate offices, restaurants, residences, museums, libraries, recording studios, and racetracks. My contribution to a project is in the form of written recommendations based on measurements, calculations, and simulations, using graphical markups, sketches, and anything else necessary to

effectively communicate the information. My involvement in any project typically encompasses three main areas: room acoustics (the character of the sound within a room, which is related to its shape and materials), sound isolation between spaces, and noise and vibration control of building systems.

Describe your career path (how you got your start, what made you choose your field).

My initial interest in engineering stemmed from my love of math. Growing up, math always seemed more like a fun puzzle than a "problem." I loved that it could be concrete and creative at the same time, that there was an answer to every question even though you could arrive at the same solution in many different ways. When it came time to apply to college, I was drawn to engineering because I wanted to figure out how to use math and physics to tackle tangible problems in the real world, but my career choice wasn't quite that simple.

Growing up, I was also dedicated to several extracurricular activities, many of them musical (piano, violin, oboe, glockenspiel — yes, glockenspiel) as well as figure skating and dance. I considered becoming a pianist instead of an engineer but didn't want to give up everything because virtually nobody makes it to the top. I wanted to keep my options open, but I didn't want to give up the idea of incorporating music into my professional life. Because I viewed life as one big math problem, my thought process went something like this: "music + engineering = acoustics."

I went on to study mechanical engineering at Princeton and had the opportunity to do acoustics and audio research with Edgar Choueiri for my senior thesis. One summer, I connected with Ben Markham through Princeton's alumni directory. He introduced me to the field of acoustical consulting and advised me on graduate programs, and I now happen to work for him. I then completed a master's degree in architectural acoustics and soon after started my job at Acentech.

What is a typical day?

No two days are the same, and I'm very grateful for that! I often have more than 20 active projects, all at different stages of design and for different types of buildings. Sometimes I'm at my computer modeling a recital hall and developing an auralization so that I can listen to it before it's built. Sometimes I'm in the field measuring sound isolation between apartments or the sound levels of a chiller. Other times, I'm visiting a construction site to see a project in progress. Throughout the design process, I am reviewing architectural and mechanical drawings, developing recommendations to achieve the acoustical design goals, and communicating with the design team. Aside from consulting on project work, a typical day often also includes writing proposals for new projects and developing ways to advance our simulation and measurement tools. The balance between all of these activities is constantly shifting, and being a successful consultant requires excellent time management.

How do you feel when projects do not work out the way you expected them to?

Although it can be stressful and disappointing for a project to turn out differently than expected, I try to focus on learning as much as possible. These circumstances provide tremendous opportunities to grow if you're willing to dig in, ask questions, and take measurements until you really understand the unexpected outcome. Architectural acoustics is still a relatively young field, and sometimes it can feel like we have more questions than answers, but this is part of what makes it so exciting!

Do you feel like you have solved the work-life balance problem? Was it always this way?

Has anyone "solved" this problem? If they have, I'd love to meet them! As someone who is very new to the field of acoustical consulting (and to adulthood in general), I certainly struggle with the balance between work and home life. I have found that it's not a static equilibrium, and it's important for me to remember this when one is dominating the other. Now that I feel more settled into my job, I'm trying to reintroduce extracurricular activities into my life. Fortunately, I often get to play the piano as part of my work! I'm also very lucky to have a supportive partner to walk our dog and make dinner when I have to work late.

What makes you a good acoustician?

A good acoustician needs to be a technical expert, a creative problem solver, and an effective communicator. I strive to be a good acoustician by drawing on my experience and curiosity at the intersection between music and engineering and by applying close attention to detail and organizational skills to manage many simultaneous projects. I am passionate about designing spaces that work well for their users. Whether it's a kid in a piano lesson, a college student in a lecture, or an employee in an open-plan office, I can empathize with the real person, and that motivates me to develop acoustical designs that are as effective as possible.

How do you handle rejection?

Acoustical consultants deal with rejection on a daily basis. What may be ideal acoustically is not always best architecturally or mechanically or feasible to construct. It's important for me to be sensitive to the perspectives of other disciplines on the design team, but it's also my responsibility to help the design team make well-informed decisions.

What are you proudest of in your career?
I find performing arts centers in schools to be some of the most satisfying projects. I know the kind of impact that these spaces have on children as they grow up, and I'm determined to make them as acoustically effective as possible. These projects are also rewarding because they're very challenging. Many spaces need to fit into these buildings; they all need to be isolated from each other so that they can be used simultaneously, and the multipurpose demands on each space are incredibly high. For example, the performance hall needs to be reverberant for the orchestra but still clear enough to enjoy the amplified jazz band and to understand a lecture. At the end of the day, the design has to accommodate the diverse needs of the school's program while still being affordable enough to build. I started several of these projects soon after I joined Acentech, and they are just starting to complete construction. I can't wait to see how they turn out!

What is the biggest (professional) mistake you've ever made?
The biggest mistake that I've made so far happened because I didn't ask a question, fearing that it would make me look stupid. It turns out that "no question is a stupid question" is a cliché for a reason!

What advice do you have for budding acousticians?
Embrace the unique perspective that you can lend to a project, whether it's as a musician, a student, a resident, an actor, or an office worker, rather than focusing on trying to fit a "mold." Take every opportunity to learn from your peers and colleagues but use these opportunities to develop your own voice so that you can take ownership and responsibility for your work. As a student, I think it's important to be well-rounded. Strong foundations in math and physics are critical, but written and verbal communication skills are equally important. If you have the opportunity to do research as a student, pick a project that excites you and ask questions that further your curiosity into interesting problems.

Have you ever experienced imposter syndrome? How did you deal with that if so?
I'm experiencing it right now, answering these questions! If I answer them too honestly, you might all find out that I'm a fraud! In all seriousness, I think many of us experience imposter syndrome[1] to some degree pretty regularly. As a young, female acoustician in an industry dominated by seasoned, predominantly male, professionals I constantly feel the need to prove that I know what I'm doing. I operate with the mentality that the best way to prove my worth is by letting my work speak for itself, but it's easy for this goal to come into conflict with my health and happiness. I recently began teaching an acoustics course at Tufts. Having a classroom full of inquisitive students to challenge everything you say forces you to become intimately aware of what you do and don't know. Pushing myself far outside of my comfort zone has helped me to feel prepared and qualified to do my work.

What do you want to accomplish within the next 10 years?
In addition to designing successful buildings, I have 2 primary goals for the next 10 years of my career: to make progress toward bridging the gap between academia and consulting and to promote greater access to (and interest in) acoustics education.

There is so much relevant acoustics research at universities around the world, particularly related to acoustical simulation and auralization. I am determined to find ways to employ those advances in consulting and to motivate new research topics from project experience as a consultant.

Architectural acoustics is a fascinating field of interdisciplinary study, but it's frustrating to me that it's limited (at least in the United States) to so few schools and often only introduced at the graduate level. I think that the industry would benefit immensely from greater diversity and infusion of new perspectives, and there are a lot of people out there that would make great acousticians, if they only knew about the field!

[1] *Imposter syndrome (also known as impostor phenomenon or fraud syndrome or the impostor experience) is a concept describing high-achieving individuals who are marked by an inability to internalize their accomplishments and a persistent fear of being exposed as a "fraud" (Wikipedia).*