Lessons from Our Advisor
Christopher K. R. T. Jones

Jonathan Rubin and Amitabha Bose

Like many aspects of being a professor, advising PhD students is often part of the job but is rarely taught. Those of us in this profession encounter many instructors during our academic careers, and hence have deep wells of experience to draw from when developing our own approaches to teaching. Yet most of us only have one doctoral advisor, so an advising style tends to be a highly individualized trait that strongly reflects an advisor’s personality and values. Both of us had the opportunity to work with Chris Jones as our PhD advisor, yet it was only from conversations after the fact that we came to fully realize how special and beneficial this experience was. Preparing to write this article reinforced this realization, as we reached out to Chris Jones’s other advisees and many shared their deep appreciation for their experiences with Chris and his role in helping them to attain their professional goals. Chris’s advisees represent a diverse array of people: those who grew up in the US as well as students from around the world; women and men; people of different races and ethnicities. How was it that Chris, who grew up and completed his Bachelor’s degree in England, was able to connect with all of them in ways that made them feel unique? What were the lessons he passed on to each of us, either through words or actions, that have helped to shape us as professionals? We’ve tried here to piece together a few thoughts about all this and underlying them all is the notion that when Chris took on a student, he never viewed it as a limited-time relationship, but rather one in which he was committed to the student for the long term, or at the very least until they were professionally and personally settled.

Prior to his entrance to university as an undergraduate student pursuing both math and philosophy, Chris had spent time traveling the world, enjoying the experience of meeting and interacting with people. These early experiences no doubt shaped his ability to connect with so many of us later on. Chris completed his PhD with Charles Conley in the late 1970s. While doing so, he clearly absorbed a strong geometric perspective on dynamical systems. For example, he learned of the Wazewski principle, a tool that became a staple of his graduate ODE classes and that both of us continue to teach in our own courses. This geometric perspective pervades Chris’s work and that of many of his trainees.

We met Chris in the early 1990s at Brown University. He joined the faculty in the Division of Applied Math in 1990, bringing his PhD student Todd Kapitula along for good measure. Among the graduate students, Chris immediately developed a reputation as someone who cared about and was willing to spend time with students. From the feedback and clarity of his written comments on our graded assignments, to his holding extra recitation sections to go over homework problem solutions, to his organization of topics seminars for his students, postdocs, and visitors, his actions spoke for themselves. For one of us (AB) a particular training method stands out. Chris made me review a set of seminal papers by presenting them in excruciating detail to him on the blackboard in his office. These meetings were intense for me, but critical to my development in understanding the depth of knowledge and expertise that Chris expected of me. I distinctly recall him telling me “You have to develop a desire to know the (mathematical) truth!” To this day, I use exactly the same blackboard sessions with each of my PhD students. It takes time. The student initially is hesitant, but as time goes by, the student becomes more confident and clearly benefits.

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Another aspect of Chris’s caring has been his respect for students’ unique individual interests. The other of us (JR) came to Brown hoping to work on mathematical biology. Knowing this, when Chris went on sabbatical just as I was looking for a thesis topic, he set up the opportunity for me to travel weekly from Brown to visit the group of Nancy Kopell at Boston University. That experience provided me with an invaluable introduction to mathematical neuroscience and opportunity to interact with Kopell, her group and visitors, and many of the other dynamicists at BU, which has had a lasting impact on my career. When that experience did not lead me to a suitable thesis topic, Chris agreed to connect me with a problem from nonlinear optics, but he specifically steered me to consider dynamics inside a semiconductor laser cavity as modeled by a coupled system of reaction-diffusion equations, because experience with that model would likely be transferable to problems in mathematical biology.

Coupled with our own reflections, the comments from Chris’s former students helped us to identify several major themes that underlie his advising philosophy, which we detail below.

High Standards

Chris has a clear view of what he aims for in his own work: results that are mathematically interesting and rigorous or at least provide mathematical insight, that shed new light on an interesting phenomenon, and that are expressed clearly and elegantly, ideally in a way that includes a geometric perspective. He applies these same standards to his students’ performance across all domains. Importantly, he does so in a way that we would describe as humanistic: he acknowledges when problems are challenging, he respects students for putting in effort, and he compliments them for success; when effort does not produce the desired outcome, he does not belittle his students, but he also does not lower his expectations. In this vein, an anecdote from Todd Kapitula is illustrative: “When I was a graduate student and learning how to use some of the analytical/topological tools associated with the Evans function, Chris had me look at a couple of problems to see what I could do with them. I ended up solving one of them. Surprisingly to me, at the time the result was unpublished. Chris complimented me on completing the work, but said nothing about writing it up and submitting it for publication. I asked him about this, and his comment was along the lines of, “not every result needs to be published.” As time went on it became clearer to me that he was looking for good work on problems that he thought were interesting, and he wanted to publish only if the problem and results crossed a fairly high threshold. It was not to say that if the threshold was not reached the work was not good—it’s just that he was looking for a little bit more.”

Individualized Attention to Students and Finding Suitable Paths for Each of Them

Each student comes with their own goals and interests. Chris embraces that gestalt and customizes his approach accordingly. Chris himself recently said to us, “I was invested in the student’s career path first and foremost, before the research that followed.” The experience of JR described above exemplifies this principle. Other students of Chris’s shared their own versions of this experience. For example, Olivia Chandrasekhar “approached Chris as a second year student, emboldened by my recent success on my first comprehensive exam and looking for a way to meaningfully apply all the mathematical theory I’d devoted my time to studying. I’d decided I wanted to study models of wildfire propagation, although at the time I had little idea what that actually entailed. I reached out to Chris because of his interest in climate dynamics, which I decided was sufficiently close to my area of interest.” Chris not only agreed to work with Olivia, despite not having his own experience with wildfire research, but went further, as Olivia describes, “After our first Zoom call, Chris sent me a paper, gave me a brief rundown of tipping phenomena in dynamical systems, and suggested that we apply for a fellowship to support my work...We worked tirelessly on my fellowship application, bouncing email drafts back and forth in real time, Chris patiently clarifying technical details I bungled or didn’t fully understand. To my absolute surprise, our application was successful. After another potential advisor had discouraged me from applying for a similar fellowship because he felt my academic record wasn’t impressive enough, Chris’s investment and belief in me was extremely heartening. The funding from my fellowship has allowed me to pursue my own research agenda, but I believe Chris would have encouraged this independence regardless of my funding source...As a rule, Chris is supportive of each student’s individual path and respectful of their career aspirations. I’m very grateful to have a mentor who understands and supports my goals, rather than trying to fit my graduate work and experience into their mold of success.” In brief, as his recent student Katie Slyman told us, “I appreciate that Chris let me dictate my future career and path, and he found opportunities for me that aided in that process.”

Constantly Seeking Opportunities for Mentees

Olivia’s experience with her fellowship application illustrates this principle, which many of Chris’s other students also highlighted. It is almost uncanny how adept Chris has been at pairing his advisees with opportunities that are well-attuned to their goals and interests and have long-lasting impact on their career trajectories. For example, once JR was settled on a nonlinear optics thesis topic, Chris supported his participation in a multiweek summer school
and workshop in Edinburgh on nonlinear optics. Similarly, when AB was deep in the throes of his thesis, Chris had a conversation with Nancy Kopell about the problem which broke my logjam and ultimately led to a postdoctoral appointment for me with Kopell. Similarly, Katie Slyman reported that, “I was able to partake in two academic summer schools, which shaped my network of collaborators, as well as gave me a flavor for different types of dynamical systems research and extensions to the field. Additionally, Chris provided the opportunity to comentor an undergraduate senior thesis project. This mentoring role gave me the chance to gain experience and learn what I could expect if I chose a job in academia.” Todd Kapitula also described this experience, “I remember him getting me invited to various workshops, and him working on getting me speaking invitations at various conferences, for the express purpose of meeting the right people, and better understanding what others were doing. As the years go by, I appreciate more and more how he looked out for me at the beginning of my poststudent career…doing what he could to help me succeed.”

**Team-Building with Vertical and Disciplinary Breadth**

Chris is a strong believer in team science. As an applied mathematician, he recognizes that research is most effective when it starts from the problems that arise in an application area, and that the best way to ensure this connection is to engage directly with the experts in this area. There are two aspects to this approach that he emphasizes with students. First, it’s important to fully embrace the terminology and “culture” prevalent in the field. Second, it’s critical to balance applied relevance with mathematical intricacy; that is, research should identify and tackle the mathematical challenges that are needed for the applied challenges. In doing so, we create new math and new science. Chris fully includes his students in this multidisciplinary team engagement, and through this experience, his advisees unknowingly develop a sense of how to organize their own professional relationships. He has used this approach very effectively over the years, for example, building diverse networks of collaborators in nonlinear optics, geophysical fluid dynamics, and most recently, climate change. Examples of this principle come from the comments of former students. Colin Grudzien told us, “Chris Jones showed that theoretical mathematics can have a direct impact in other sciences and real-world applications. The key that Chris showed was in engaging scientists from other disciplines with openness and respect, and by assembling diverse teams that valued the differences in members’ expertise and perspectives.” Monica Romeo wrote to us, “I appreciated Chris’ community-oriented style of mentoring and practicing mathematics. Knowing a wide range of applied mathematicians helped me become more comfortable talking about mathematics with different people. It also connected me with a great group of individuals.” Finally, Olivia Chandrasekhar writes, “Another hallmark of Chris’s advising style is his willingness to collaborate, both with other mathematicians and researchers outside his field. Throughout my time as his student, he has encouraged my ongoing collaboration with researchers in wildland fire modeling at a national lab. This work furthered both my current research interests and my future career goals.”

**“Mathematics is a Social Activity”**

In May 2023, at the recent “SIAM Conference on the Applications of Dynamical Systems” in Portland, Oregon, the two of us had a chance to sit down in a lovely park with Chris to hear directly from him about his advising style (Figure 1). We didn’t share with him any of the comments of his former students, but simply asked him if he had a specific advising philosophy. In response, one thing he mentioned that resonated with the two of us was the phrase “Mathematics is a social activity.” Chris’s elaboration on this simple statement was very consistent with what his students had independently communicated to us, as documented above. Undoubtedly his advising style has centered around this notion while being informed by and evolving due to his interactions with students and colleagues. The two of us, and likely all of his advisees, understand this statement in light of our witnessing the depth of Chris’s involvement with the community of applied mathematicians as a whole, as well as the commitment, care and attention that he has individualized for each of his students.

![Figure 1](https://example.com/figure1.png)

**Figure 1.** Jonathan Rubin, Christopher K. R. T. Jones, and Amitabha Bose.

**Credits**

Figure 1 is courtesy of Amitabha Bose.