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Introduction

Organizing Indeterminacy across Tethered Venues

A long tradition of scholarship beginning with Everett Hughes reminds us that professions have authority. In his examples, the experts who govern us define what is a crime and how it should be punished; for example, the clergy, who have expertise in salvation, define what is a sin and how one responds to it. In medicine, various stakeholders including doctors define physical or mental conditions as healthy or unhealthy, and how they should or should not be managed. To put it another way, as experts do their work, they see and establish what for them, as professionals, is a problem they are meant to solve. When experts are managing problems, then, these problems are not "natural," but instead are created by those experts, who also create the solutions.[1]

If experts are able to manage their authority well, they will have support from clients as they do their work, and from other stakeholders with whom they work, and will continue to occupy their position of social influence. This project is an attempt to understand how it is that medical experts in particular manage their authority so that they do not have problems with patients and others who have a stake in medicine. More particularly, it is an attempt to understand how together, physicians and other expert stakeholders, maintain medicine's authority.

The management of authority has consequences if not done well. Historical scholarship on medicine, as well as everyday observations, suggests why medicine's authority might not always be a given, and also the potential consequences of the profession's inability to manage authority. Medical practices have not always worked, and sometimes still don't. Medicine, sometimes not far from bloodletting, involves much trial and error. Technologies break, and kill people. As a consequence, some patients may reject the value of medical solutions—for instance, vaccines. Doctors may find that, as they treat patients, the diagnoses and treatments they would usually

support are not right for the case. Hospitals may seek to control the kind of work doctors do. This problem with reputation sparked the emergence of the allopathic medicine movement.[2]

This project differs from earlier work on what authority is and how it is originally obtained, as framed by Hughes and the many he influenced: I ask how authority is continuously managed. For instance, what is the role of individual professionals in managing medicine's authority? How are competing claims for authority adjudicated by individual practitioners when they need to make a practical decision? And what are the practices that doctors regularly engage in to maintain the authority of the collective?[3]

This book is the product of my work to understand the connections between the individual interests of these stakeholders and the collective consequences for their patients and themselves. That goal, and questions including those posed above, require attention to the processes physicians use in an ongoing way to maintain authority. As we will see later, when doctors manage their authority, they are managing different aspects of their work and relationships with others in their occupation, as well as with patients, including creating new practices, and evaluating and adopting technologies. This approach offers a new perspective on the management of authority, and tests some basic assumptions about physicians' tasks that have been isolated from the broader scope of work they do with their credentialed peers and other stakeholders to manage medicine's authority in what I will refer to as an "occupational project" shared by all the stakeholders.

This book is an ethnography, and as such it focuses on individuals, and all they might do to establish, reinforce, and implement practices. But it also focuses on a compelling account of the relationships between individual actions and their collective consequences, and it accounts for persistent and consequential processes and connections among those who perform different work and periodically meet in various venues, including venues often obscured in ethnographic work. As I'll explain in greater detail below, I use the term *venue* to capture places that are formatted for focused tasks that involve joint activities, are attended during specific periods for particular events, and serve to organize work on some dimension of the collective project that those attending are at least minimally motivated to strengthen. Rather than examine a single venue or compare venues, as is often done, I study consequential linkages between them, examining the relationships among a set of venues that are interconnected, or "tethered."

The venues I observed were a hospital's wards, the operating theater (which they and I refer to as the "lab"), and boardrooms; industry-sponsored fellows' training programs and hands-on meetings for physicians to learn new technology; and annual meetings of the professional association.

The multiple venues I observed allowed me to understand how doctors define what counts as a medical condition and perform medical in-

terventions to treat those conditions. What I saw was a very complicated relationship—and which has not been revealed in previous studies—between authority, cross-venue collaboration, and making new knowledge. The next step for this study, then, is to take a quick look at a particular venue that lets us see joint activities in medicine in all their complexity. Then I will read this vignette through the conceptual vocabulary this book proposes.

The Live Case Presentations at the Annual Professional Association Meeting

The vignette below describes individuals who perform many of the tasks involved in managing authority, gathered at a conference organized by the Heart Rhythm Society. Many of these practices seem foreign to what I understand as medical work. Specifically, several of the problems they have to face in this venue broaden the scope of their work beyond working with their hands or developing new knowledge.

> When I get to the venue, which is the annual meeting of the professional association for certain specialized cardiologists—cardiac electrophysiologists—and take my place with the attendees, I recognize that some of their tasks are familiar, if at a completely different scale. I'm sitting in a 10,000-seat auditorium, featuring an immense Jumbotron screen. It's the largest conference room in the country's largest convention center. We're about to watch a live case presentation, in which some well-known physicians are working together to demonstrate new knowledge and allow others to critically examine it. Specifically, selected presenters are directing surgeries from their home operating theaters—or "labs"—in which they operate, in real time, on real patients, while these surgeries are broadcast into the auditorium.
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> The live case presentation is a centerpiece and the most popular event of the international annual conference. The master of ceremonies and a row of internationally distinguished cardiologists sit on the stage, but everyone's eyes are fixed on the forty-foot screens behind them. To keep up with the state of expert knowledge, EPs in the audience have arrived from the institutions where they usually do their work, and those who can't attend have paid hundreds of dollars for on-demand access at home. They are here to learn about new territory being charted, but also to marvel at these sometimes-transnational performances. Given the pulsing music, and the rise and fall of audience members' cell phone

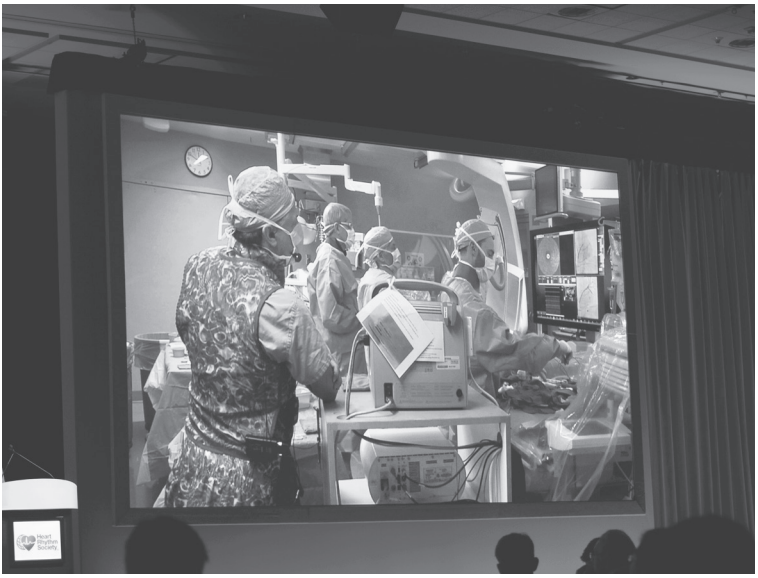

Figure 1.1. An operating theater, or "lab," in which an electrophysiology procedure is being performed. Although it is not the live conference described in the vignette, it has a similar audience size and composition. The doctors being watched are dependent on screens to ensure they address the patient's problem, and, for purposes of validating their observations in their home labs, the doctors watching the screen from the conference rely on watching the mediated doctors. Photograph by Carlos Javier Ortiz.

cameras, to me, at least, it feels less like a conference than a rock concert.

The first presenter is Dr. Kellogg. Her procedure involves a new way of pacing the heart to prepare for a pacemaker. She is the only speaker in the presentation, but behind her are two nurses, a technician (or "tech"), and an advanced student ("fellow"). Another fellow stands at the bedside, with hands on a lead he's snaked up the femoral artery into the patient's heart. Dr. Kellogg next introduces "our friends from Medscape and Medicore," the medical device company representatives who are always at the bedside during procedures, there to clarify the affordances of new technologies, offer a hand, and gather intel on how doctors like the technologies and whether those doctors can use them safely.

One of the purposes of Dr. Kellogg's presentation is to point out a new solution to a recognized problem. Dr. Kellogg grounds her work in recent scholarship, and she mentions another case her team will soon publish, based on an innovation they developed

in their lab. She describes the lab's "neat double-alligator technique" for collecting and visualizing EKG signals from the lead, which is a kind of antenna that carries electrical signals. She also demonstrates her new way of pacing the heart, called "His bundle" pacing, performed from a different location than usual. This approach allows doctors to more precisely program a pacemaker to fix the rhythm of an abnormal heartbeat, by electrically activating both of the heart's ventricles, rather than one alone. On one screen, we see slides of EKGs, images of anatomy, and results of clinical research. On the foot of many of the slides that contain elegant images of the anatomy she is treating, Dr. Kellogg has acknowledged another respected standard-setter for providing the images. On another screen is an ongoing live image of the lab itself, the true testing ground for any medical procedure. It offers a view of the hands of the fellow performing the procedure as well as the team enabling their use. Displayed on yet another screen is a real-time digital capture of a fluoroscopy of the patient, an X-ray image of the movements of the heart. Dr. Kellogg provides a verbal interpretation of both the EKGs and the fluoroscopy for the audience and panel, and points out the atrial lead, which, she notes, was placed "at the suggestion of an astute representative from Medscape."

Some questions with direct and straightforward answers are asked by doctors who already use these techniques, and by the moderator. As the fellow screws a lead into the patient's heart, an audience member asks whether the patient will be safe if they must get an MRI scan at some point in the future. He is concerned about whether Dr. Kellogg's new direction is compatible with his everyday routine. "The 38/30 lead is not MR conditional. How much of a problem is that?" Dr. Kellogg responds: "OK, that's a good question, and we got confirmation from our Medscape rep here that the lead is MR conditional at this point." After she gives a thumbs-up to the camera, she redirects attention back to the lab's innovative technique of displaying the jagged EKG on the same screen as the map of the heart they've made, yet another image they make to track their progress on the procedure. "Having used our neat double-alligator technique, you can see the position of the lead on our 3-D map there." It's an innovation that affords the physician the ability to see more, and that Dr. Kellogg believes will offer colleagues a valuable way of interpreting information on their patients' hearts.

The expert panelists begin to ask questions about the direction proposed, ones that reflect their own positive and negative

experiences. A key issue involved in the task of pacemaker implementation is that the screwed-in lead can become dislodged from the heart's wall, requiring a new operation. Dr. Strauss asks, "How often do you encounter the issue of the lead falling off?" Dr. Kellogg repeats the question, and admits, "I would say that probably for most of us, in the initial experience the answer is, 'More than we would have liked.'" Dr. Kellogg is willing to acknowledge that she, like doctors with less experience, encounters challenges when undertaking a new procedure. She indicates that she's still working out a strategy. Dr. Strauss is paying attention not only to the screen but also to the audience, and he endorses using *his* approach with the lead. Their other panelists endorse their own approaches, in turn.

After answering all these questions, Dr. Kellogg once again takes center stage. As a riposte to the others' attempts to validate their own track records, Dr. Kellogg makes a display of success: she finishes the narrative of the case by showing, and defining, its completion; turning back to the fellow, she asks him to show one last X-ray image and set of EKGs. She finishes by describing her good result: "We checked our threshold and it looks like it's .3 at 1.0 milliseconds." That level signals success, and she reinforces it for the audience. The audience members' cell phone cameras bob for a final set of screenshots.

Amid the applause, the master of ceremonies issues his praise: "Well done, congratulations."

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The cameras now move to another lab at Cityview Hospital. In this case, the presenter is Dr. Passer, but doing the procedure is not a fellow, but rather Dr. Stimm, who is Cityview Hospital's EP program director and a well-known expert in ablation. Ablation is the practice of using a catheter to create scar tissue in the heart so that it doesn't trigger or sustain an abnormal rhythm. Dr. Stimm is focused on the case, but also on the international viewing audience. The procedure Dr. Stimm will perform is more complex than the first one we observed, and is considered innovative for its use of two existing technologies not ordinarily used together. These technologies are usually used for different procedures than today's, but Dr. Stimm wants to show that when used together they can solve new problems that cannot otherwise be addressed with existing technologies.

Unlike Dr. Kellogg, who was directing a fellow to perform a procedure that has become fairly routine for her lab and has been made accessible to non-experts, Dr. Stimm's procedure requires more specialized knowledge than most EPs hold. The other physicians on the screen are also esteemed for their particular niche in the laboratory; when Dr. Lindbaum, one of the panelists, brings up a question on anticoagulation, we can see Dr. Passer, on the screen, turn and ask his colleague Dr. Long, who has specialized knowledge in the area.

Dr. Stimm has selected the case because the conference audience comes to be wowed, and this one truly fits the bill. As he later put it, in an interview with me, people want a live case to be "a little bit like NASCAR, where you watch it to see a crash." But ultimately, he said, doctors performing live cases strive to select a patient with whom they can succeed; they want to show that their group does high-quality work. Before this patient was chosen, three others were considered and rejected: one with cardiac anatomy that was too large, a second whose wife objected, and a third who didn't reliably show up to appointments. Somehow this patient was comfortable—or made to be comfortable—with the potential risks.

The camera first zooms in on Dr. Passer, who describes the catheters they'll use, and then onto Dr. Stimm's hands, which loom large on the screen. They hold and flip the handle of the ablation catheter, to demonstrate how he will soon apply light pressure on its small knob.

Behind the star power of Dr. Stimm is a support network that reaches beyond the members of his lab. Dr. Lindbaum recognizes when Dr. Stimm is struggling to place his catheter where he can pick up important signals. This struggle occurs despite Dr. Stimm's earlier efforts to prepare for a smooth performance, which he initiated the moment he was invited to carry out the presentation in front of thousands. As he recounted to me later, in an interview, "Before we went live, we put a wire in a nice place and took it out, so we knew we could get there. When we went live, I couldn't get it back there." Fortunately, Dr. Lindbaum had visited his lab the week before to observe the innovation, and as he sat on the dais at the conference he was able to help Dr. Stimm save face during the live procedure. Dr. Stimm said, "Steve Lindbaum texted [my lab colleagues] to put the endo wire in further. I did that, and it went right in; that's what allowed us to get the wires together." Such on-the-fly support from a colleague in a far-flung venue will be remembered; as Dr. Stimm later put it, "I owe him now."

Arrhythmia eliminated, Q&A begins. The conversation turns to post-procedure experiences. Live cases like these are venues where experiences that look like complications can actually be recast as common occurrences, and even expected. There is a back-and-forth, with doctors sharing their own experiences with patients whose procedures didn't follow the same trajectory as Dr. Stimm's. Dr. Lindbaum asks about a possible complication that has to do with how long to keep a drain in the patient's chest after a procedure: "How often do you see the pericardial effusion the next morning?" Dr. Passer answers: "We keep the drain in until we see no drainage. However, sometimes they come back with [fluid]. Is that a unique experience, or are we the only ones to see that?" Other panelists jockey to share their similar experiences. Dr. Strauss responds, "Sometimes it happens, if they have heart failure." Another panelist affirms in a way that helps those in the audience, who may eventually perform these or similar procedures in their home labs, interpret and justify their own experiences: "Sometimes that happens, and they need support for a few days. So keeping a drain for a few days is a good idea." At this point, the direction forward does not seem clear, but something else is clear to me: even once new solutions are proposed for problems that physicians tackle, those solutions may not always work.

The master of ceremonies ends on an aesthetic note. "Beautiful outcome there. Congratulations. Very courageous case."

The applause of the audience thunders through the room. Regardless of where the audience members are watching from, the conference center or their homes, all now know what innovations—and what challenges they create—are coming from one of the top programs.

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The next morning, the third and last case is performed in a recently redesigned lab across town, at Superior Hospital, where the matter of dexterity becomes more complicated. This hybrid lab is new, low-lit, and holds robotic technology that enables collaborations between those on the vanguard of both cardiology and cardiac surgery. Dr. Torstal, the director of the electrophysiology program, introduces Dr. Balter, a cardiac surgeon who "just celebrated his 300th robotic procedure in three and a half years." Behind the crossed-armed Dr. Torstal, in the remote laboratory, we can see the robot's metal fingers tweezing into a beating heart.

Dr. Torstal intersperses his descriptions of their next plan with the word *disruptive*, a term that means "pioneering" among the au courant business school set. He notes that the current procedure is based on a "first-in-man" procedure—that is, one previously tested only on animals—that he published as a case report in electrophysiology's top journal. Dr. Torstal describes the part of heart he's operating on: "This might be an area that has truly never been accessed in human beings. Any comments from the expert panel?" From the conference stage, Dr. Strauss asks Dr. Balter how he does the procedure safely, while pointing out his own strategy. Dr. Torstal comments approvingly, "Wow, that's slick."

Suddenly, a seemingly uncontroversial subject—the existence of a piece of anatomy—becomes a matter of contestation. When one of his fellows shows him the map of the heart they've made, Dr. Torstal acknowledges and calls into question the position of those who, as he puts it, believe in something called "macroscopic channels." "There does appear in the area there—*if you believe in the macroscopic channels*, the area we didn't map—you can see there is a potential broad isthmus between the scars." He then mentions leaders in the field who were skeptical of the value of examining these so-called channels, and "had a nice paper in *JACC* [*Journal of the American College of Cardiology*] several years ago saying that isolated diastolic potentials offered a better case for ablation than what you got from just looking at those channels macroscopically." After asking the expert panel for their impressions, he gets validation—and the last word: "It's a good point—I think you need to combine both, you need to look for the channels, but you really want to see those isolated diastolic potentials, which you have here."[4] Thus, anatomy, especially anatomy one's rivals will reference to justify their practices, seems to become a matter of belief.

Similarly, other questions about medicine appear to afford a chance for an individual physician to set a professional agenda—and to also signal their distance from industry. Such opportunities are usually seized by central leaders in electrophysiology, whom I call "standard-setters." These leaders can be distinguished from doctors who are a bit more peripheral—I'll call them "clinicians"—and who comprise much of the live case's audience. When Dr. Torstal answers the next question, from a clinician who asks what technologies he advises using for a procedure, he asserts that no doctor should be tied to one medical device company. Even if his embrace of "disruption" suggests in part an appreciation of what technology companies may offer, he has distanced

himself from physicians who appear unjustifiably exclusive with the technologies they use. A different clinician asks him about the advantages of the mapping system he is using. "We use all three systems. The advantage of this system is—" He takes a moment to reassert the importance he places on choosing whichever technology suits the particulars of the case at hand. "I personally, to editorialize, think that we should choose the shape of a mapping catheter tailored to the arrhythmia of interest."

More cell phone cameras rise and fall, and a clinician I've approached says she plans to share her photos with colleagues and administrators "back home," despite the fact that a recording of the event is included with her conference registration.

The moderator signals he is aware of the suspense and general entertainment value that this live case has created: "Dr. Torstal, we've given you five extra minutes in this session. It's an encore; they're holding up lighters in the audience."

Even with the enthusiastic extension, Dr. Torstal remains restrained. He primes the audience to be prepared for the possibility of a "steam pop," in which a bubble forms during the process of burning, or ablating, the heart, which can marginally increase the possibility of perforating the heart. Later, he reiterates this concern. "Again I want to remind the audience that if you see a steam pop, don't be too alarmed—everything's quite superficial. [There may be a steam pop] because there's no cooling."

The moderator congratulates and thanks Dr. Torstal and the experts. No steam pop has occurred, and the fellows have begun stitching the sutures. In closing the moderator reaffirms the role of chance: "We wish you good luck."

Getting to Authority: Organizing the Indeterminacy of Expert Knowledge

In many ways, the vignette is a setting similar to the classic representation of medicine's authority in so many paintings, such as Rembrandt's *The Anatomy Lesson of Dr. Nicolaes Tulp*, or Eakins's *The Gross Clinic*. I turn to these paintings now because they are iconic representations of some of the raw material of authority. These paintings depict an operating theater in which top physicians, demonstrating points of anatomy, are surrounded by people in tiered seating. These doctors are using their resources in time and energy to define and reinforce definitions of sickness and health, respecify anatomy and diseases, and share expertise—that is, teaching. Some have earned the right to teach and demonstrate, while others are there to observe and defer.

The scenario depicted is familiar to many sociologists studying medicine, too, who have seen, for instance, how the ritual of grand rounds allows surgeons in a hospital to observe their colleagues' virtuosity with high-risk patients, and to collectively review the generalizable principles that are emerging for the surgical management of disease. The paintings show us authoritative experts who get to perform the riskiest medical tasks, and others who are watching them, as they reinforce and sometimes shift the profession's understanding of the body, illness, and treatment.[5]

These pictures not only hang in world-class museums but are also reproduced on the covers of some of the most influential social science works on medicine. But there is much that the pictures obscure. They don't show that in the face of a high degree of risk, medicine is characterized by a wide variance of plausible options for dealing with that risk. They don't show the give-and-take among medical experts who question each other and suggest competing approaches. They don't show that medicine is, to a great degree, indeterminate with regard to the boundaries of expert knowledge and accepted practice. As shown in the vignette and in the data presented in this book, organizing this indeterminacy is important because there is a project around it, one that extends to other venues.

Some features of the vignette help to illustrate this idea of indeterminacy. First, in contrast to the static account offered by the paintings, we see in the vignette repeated instances where the presenting doctor constructs others' view of their work. For instance, when Dr. Torstal recasts the steam pop as relatively benign—or at least justified in light of the benefits of his procedure—he is offering for his colleagues a way to understand a particular dimension of EPs' work. And he calls into question the existence of "macroscopic channels." But what sort of processes are involved in a situation in which someone is both shaping understandings, but also giving space to those who push at his preferred understandings?

We can see indeterminacy a second time when the doctors in the vignette demonstrate their expertise alongside other stakeholders and tasks, which the paintings also obscure. We see in the vignette, for instance, the interesting fact that Dr. Kellogg looks to medical technology reps on the stage for knowledge that she and the observing clinicians both lack. Overall, what's the significance of the fact that they are performing multiple tasks and working with unexpected stakeholders like companies?

And we see indeterminacy a third time, in the presenters' references to those far beyond their labs, and to their knowledge, distinct connections also not suggested by the paintings. What's the significance of the fact that the presenters are linked by digital feeds to the audience at the conference venue and to those watching from remote locations? In the paintings we have a range of people in the audience, and some are talking to each other.

How do we make sense of the fact that Dr. Stimm's colleague in the conference venue was sending text messages to the lab, offering him advice that ultimately enabled him to execute the procedure successfully?

Finally, in the vignette we see indeterminacy in shared understandings of how medicine itself should be understood, and in efforts to help shape that understanding. For instance, on the foot of many of her slides, Dr. Kellogg has acknowledged another respected standard-setter for providing the images she uses. And in Dr. Torstal's presentation, we saw him seeking to shape understandings about technologies, when he suggested how decisions about catheters should be made. How should we make sense of the fact that these experts appear less uncertain about what they are seeing than they are actively shaping what other experts involved in medical work should be saying and doing?

This book is intended to explore this indeterminacy of knowledge, practice, and the occupational project itself. It stretches across many venues, to show how in the face of this indeterminacy, powerful experts go about managing their authority by managing the conceptualization and implementation of their occupation's core ideas of problems and solutions. For sociologists, there are many potential payoffs of looking at the ongoing organizing of authority in medicine. Such a focus can allow us to understand the individual's role in managing authority. We can then account for why there are differences in practices across places. We can understand how authority can persist regardless of stratification inside of medicine, and how physicians at different social locations differently contribute to the authority of the group. We can identify why some treatments that are considered effective at one point might later be considered problematic. We can go beyond demonstrating that medical work is unsystematic ("it's complicated" or "nuanced" or "messy"), and show, especially in terms of its relationship to science, some principles through which it is organized. And this focus can provide a way of thinking about how knowledge is considered by a group given privileges to create and vet it, and how we should understand what knowledge is accepted. Finally, a potential practice benefit beyond sociology might follow a focus on the fact that they do manage authority, and how: it provides a basis for trust. What we might see is that giving doctors the right to manage their authority serves public interests more than otherwise thought.[6]

Yet, because the processes I use to observe and study interaction are new, we need a vocabulary for understanding what is happening. To take our scope of inquiry beyond the immediate conversation, I ask: How else might what we have seen in the vignette be related to authority? To answer this question, in what follows I will continue to read the vignette using theoretical constructs I propose will be valuable for understanding authority, namely, organizing indeterminacy, problems and solutions, the occupational project, and tethered venues.

The Process of Organizing Indeterminacy of Expert Knowledge

From the perspective of a sociologist, what we saw in the vignette might look like managing uncertainty, that is, the application of expertise to particular circumstances. When we talk about individuals with uncertainty, we are referring to situations where members of a group must make a decision and are not sure either how the group understands the knowledge base related to that decision, or whether that knowledge applies to the specific decision at hand. The managing of that uncertainty is a process of trying to apply expertise in working through a particular case. And we can see some of that in the vignette, for instance in Dr. Stimm's concern about whether his procedure would be successful. Similarly, we saw Dr. Kellogg ask colleagues about how long to put a drain in a patient's chest after a procedure, which reflects her uncertainty about whether challenges involved with this practice can be traced to the patient or to the procedure.[7]

I differentiate this process of organizing indeterminacy—which involves processes of active definition, control, and construction—from well-studied processes of managing uncertainty. Organizing indeterminacy in medicine is a process of defining and changing the way anatomy, disease processes, and medical practices writ large should be understood by colleagues and the public, while managing uncertainty is a process of working through a particular case about which one is uncertain regarding those details of anatomy, disease processes, and medical practices. Organizing indeterminacy involves controlling people to shape medicine itself. Individual physicians are actively working together in an occupational project not only to understand medicine as it has been handed down to them, but also to *construct* medicine itself in light of constant social changes. They are working as individuals, but they are also collectively contributing to the practice of medicine itself, because they are allowing people to see their work and comment on it. In contrast, managing uncertainty happens once the work of labeling is done. It is a term often used to describe the individual's state of understanding, rather than the individual's work in shaping others' understandings.

The data, taken as a whole, show a picture different than that of managing uncertainty. The vignette shows an open, but noticeably organized, physical and conceptual space, in which a whole range of ideas about medicine is entertained. It's a situation offering a range of potential directions that physicians could have taken, and a range of diverse positions on knowledge that people might potentially agree on; a moment prior to the carrying out of the tasks. In that situation, multiple different doctors were attempting to use language, people, and material resources to shape thinking and behaviors about medicine. And the germ of that idea is behind the work done by this book.

My reference to openness captures the idea that for these experts in medicine, it is a given that people can disagree—different opinions can exist in the same space. In the vignette, we can see openness in the fact that in certain circumstances there may not be a single, widely shared, way of understanding a social and physical fact, but rather, different perspectives on the way the EPs' work might be understood. In the state of indeterminacy we saw in the vignette, individuals have a relationship with that work that is conditional. The vignette highlights contestation, even over the existence of a specific location on the human heart and the use of existing technologies. The conditional relationship to work can also be observed when technologies change, resulting in new signals to be seen, understood, and addressed, and new opportunities for treatments.

The most interesting quality about the data offered in the vignette is that despite the indeterminacy about what the profession's knowledge was, is, and could be, this was also a systematically managed event. And, as I saw later, there were features common across different venues—in particular, the systematic management and the building of the knowledge base. I saw a condition in which individuals who are reliant on a knowledge base are *also* actively working to shape that knowledge base, and how others interpret information that is part of that base. They are renewing, refreshing, and reinvigorating a knowledge base.

I describe these processes together as organizing indeterminacy, which involves claim-making (including labeling), advocacy, examination, refinement, and accommodation of the views of others. These stakeholders were differently advocating for surgical versus pharmaceutical versus behavioral interventions, and they were differently claiming the superiority of one particular school of thought (what Crane referred to as an "invisible college"), often tied to their training program. And all were seeking to convince peers and students of a particular mode of interpreting an EKG or even recognizing an anatomical structure or physiological process; for example, Dr. Torstal's indicating to the audience that they might understand the patient's problem as involving either "macroscopic channels" or "isolated diastolic potentials," depending on what they believed. They were refining and reinforcing different approaches and best practices for the clinicians in the audience. The doctors were choosing to label standards for the tens of thousands of viewers paying to watch in person, via the live feed, or through the videos they purchased "on-demand" online, or on a portable hard drive, to learn about breakthroughs and gain continuing medical education credits. In the vignette, the labelers were defining the boundaries of the open, indeterminate physical and conceptual space of medical work. This indeterminate space doesn't exist independently of those who label it; and so, although it might be described as the proverbial "gap" in knowledge, it is not.

Having gotten a partial view of the cast of characters we'll encounter in this book, we can now take a closer look at how their collective efforts con-

tribute to the management of authority. The choices made by the vignette's doctors are similar to the organizing processes captured in observations of grand rounds in a hospital, but their pioneering choices have a global scope, involving rare and often tricky conditions, for which no map exists. And we see, consistent with what scholars have demonstrated regarding the hesitancy of senior physicians to sanction colleagues, that nothing's punitive—no one's getting blamed for unpredictable events. Rather, the peers of these senior physicians recognize and make concessions for inevitable complications that might happen in this space of openness, maybe even letting them organize indeterminacy by relabeling events that initially seem negative (such as Dr. Torstal's steam pop). No one is guilty for raising an objection or question, because new ground is being broken; those who speak up are trained to organize indeterminacy. Overall, the vignette offers a snapshot of what the leaders of cardiac electrophysiology are doing, as practitioners of medicine, to organize themselves and a knowledge base.[8]

Creating Problems and Solutions

When physicians shape indeterminacy at both individual and collective scales, they produce medical authority. And medicine, like other areas of expert work, trains its members to do this shaping, and to understand that it is a part of their work. They have enough to do in the fast-paced and high-stakes environment of their day-to-day work on the wards and in the operating theater. How do they manage the constant pressure of change, for instance, the indeterminacy generated by introduction of new technology, or the pressure of a new disease on matters of the heart? Together, they organize it by labeling problems and solutions.

This process of labeling cannot be organized by individuals alone. Professional authority doesn't exist unless a range of stakeholders buy into it, sharing an at least provisional idea of what the professional group's work is. Those people are different, and the tasks are too—there are different tasks done in different venues, and those venues necessitate that different people work to carry out these tasks, and that the acceptance of subordinates is at times necessary. In the live case presentation, we're seeing alternative interpretations about how peers should approach how they gather and interpret information in everyday work. In subsequent chapters in this book, we're going to see other tasks; for instance, in medical device company meetings, the synthesis of a range of research and clinical data into support for using a particular technology; and in annual meetings, the endorsement of a particular school of thought. How are people, tasks, and venues connected in terms of how indeterminacy is organized?

One way to think about what happened at the conference observed in the vignette is that indeterminacy was defined by individuals, and organized in a way that had the potential to shape the understandings of those inside and

outside the professional group. Scholars of professional work, and of social problems generally, have used different terms for this basic social process, from "diagnosis and treatment" to "labeling" to "social problems." Sociologists have recognized that this process is central, for instance, to the control of people who are considered different, whether in the work of the criminal justice system or in the work of the professions. And labeling has also been understood to make it possible to socially process individuals in these systems of criminal justice and health care. More important, it has been recognized that this process plays a role in the further development of those systems.[9]

The terminology I use, "problem and solution," is continuous with this language, yet broader, as I seek to reinforce that a homogeneous set of experts—that is, a set of similarly trained and credentialed professionals—are not just taking an existing task by relying on a set knowledge base. Rather, a wide set of stakeholders from across professional groups are continuously generating those problems and solutions themselves. Even if it describes a general social process, the language "problem and solution" closely tracks the terminology used by scholars of medicalization, those concerned with laying out the contours of medical authority. On the one hand, medical professionals, often alongside stakeholders such as industry, and patient advocacy groups, label problems: should a heartbeat with a certain EKG reading be called an arrhythmia or a consequence of too much caffeine under stress? Should a set of behaviors, such as distractibility or forgetfulness, receive the diagnostic attribution of attention deficit disorder, or of being twelve years old? They create these classifications for a collective group, both inside and outside medicine. On the other hand, professionals also label solutions: whether it should be medications or school recess that is needed to address attention deficit disorder; whether surgical intervention or meditation should be used to treat arrhythmias.[10]

This focus on ongoing shifts in problems and solutions reflects a key way this book departs from previous literature on medical authority. In their studies of medical authority, Freidson and Starr were focused on explaining how physicians make, in Paul Starr's terms, their "definitions of reality . . . prevail as valid and true." This project is informed by a different question that is equally if not more important: *How* does a wide set of stakeholders continuously organize the processes of defining how medical work should be understood? This question arises because, unlike Freidson and Starr, who were trying to understand the social organization of medical authority by looking at a very small set of stakeholders, primarily comprising and centering physicians, this account is centered on a wider group of professionals. And unlike theirs, my question is process-oriented. While they used synthetic or historical approaches respectively, this ethnographic account focuses on the people and places continuously organizing medical work. And therefore, it is centered more on a wider range of ongoing pro-

cesses at work, offering a way to conceptualize and understand the management of authority in the present and into the imagined future.[11]

This book will begin to examine this adjudication process central to medical authority. Other questions arise, for example, how does the social organization of authority work so that someone can identify a problem and solution, comfortably pronounce on it, and, at the same time, also acknowledge that people are going to possibly disagree with it? Dr. Torstal's comment suggests that part of the labeling process is knowing that it's possible to disagree with a label once it is made by an influential doctor. It suggests that there are some processes yet to be identified that allow work to continue even when strong differences exist. Later in the book I pursue how doctors like him go about socially organizing their work to try to fill the indeterminate space of defining problems and solutions, while also leaving it open, and I will consider the space's consequences.

The Social Organization of the Management of Authority: The Occupational Project

It's time to acknowledge that in one way, the vignette could be somewhat misleading. Specifically, it might suggest that the process of creating problems and solutions is an individual project of particular doctors. But, if we think about the vignette a little more closely, we can see that it is showing us a social project, in which we see ties to industry, and physicians with different opinions deciding to come together in this venue of the conference, to share their positions, contest each other's positions, and propose new positions. This section focuses on paying attention to a social project of a particular type: the occupational project. This concept of occupational project captures a range of tasks that constitute work; as we'll see in subsequent chapters, for doctors these tasks include, for instance, maintaining relationships with invisible colleges, accessing resources for clinical trials, and naming anatomy—tasks performed with an eye toward the future of the group. These tasks contribute to processes of establishing problems and solutions with a range of stakeholders—including ones often thought of as "external"—as these stakeholders manage authority.

I introduce this concept of occupational project because it is a way in which we can examine more broadly the range of processes that may contribute to managing authority. In an important way the vignette has focused us on the steps taken by a few prominent people on the stage, but looking at the occupational project brings our attention not just to shop-floor tasks of work, not just to the positions of prominent people, and not just to the efforts of credentialed professionals aiming at a unitary goal, but also to the actions of interdependent stakeholders that are centered on taking the profession into the future.

The vignette also shows us characters new to ethnographic studies of medicine and the professions, and, in contrast to other works, positions them as constitutive of, and not external to, medical work. What we see in the vignette is a diverse group, taking on multiple new tasks, and engaging in unexpected collaborations. They also interact in ways that show us a bigger kind of project, in which different kinds of knowledge are integrated and integral. First, and most striking, was the presence of those typically thought of as not from the world of professions, but of business. The relationship doesn't seem one-sided; those company reps appear to be neither exerting strong influence on doctors nor affording those doctors much influence over them. And Dr. Torstal, in advocating for maintaining relationships with multiple companies, suggested the value of having an arm's-length relationship with any given company. But the device company rep, whose expertise came from having a foot firmly planted in the company, appeared to be a key partner in innovating. Second, given the cost of the live cases described, there was likely some cooperation from hospital administrators. (Indeed, in a later conversation Dr. Stimm relayed that the procedure cost his university tens of thousands of dollars to organize, as it involved getting advanced camera equipment into operating rooms not prepared for the performance, and reducing considerably the number of procedures the hospital could conduct that day.) The vignette shows collaborations occurring among stakeholders in and from a range of venues—some normally considered to be "outside" the profession.[12]

The vignette also shows that in addition to undertaking the task of ablating arrhythmias, the diverse group of stakeholders is engaged in many other behaviors that can be understood as tasks, ones involving a different knowledge base. As we saw, Dr. Kellogg was spreading a colleague's observation, sharing slides that she had received from a fellow well-known EP standard-setter. Also, rather than performing the procedure herself, which might be more efficient and effective, she was taking the extra time necessary to educate fellows. We saw that Dr. Stimm had to select a patient carefully as he performed the task of ablation, in order to ensure his contribution to the success of the procedure in an operating room that can be said to be global. And physicians we often think of as working toward different goals, in different jurisdictions, were working toward similar goals and seeking to manage tasks together: Dr. Torstal and the cardiac surgeon were helping each other complete their tasks and build their reputations. A diverse group of stakeholders was performing a range of tasks that may appear completely irrelevant to the central one they were trained for, that their professional jurisdiction has claimed, and that they must perform on the front lines, but these other tasks also have the potential to be consequential for the problems and solutions the profession can create.[13]

The case study-based scholarship on expert work and knowledge production suggests that this diversity of stakeholders is significant in socially organizing the management of authority. That literature, which focuses on expertise and laypeople, has also shown us that different venues are important. Indeed, this literature was part of my motivation for visiting some key venues in which these stakeholders might assemble. The literature's relevance to physicians' work, which involves collaboration with a range of stakeholders, is clear; doctors periodically visit several venues with varying recurring social dynamics, where they perform tasks that are both global and local, including training subordinates, selecting clients, managing patients, testing new technology, cultivating new colleagues, adjudicating each other's claims to knowledge, and forming electrophysiology-wide practice standards.[14]

Like much of that work, this study's focus on knowledge locates it not only in people but also in things (e.g., technologies). In addition, it analyzes the work of physicians and other stakeholders across many venues in which efforts are oriented toward ensuring that they shape the knowledge discussed and used there. While capturing the range of stakeholders involved in the shaping of medical work, the case study work raises some new questions about how we should think about how individuals hold together as a collective, and remain connected, as they continuously respond to changes and shape future work in ongoing ways. How, then, should we think about how they authoritatively work out the details of their project? This project seeks to capture the ways that different stakeholders develop and maintain authority-strengthening connections across venues. But if we don't use the terminology used by scholars of the professions, how should we conceptualize the set of stakeholders involved?

Here we return to the concept of the occupational project, which I see as the solution to the problem. I am using the word *occupational* because I want to account for the working relationships between the professionals and the wide range of people they deal with, including those in areas not traditionally thought of as being organized by expert knowledge. The tasks of managing authority do not involve a set knowledge base that is held by one group, but rather one that is constructed by a range of stakeholders, whose alliances may be stronger or weaker according to time and place.[15] This attention to time is one reason I am using the word *project*, because I want to capture that the work is ongoing and future oriented, and sometimes involves alliances that shift. Especially when discussing professionals, projects involve agency in the sense of choices and intentional action; they include, for instance, choosing to use and endorse a technology, or to help an employer raise its standing in competitions for prestige. Some social work must be accomplished in order to manage tasks, and also to set the rules for how things get done and can change. A future orientation underpins this

defining; those in an occupational project want future insiders and outsiders to use their terminology and technology, and to look first to its practitioners' expertise. As technology changes, experts must change the way tasks are organized. The term *project* implies, too, that as policies change—such as a hospital's policies for financially supporting a set of doctors, or allowing companies into the building—experts' relationships with their occupation's stakeholders might have to shift. The future orientation of the occupational project is directed at the profession's capacity to retain its say on what constitutes a problem and solution for a community.[16]

It's possible for a multidisciplinary group with a diverse set of tasks to be operating in a state of indeterminacy and not get much done. The defining characteristic of an occupational project is that this group of stakeholders has resolved to organize indeterminacy on subjects for which their skills are relevant. As we saw in the vignette, future approaches were proposed. Clinicians had come from all over the globe to see these new procedures described, in Dr. Torstal's terms, as "disruptive." The future was onstage. The standard-setters were taking the risk of presenting live cases and using new methods, to talk about technologies that will eventually allow them to address problems for which there are currently no solutions. This attitude toward the future is further evidenced in the fact that we are observing the intentionally organized dissemination of knowledge; the event is being recorded and will be shared on the Internet, as well as archived for those who are not there seeing it and will feel the imperative to do so.[17]

At its core, maintaining authority in medical work is about sustaining deference from those outside the occupational project, to the problems and solutions that have been defined under the banner of "medicine." The profession must get, and maintain, distinction from key stakeholders, which range from patients to companies to the state. Authority resides in the group of people doing the work, which particularly includes, but is not limited to, doctors. Expert work involves a division of labor, albeit one that involves interdependence and collaboration. And so it involves multiple goals and activities, including raising funds, attracting collaborators, and evaluating opportunities.

Scholars' more recent observations about the nature of expert work have implications for the way I use the term *authority*. In this book, authority refers to what a group has when it can keep control over what people in and around an occupational project should be doing. I am talking about authority in a particular sense, one that has to do with management. Authority reflects those stakeholders' knowledge, their skills, their technology, and their rhetoric with those they serve in key venues.[18]

This use of authority is not meant to suggest that authority is rooted in rights or claims; rather, it is oriented toward an understanding of authority as processual. Authority confirms, momentarily, how some group should think about things—and rethink them, into the future. Therefore, it deter-

mines what they can or should do. In other words, my understanding of authority addresses questions like What's the nature of the decisions the group members are making? and How do their decisions contribute to their ability to move into the future?

This conceptualization of authority follows from recent scholarship and changes in the nature of the relationship between physicians and "outside" stakeholders, that suggest that authority has become more complicated. In studying medical work, Freidson and Starr approach authority in a way that excludes stakeholders such as industry, because they use a traditional way of defining "professional." The language of "occupational project" reflects a much broader set of stakeholders. When one types *catheter ablation* into the Google search engine, results two through four point to the websites of the National Heart, Lung, and Blood Institute, the Mayo Clinic, and the American Heart Association. Revealingly, the first link points to a site created and maintained not by any professional association but by Medtronic.[19]

I study different venues, stakeholders, and the relationships between them because I am interested in capturing how these individual stakeholders relate to the collective groups to which they belong, as well as how the content of authority may be reinforced through the occupational project. Authority may be threatened by ongoing social changes, including those involving technologies created only in part by those trained in medicine. The demands on physicians as caregivers, and other experts, are constantly changing; technological capabilities increase, disease trends develop, and patients' lifestyles and experiences change. In response to these shifts, standard-setters need to create new knowledge, and clinicians need to be guided by new knowledge. In other words, medicine's stakeholders are involved in an ongoing process of proposing and reinforcing new problems and solutions. As I will describe below, we do not yet understand how these stakeholders develop the control necessary to maintain authority, and whether we can identify a systematic process underpinning the organization of that control.

We see from the vignette that indeterminacy with regard to knowledge of medicine is connected to the making of that knowledge. The vignette shows an open space that is flexible conceptually, in that it allows those in it to do the work of presenting new knowledge, but also physically, in that it is a place where they can see and be seen. Our next step is to notice that this open venue is gesturing to and connected to other venues.

Venues and Tethers

Having settled the matter of a definition of the occupational project, at least provisionally, the next step is to look at what its stakeholders *do*—all the different kinds of work conducted by all the stakeholders. So, it makes sense

to look at as much of what we would call the "practice" of medicine as we can see. If we are to tie the occupational project to management of authority, we need to observe many places, and understand how those places are interconnected in that occupational project. Each of these places is a venue where participants meet to engage in focused tasks that in some particular ways shape and sustain the different social projects that can contribute to the occupational project. I will also scrutinize what I call tethers, that is, persistent cross-venue linkages that facilitate the efforts of those participating in a social project to set and contest its problems and solutions. Theorizing work in this way foregrounds the importance of culture in the concept of authority.[20]

The vignette is our first snapshot of the work done by doctors, but it implies, either directly or indirectly, the existence of other venues that the doctors are tying together. Dr. Kellogg, in using slides that contain the images shared by a fellow leader in the occupational project, demonstrates that she is interpreting her work in a way that resonates with that of respected peers working in other labs. Dr. Torstal uses his preemptive neutralization of a potential steam pop to reaffirm that he's done many of these cases in his home lab, without incurring the negative outcomes that his peers and audience might ordinarily expect. And we even see the clinicians in the audience use their cell phone cameras for pictures of procedures deemed successful by standard-setters, in order to share news of innovations with local colleagues and support arguments about purchasing technology that will help them generate similar results. Another way we can think about what we saw, then, is that the vignette is implicating, either directly or indirectly, the existence of other venues that their inhabitants are tying together.

My notion of tied-together venues is informed by, but addresses limitations in, the concept of "worlds," which, as initially applied by Howard S. Becker to "art worlds," is used to describe how people with different skills get other people to help them get things done. This idea is innovative in its focus around tasks and projects in places like the construction of an art opening, or the staging of an opera, where it is necessary to understand how members of an occupational project maintain authority. It is centered also around the language of "project"; as Becker notes, it involves "real people trying to get things done, largely by getting other people to do things that will assist them in their project." Becker's concept is particularly valuable for understanding the construction of one-off events in particular spaces, such as the performance of a play or the creation of an artwork. It offers the concept of convention, which points to the usual roles taken by people—for instance as it relates to scripts that organize the enacting of gender roles in relationships—in those specific spaces where coordination is necessary.[21]

Yet this focus on events does not provide a conceptual vocabulary that would allow us to understand connections across spaces for accomplishing

a single complex task, and see how these places are connected in the service of the future-oriented dimensions of expert work. As Becker pointed out in his discussion of performance artists, a director may have to collaborate with actors and funders, and their actions in those venues tend to be focused on present goals, just as it could be said that the doctors presenting the live cases are focused on the successful completion of a certain surgery, in that moment. But the conceptual needs are different for studying the ongoing management of authority; understanding the project of professionals involves understanding work in the context of a much longer time horizon, as well as a range of individuals who have their own visions of the future of that enterprise (there may be, for instance, new practitioners who need training). And, beyond this theoretical justification, what I came to see during the course of my years of research was that the doctors were doing much more than thinking of the present moment, and that it is important to follow them as much as possible into the many venues where they mentor trainees, negotiate for resources, expand their referral base, influence the practices of clinicians, and shape guidelines.

And so, in observing these scenes in which participants seek to shape understandings and strengthen claims by tying together important meeting places, we can see there's more to be done if we are to understand the relationship that must exist between individual and collective in accounting for the management of authority. Although I am using the language of occupational project (rather than the more narrow language of profession), my goal is not to discount the fact that there exists something about professions that involve peoples' coalescence: that is, how a group holds together and strengthens itself while continuously carrying out its work. When sociologists use the word *coalescence* it tends to refer to onetime victories such as the use of credentials and licenses, and onetime experiences of training (or "socialization") in a formal institution. It is also assumed, at times, that coalescence just happens. The nature of coalescence, the processes involved, and its association with our focus on the professions, remain largely unexamined. Specifically, we may still want to build in the capacity to understand how our subjects' understandings reflect and influence those in other spaces. Since parsing out the qualities of the professionals themselves is inadequate to show their more complex social relationships and interdependence around local tasks, this book is organized around the places—venues—in which they do their work. These are places, I will argue throughout the book, where their occupational project is furthered to continuously strengthen their case for the social permissions they have been granted.[22]

Venues provide affordances for a potentially wide range of specific task-centered social interactions, and, taken together across the rich variation in work-related tasks, they provide affordances but also limitations on permissible interactions. As I use the term, the venue is a social space where people

meet to carry out work, affirm knowledge claims, monitor each other's progress, and keep each other apprised of changes in techniques and tools. A classroom is a venue. The operating room is a venue. The conference described in the vignette, like a hospital, may contain multiple venues. As we will see in subsequent chapters, in venues participants format the tasks, the roles, and the opportunities to interact. They do this formatting to accomplish organizational and professional goals, and demonstrate particular skills, by defining tasks of work that are appropriate to the venue. Venues also place limits on what can be discussed, what is observed, who attends, and what role a person is allowed or expected to play. For example, doctors understand that representatives of a medical technology company are welcome in an operating room to teach how their technology is used, but not in the boardroom where administrators are discussing how to reduce the appearance of conflicts of interest. And so, they are places where one is likely to observe interdependencies between those trained, and often working, in professions we would consider different and potentially oppositional. As noted above, what we casually refer to as "medicine" embraces a huge range of activities carried out in venues that are medical in nature, but also ones that are less centered around medical tasks.[23]

These venues are connected by tethers, persistent cross-venue linkages that are reliably useful in facilitating the efforts of those participating in a social project to set and contest its problems and solutions. Tethers allow participants to do things that strengthen projects of their own and the group, working within the open space of indeterminacy. Tethers capture the idea that there are personal and professional relationships across the venues that people use to tie together the otherwise discrete tasks that might be called the work of the profession. Sometimes a tether is used in the service of generating and changing a shared knowledge base, and sometimes it is used in the service of collective action. There are many examples, including language, material, and human ones. To take a linguistic example, if a physician speaks of "macroscopic channels," the matter of belief described by Dr. Torstal, they are tying themselves to those in other venues who accept this language as a matter of course. And with his use of the business register, Dr. Torstal projects himself as someone who, elsewhere, can identify promising innovations, and also support people with the same foresight. Dr. Kellogg notes that her decision to place a lead in one of the heart's chambers was based on the suggestion of an "astute" company representative, signaling that the ties she has with companies are constructive of exceptional practices. She also uses the medical technology person by having them ask audience members a question to tether to those in the audience who might use technology. And she uses those sitting in the audience, on the edges of their seats, to go back to their home labs and spread the gospel.

It is worth noting that the concept of tethers and venues reflects a certain perspective on studying culture, a feature of which is attention to where cul-

ture is located. The subject of culture is of course a vast and well-trodden one, debated for centuries by diverse scholars across disciplines. While the concept is important to the notion of tethers and authoritativeness discussed below, it would be distracting and peripheral to this project to discuss in detail that literature's particular relationship to the concept of authority. The closest analogue to how the concept of culture is engaged here is in Michael Silverstein's attention, not to what is "culture," but to the way culture presents itself to humanity, which confronts the question of *Where* is culture. And, as this book demonstrates in its attention to venues, it might be possible to understand people's conceptions of medicine's problems and solutions as authoritative—in the sense of having shaped relevant stakeholders' understanding of the work—in light, at least partially, of the venues from which those enumerations emanate. It is in these venues, and the tethers between them, that the culture of medicine emerges, and where connecting that culture to authority begins. And in its attention to tethers, then, this book finds culture to be used in forms that range from the linguistic to the material, circulated across venues of interaction, and imminent and constitutive of task-centered work.[24]

By paying attention to tethers and venues, it is possible to see the active role of professionals in managing the structure and the content of their work across locations in the occupational project, offering tools for understanding the active work involved in organizing indeterminacy. We can see their value in the process of organizing indeterminacy by recognizing that members of an occupational project offer problems and solutions that are not self-evident but rather essentially contested. Without studying multiple venues, for instance, it might be difficult to make sense of failures in attempts at social control—for instance, as we will see in chapter 4, when a hospital's attempts at asserting control cause doctors to seek jobs elsewhere. And specifically examining tethers can show us how doctors are able to carry out and shift pioneering practices about which they might, at times, feel personally uncertain, as well as how they might organize indeterminacy for peers and followers. More generally, moving across venues allows us to keep our eyes on both experts' individual responses and the multiple collective consequences, different units of scale reflected in the distinguishing here of uncertainty and indeterminacy.[25]

Finally, attention to the connections among venues and stakeholders can help us answer questions for which the interest of scholars has been evergreen: what is the relationship between those pursuing their own self-interest and the stability of group they constitute? Durkheim and Marx, in their studies of work, of course took up the interest of classical liberals in this question. It's also familiar to scholars of work who have taken up these questions of social control in terms of professional self-regulation. Early work by Freidson on this subject examined a group of clinicians in a private practice setting with little evidence of professional control, finding a "live

and let live" philosophy among practicing clinicians. Later work by Bosk reinforces the presence of these attitudes among attending physicians, while demonstrating the presence of hierarchical control processes in attendings' teaching relationships with subordinates. In part perhaps because social scientists have studied single practice settings, there's rarely been any indication of extra-organizational control. Perhaps if we look differently, we might observe more.[26]

The Ethnographic Approach

The concepts sketched above were developed through an approach to ethnographic observation centered around attention to distant influences on the ethnographic here-and-now. This approach differs from one involving being embedded in one or two venues.

For many years I have been embedded in multiple venues where doctors carry out a broad range of tasks, including work involved in organizing their occupational project. I found, as the vignette illustrated, that venues are implicitly interconnected in complex ways. We can see that in the venue of the live case presentation, or the "virtual" lab. I was describing there not only what the standard-setters and their fellows were doing with their hands, which can be properly called practicing electrophysiology, but also how the clinicians in the audience raised questions, and how the medical representative helped the work. Those relationships, between teacher and student, core and periphery physicians, doctor and device rep, must be cultivated and reinforced somewhere. The real and implied presence of those different places where they do different work suggests the payoff from not simply examining action on the "shop floor" of the clinic, or comparing dynamics in several venues. That the vignette revealed a working link, or tether, between the home lab and conference meeting suggests potential new ways of looking at venues and ways their participants are oriented to other venues. It's a potentially productive perspective, not least because of how medicine is organized in the globalized high-tech present.

The literature that both directly and glancingly addresses authority has not yet captured the dynamism in medical authority. The most common approach to understanding professions is the creation of synthetic, stylized accounts of the work of their medicine alone or of multiple professions. Some scholars, like Freidson, who uses an ideal typical approach, pull together multiple accounts of medicine, capturing the experiences of a massive group in schematic terms. Abbott took a similar tack, creating a conceptual vocabulary by synthesizing areas of work from librarianship to law. Even as it removes professionals from the place and time in which they work, the synthetic approach was compelling for its time, and remains useful today because it offers an encompassing account that spans the venues where work

is carried out. And the synthetic approach is also compelling if we are to look at "pure" cases of those trained with a homogenous body of expertise, rather than the range of knowledge reflected in an occupational project.[27]

However, while valuable for proposing commonalities and differences across those considered to be in different professions, the synthetic approaches of earlier scholars can't offer insight into the ongoing interactions and interdependencies among people who share an occupational project but bring different perspectives. Because they seek syntheses, these scholars' interest is not in studying individuals in a group of people whose expertise has shifted and will continue to change, who respond to and enact transformations in the standing of their profession, and who frequent venues not always defined as "professional" in nature. It doesn't situate the decisions of individuals in terms of the everyday pressures they experience, and it assumes that the motivations of individuals mirror those of the profession. Because they are looking for standard qualities across groups, they can't capture that there are very different rates of attrition from the occupation, stratification processes, and degrees of consistency in terms of dominant tasks performed across groups. These approaches tell us less about processes through which individuals shape each other's understandings of the culture of the occupational project in particular places. It is only by seeing how subjects regularly work in and across usual venues that we can make sense of how they might manage the occupational project in light of everyday pressures. This multivenue ethnography that's attuned to processes helps show the perspective of those who are making decisions to do the social organizing that is important for managing authority.

It is true that some sociologists have looked ethnographically at processes underpinning medicine's social organization, but they have done so by adopting a primary focus on a single hospital, or by making comparisons across them. These study designs do not capture the sense of a broader occupational project. For instance, some ethnographic work on physician training does examine multiple venues in one hospital, from the classroom, to training teams, to mortality and morbidity meetings and grand rounds. But it does not account for the interdependence between those in the hospital and those working in other venues. Other work, primarily focused on physician training, compares the experiences of incipient professionals across hospitals with different missions and thus patient bases (e.g., academic and community hospitals). Comparative studies can show variations in what might be called "top-down" effects, in which subjects in two different venues are compared in terms of their response to a policy. Or they might take a "bottom-up" approach, examining differences in the training experiences of two groups of people who work in different hospitals but are treated as similar in terms of background. Yet this comparative work gives the impression that professionals are socialized "once and for all," and in a

way that doesn't reflect the diversity of career types in the vignette, as well as the fact that physicians might change after their training. It also tends to obscure the ways that medical professionals work actively to link these venues.[28]

Others have looked at the doctor-patient relationship. I pick up on that approach, but I triangulate that relationship with other relationships that are going on at the same time, examining the doctor-patient relationship as it is inflected by the doctor-doctor and doctor-trainee relationships in the context of the hospital. This choice follows from my focus on authority. The decision to study venues comprising other stakeholders reflects the inability of individual doctor-patient interactions alone to shape authority, and the role of expertise. The literature shows, and the physicians themselves assert, that the work of definitions of problems and solutions, and their shifts, cannot be validated by individual patients. Specialized physicians would claim that even non-specialized physicians would be unable to understand sufficiently the range of factors involved in these definitions and shifts. Judgments about knowledge in an occupational project reflect the judgments of a specialist group, one that can construct a belief system that defines certain things as problematic, and potentially solvable. My interest is in what the doctors are doing in their process of social organization, which means I'm more interested in what they are doing with each other and other stakeholders.[29]

Medicine is an apt subject for developing this venue- and tether-centered approach to ethnography, because the tasks of work in medicine are many, and they are located in and across many venues including those involving quite distant influences, and because its stakeholders develop and maintain many interconnections, via tethers, across the venues. Physicians perform many tasks, and they cannot do all these tasks in an operating room; like the device reps in the vignette, they serve as teachers but also have some tasks of scientists and, especially with patients, salespeople. To understand the management of their authority I found it necessary to understand ways those tasks differ among members of the occupational project and across venues, as they are conducted not just by doctors but also by industry reps, administrators, and those working with the state (malpractice attorneys). Studying medicine in this way allows us to see some of the individual-collective relations that are hard to observe in one venue, such as processes of coalescence and social control.

This book therefore takes a methodological step, in an effort to show how the organizing of authority is supported at different venues. Specifically, I seek to look at how individuals are moving across venues that are tethered together, as though on a plane, and using these tethers to organize indeterminacy in a way that strengthens the occupational project. This helps us understand how tethering contributes to the coalescence of a group that we call a profession. In doing so, I consider whether it is possible to extend a

tradition of Chicago-school ethnography, which focuses on the importance of time and place, to account for relationships with venues outside the workplace, and—in light of efforts to conduct global ethnography—outside the city; relationships that others have argued Chicago ethnography is unable to capture. Thinking in terms of horizontal tethered venues, rather than either the more common and hierarchical imagery of the "micro" and "macro" "levels" or the promissory socialization model, privileges the dynamism of social life.[30]

On the Occupational Project and Venues of Cardiac Electrophysiology

The key questions of this book are answered in a theoretically informed and systematic ethnographic study of tasks performed by cardiac electrophysiologists (EPs). EPs are not interventional cardiologists (who open clogged arteries and sometimes implant stents), nor are they cardiac surgeons (who perform open-heart procedures). In contrast, EPs use ablation catheters to burn or cool parts of the heart to repair abnormal rhythms. They might also regulate the heart by implanting defibrillators and pacemakers. The EP tasks I observe also include managing patients, socializing trainees, performing surgical procedures, learning new knowledge and techniques, and discussing the process of creating guidelines for the occupational project more generally. At times I juxtapose these specialized cardiologists with those in less-specialized areas. This book strategically analyzes doctors in "Superior Hospital," a top-ranked tertiary-care teaching institution. EPs also welcomed me to join them across a number of different venues outside of the hospital that they said they regularly attended, and I also attended these venues independently. I was with these doctors as often as possible, working as a participant-observer.[31]

In planning my observation of tethered venues I soon became conscious of the importance of close attention to venue selection, using inductive and deductive strategies. Working inductively, I reviewed the study participants' schedules and noted the usual events and their venues. I chose to follow doctors in these venues, because the venues themselves are regular features of the profession's work that are directly linked to the referral network important to competition. This approach has some limitations; when ethnographers are working in one venue, they will miss direct observations in another that may be significant for understanding the initial one. In this case, I had reason to believe that information on the management of authority would be spread across venues that are hard to observe, such as conference calls in which international colleagues discuss research findings that should be included in professional guidelines. And it is also true that professionals' schedules may include events that have little influence on

decisions or outcomes that are important to subjects. In partial response to these challenges, working deductively, I worked to find optimal venues to include clinicians I would not see in Superior Hospital. In this case, I knew that the doctors who are best reputed among their colleagues in academic medicine are usually active in research and interested in publishing unique patient cases. Therefore, it made sense to rule out city- or state-based medical society meetings because I was able to interview and observe clinicians in industry meetings, and medical society meetings didn't include the kinds of subject matter that standard-setters care about. (For instance, I knew, based on my understanding of observing physicians' interactions with patients, from interviews and observations, that interactions with patients before procedures were of minimal importance for the relationships among colleagues in the lab and elsewhere.)[32]

My account of the work of cardiac electrophysiology is broad with regard to venues, but like other ethnographies, it is necessarily narrow. For instance, I study doctors primarily in one subspecialty of medicine. Moreover, electrophysiology is skewed in some meaningful ways. For example, it is fairly white, which is not uncommon in American medicine. Less common, however, is its sex composition; even as some other medical subfields have approached or reached sex parity, EP remains 90 percent male. Because of this skew, I have pointed out when my argument is potentially affected by qualities of the group (as in chapter 2).

It is also the case that even if cardiac electrophysiology work has some particularities, no single field of medicine includes all areas of work in medicine as a whole. Conversely, as mentioned, a synthetic approach would have been limited in accounting for the agency of those individuals who continuously reconstitute medicine. I felt that EP exposed a number of dimensions of the occupational project of doctors, with its ability to capture economic matters, as well as the tasks of both the knowledge-based internal medicine tasks, and the active hands-on tasks of procedures of the type we saw in the vignette. And, among the many problems addressed by doctors, heart-related medical conditions represent the number one cause of death in the United States. The array of traits described here makes EP an important domain as a proof of concept, letting us see all the potentially germane players across subfields.

Also of importance, studying cardiac electrophysiology offers a way of studying venue-specific tasks potentially involved in the management of authority. One such task is that of participating in university-based training programs. After medical school, EPs, like other physicians, do three years of residency in the venue of the hospital. They rotate through subspecialties in the hospital and they work in teams led by an attending physician, which include senior residents who supervise interns (junior residents) and medical students. The team goes on rounds, which is the process of caring for

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