Protecting occupational integrity:  
The culture of anticipation in a crime laboratory

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As knowledge work has become more specialized, skilled experts within organizations increasingly face the challenge of collaborating with others who do not understand their work. The prevalence of knowledge workers in the post-industrial economy (Gorman and Sandefur 2011) means that multiple groups with expert knowledge must interact to accomplish organizational goals. Research suggests that to do so successfully, occupations must address differences at their boundaries. Occupational groups use rhetoric at their boundaries to distinguish themselves from others and claim jurisdiction over tasks (Abbott 1988; Gieryn 1983). At the same time, negotiations at these boundaries is also necessary to enable joint work with other groups in organizations. For instance, Bechky (2003) shows how engineers, technicians and assemblers in a manufacturing firm interacted at their boundaries, communicating through artifacts. Engineers’ control of blueprints enabled them to assert control over the task of building the equipment while at the same time orienting the technicians’ and assemblers’ work.

The literature on occupational boundaries, following Abbott (1988), has had a focus on legitimacy and jurisdiction over work. We therefore are well-versed in the tactics professionals use to claim and maintain control over their task domains, as well as how occupations jostle and negotiate to complete interdependent tasks at the workplace. However, in elaborating on these task-related activities, we have paid less attention to the cultural values underpinning what occupational communities do. Occupational groups not only work to protect and maintain their task boundaries, but they also are motivated by shared understandings and a sense of belonging with their colleagues.

Boundary problems rooted in occupational values are exacerbated for experts whose tasks are peripheral to the core activities of the organizations in which they work. Consider the work of human resource professionals who provide expertise about diversity within
organizations (Edelman, Petterson, Chambliss and Erlanger 1991, Sandholtz, Chung and Waisberg 2019), mental health professionals advising military officers about post-traumatic stress disorder (DiBenigno 2020), or scientific experts helping organizations with safety or sustainability (Huising 2015; Brint 1996). While their work is critical, it may not be a central task of these organizations. Because these occupations’ knowledge and values diverge from those of others in their workplace, they face increased barriers to communicating with others to accomplish their work. Given the increasing numbers of such peripheral experts in organizations (Sandefur and Gorman 2011), it seems particularly important to explore how they manage their work in anticipation of such difficulties.

In this paper, I describe forensic scientists’ experience as peripheral experts. Crime laboratories sit within a constellation of agencies and courts that rely on criminalists’ accurate, timely interpretation and reporting of their findings about the evidence. At the same time, scientific knowledge is not a central goal of the criminal justice system. In the words of Taylor, describing what it means to be a peripheral expert,

> When I’m in the courtroom I’m my only advocate. There are no other advocates in there for the evidence except for me. Everybody in there has their own agenda and I’m the only one that has an agenda for the evidence, that just tries to clarify what the evidence means, what it doesn’t mean, and what the limitations of it are.

Forensic scientists therefore must carefully organize their expertise with respect to these other groups in order to accomplish their own work.

I illustrate how forensic scientists developed a culture of anticipation that both incorporated the expectations of the criminal justice system and protected the core of their science work. Because they anticipated attacks on their expertise, forensic scientists prepared by crafting language for the court and rehearsing their role as the advocate for the evidence. They also circulated their expertise within the criminal justice community both through activities to
broadly educate their colleagues and by defining their expertise as they interacted about specific cases. This culture of anticipation was not oriented toward maintaining or protecting their task jurisdiction, but instead toward preserving their occupational integrity, the soundness of their values of scientific truth, the efficacy and legibility of their procedures, and the standards of good science.

THE BOUNDARY WORK OF OCCUPATIONAL EXPERTS

In his 1988 work, Abbott provided an ecological grounding for the study of professions. Reconceptualizing professional relations as a dynamic competition for task jurisdiction, he noted that “the strength of task area boundaries is a central and problematic property of systems of professions” (Abbott 1988: 109). This shifted scholars’ attention to processes of occupational formation, maintenance and change, emphasizing the relationality of professions within a field. Relations between occupations require boundary work as occupations compete for control over tasks, legitimate themselves by making distinctions, and get things done through collaboration with others.

One aspect of these dynamic relations involves rhetorical boundary setting (Gieryn 1983). Occupations engage in discourse about their work as they move to enhance their legitimacy and maintain or create their task jurisdictions. Gieryn and his colleagues demonstrate how scientists, for instance, claimed particular values and characteristics for science in order to gain resources and maintain professional autonomy. In public debates, trials and written statements, scientists created symbolic boundaries between themselves and non-scientists such as the Church, as well as pseudo-scientists such as phrenologists and creation scientists (Gieryn 1983, 1999; Gieryn, Bevins and Zehr 1985). We see such demarcation strategies among
occupations facing changes and challenges from others in their professional fields. In the battle over the legalization of multi-dimensional professional partnerships, for instance, law and accounting firms framed their arguments around the logic of professionals as experts and trustees (Suddaby and Greenwood 2005). Similarly, Bucher, Chreim, Langley and Reay (2016) examine professional associations’ responses to the Canadian government’s attempt to restructure practices in the health care system, and show that the various professionals involved made different claims about the meaning of “interprofessional collaboration” and its implications for patient care. Physicians defended their task jurisdiction by offering a naturalistic framing of the issues that took their own authority for granted, while others argued more forcefully for change by problematizing the current situation.

Task jurisdiction is also a critical juncture between members of different occupations at the workplace. The blurry boundary of tasks is fought over, negotiated, or just ignored as people try to get things done at work (Strauss et al. 1963). Some occupations regularly accommodate the needs of the organization by picking up and completing the tasks of other, usually higher-status, occupational groups, as Allen (1997) and Apesoa-Varano (2013) demonstrate in health care settings. At other times, the boundary between occupations who work together can be a contentious one fraught with misunderstandings and underlying differences in practices. Bechky (2003) shows how engineers, technicians, and assemblers used blueprints and machine prototypes in their conflicts over knowledge, authority and legitimacy in one manufacturing firm. Working across the occupational differences at these task boundaries sometimes requires compromises over interests. For instance, in Kellogg, Yates and Orlikowski’s (2006) study of different occupations working together in an advertising firm, the creatives did not want to be
pinned down by the project managers’ detailed plans and timelines for completion and only sometimes complied.

As these examples illustrate, occupational studies of boundary work focus primarily on competition and collaboration at the task boundary. But broader sociological approaches to boundaries also include a significant focus on the cohesive properties of boundaries: the ways in which boundaries help people to agree on definitions of reality, and create feelings of similarity and membership in the group (Lamont and Molnar 2002). At the same time that boundaries differentiate between people, they also bring people together around shared practices and values (Bourdieu 1977; Langley, Lindberg, Mork, Nicolini, Raviola, and Walter 2019). Groups develop particular ways of being “in everyday practice [that] are culturally patterned and meaningful in themselves” (Eliasoph and Lichterman 2003: 738). These ways of being not only define groups, but have consequences for what they value and how they act.

Early studies of occupations argued that these feelings of group consciousness were necessary for occupations to coalesce. Bucher (1988) suggests that workers find like-minded others who share similar definitions of work and ideas about how to pursue answers to essential problems. They come together around these feelings of similarity to develop an occupational mandate (Hughes, 1958). Occupational members identify through both “consciousness of kind” and “consciousness of difference” in Weber’s (1968: 42-3) terms: when they share distinctive ideas and interests they seek out others who make similar distinctions and develop feelings of community. Occupational communities thus are primary reference groups for their members, who “share a distinct pattern of values, beliefs, norms, and interpretations for judging the appropriateness of one another’s actions and reactions” (Van Maanen and Barley 1984: 303). The collective value system and shared language of such communities not only structures the
work of occupations (Bucher and Strauss 1961), but shapes how they view themselves and others (Reilly 2018; Weidner, Nigam and da Silva 2020), thus influencing how they interact with other groups. For instance, Fayard, Stigliani and Bechky (2017) illustrate how the ethos of service designers – their practical enactment of values of holism, empathy and co-creation with clients – structured their interactions with clients and competitors.

At the same time, occupation members’ ability to enact their valued expertise is dependent on their local organizational circumstances (Selznick 1957; Anteby 2013). Organizational constraints, such as pressures for efficiency and the autonomy granted an occupation, matter for whether they deploy their values (Bechky and Chung 2018, Evans 2021). Given this, we might expect values to be particularly salient for expert workers working within heteronomous organizations (Scott 1965) in which they do not play a central role.

As expert work has been drawn into organizations (Sandefur and Gorman 2011), members of many knowledge occupations perform tasks that are peripheral to the core function of the organizations within which they work. These experts are oriented toward their occupational affiliation while simultaneously serving their organizational masters, which results in barriers to accomplishing their work (Edelman et al. 1991; Sandholtz et al. 2019; DiBenigno 2020; Wiedener, Nigam and da Silva 2020). For instance, Edelman and colleagues (1991) show how affirmative action officers handle the structural contradictions of their role within organizations by adopting strategies of advocacy, professional neutrality, or procedural rule-following, with varying levels of success in implementing their programs. However, while these barriers are sometimes related to skirmishes over tasks (e.g. Huising 2015), more often than not, other organization members are not competing for experts’ task jurisdiction. Because expert work is specialized, credentialed, and peripheral (Carr 2010), nobody is trying to horn in on
experts’ work. In fact, in the case of human resource professionals, Sandholtz and colleagues (2019) show that other members of the organization encouraged HR experts to hold onto their established tasks.

Moreover, because the tasks of expert workers are peripheral, they often do not need to be integrated as seamlessly with the tasks of others in order for organizations to accomplish their goals. Coordination of tasks is therefore less problematic for them. Instead, expert workers need to enact their expertise in ways that others evaluate as credible: they need to convey inaccessible information to laypeople (Carr 2010). Doing so convincingly is pivotal to their accomplishment of their own work. This expertise, deployed at boundaries with others in their organizations, is developed within their own occupational communities, but must also take into account their position vis-à-vis their relational partners (Anteby and Holm 2021; Anteby, Chan and DiBenigno 2016).

**Boundaries, expert occupations, and anticipation**

In exploring expert workers’ boundary work, therefore, we need to attend to the ways that experts’ activities are affected by their relationships with others in their organizations (Abbott 1988; Hughes 1984) and consider how occupations anticipate the reception of their work. We know that the expectations of others in their orbit, such as clients and other audiences, affect the work of occupations. Cooks change their dishes in response to the tastes of customers (Fine 1992); musicians play songs that their audiences demand (Faulkner and Becker 2009). Anteby and Holm (2021: 332) show that when puppeteers shifted their work context from stage to screen audiences, they began “catering to the needs” of their new audience. Similarly, Vough, Cardador, Bednar, Dane and Pratt’s (2013) study of four types of expert work – nurse practitioners, CPAs, litigation attorneys and architects – suggests that these professionals are aware of their clients’
perceptions and approach clients with specific tactics to counter them. Professionals who think that their clients underestimate the scope and complexity of the work approach clients with an abundance of information about their process; those who expect clients to be skeptical of their professional ethics try to be “nice little teddy bears” in order to build relationships and engender trust (Vough et al. 2013: 1070). Chan and Hedder (2021) show how college career advisors discern how student values differ from their own, and modulate their advice in response to students’ career concerns.

Moreover, studies show that occupations modify not only their interactions, but the substance of their work, on the basis of their expectations about how their work products might be received downstream. In Bruns’ (2013) study of systems biology, computational and experimental biologists who collaborate on research projects anticipate how their work needs to be used by their collaborators. This leads them to change both their experiments and their computational models in order to align their outputs to make their joint work more effective. Barley (2015) similarly describes the “anticipatory work” of scientists at the National Center for Atmospheric Research. Here, the scientists worked with applied partners who had particular representational needs in terms of output and models, and Barley shows how the NCAR scientists changed their modeling practices, and even the research questions they pursued, in order to make the representations they produced useful to their partners.

These studies inspire a closer examination of the ways that expert occupations anticipate their boundary relationships. In doing so, we can learn more about the dimensions of boundary work and expand our understanding of occupational relationships beyond competition and collaboration over jurisdiction and legitimacy. In this study, I trace how the work of one expert occupation, forensic scientists, is shaped by their embeddedness in the criminal justice system.
Forensic scientists’ peripherality within that system leads them to develop a culture of anticipation in which their everyday work activities are oriented towards the expectations of criminal justice.

**METHODS**

**Research context: the expert work of forensic scientists**

Forensic science is a field in which applied scientists provide evidence and conclusions for use in the criminal justice system. Because it is a science located within the world of law, its practitioners (called forensic scientists or criminalists) must create facts that are recognizable and useful in both worlds. For this reason, forensic science is an ideal context to explore the boundary work of an expert occupation. Their location is key to understanding the work of forensic scientists: their peripheral position within the justice system results in a culture of anticipation in which their expectations about what will happen at their boundaries permeates what they do within the lab.

The institutional order of forensic science is encapsulated by the motto of one professional organization of criminalists, “Fiat justitia per scientiam”: justice done through science. In crime laboratories, forensic scientists with bachelors or masters’ degrees in biology, chemistry, and forensic science analyze evidence from crimes. The judgments they make about what this evidence demonstrates are used in legal proceedings. Unlike popular television images of the super-scientists who hunt down suspects on CSI or NCIS, forensic scientists rarely go out to crime scenes. They analyze evidence at the bench in the lab, write reports detailing their analyses and drawing conclusions, and testify to these reports in court as expert witnesses. As a
part of their regular work, criminalists interact not only with each other, but with attorneys, police officers and investigators, non-sworn evidence technicians, and judges and juries.

Forensic science in the United States is a patchwork quilt of multiple types of criminal justice agencies supervising crime laboratories in different locales. Public crime laboratories include FBI and ATF crime laboratories located throughout the US, state-run Department of Justice laboratories, and laboratories that report to local jurisdictions such as city police departments, Sherriff’s offices, and county District Attorney’s offices. These agencies control the budgets of the laboratories that report to them. Crime laboratories initially sprung up from within the criminal justice system, and this is the primary structural relationship that influences their work. They depend on this system not only for their operational budgets, but also for their inputs. Almost all laboratories have a reporting relationship to a law enforcement agency, and their primary task of analyzing evidence arises from the requests of law enforcement.

At the same time, the norms, practices, and expertise of forensic science differ greatly from that of the criminal justice system. While both science and law are knowledge-building systems, they have different purposes and approaches. Fact-making in law is about creating knowledge related to justice in a particular case, while in science it is about seeking truth detachable from where it was produced (Jasanoff 2005).2

Criminalists’ daily tasks entailed using scientific techniques on evidence from crime scenes to produce findings that might link lawbreakers to crimes. Typical practices of bench science were evident in this work: validation of methods, cautious following of scientific

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1 In addition, there are small private forensic laboratories in some states.
2 The Supreme Court acknowledged this difference in Daubert, a key ruling about evidence admissibility, noting: “there are important differences between the quest for truth in the courtroom and the quest for truth in the laboratory. Scientific conclusions are subject to perpetual revision. Law, on the other hand, must resolve disputes finally and quickly.” Daubert, 509 US at 596-597.
protocols, and obsessive prevention of contamination (Latour and Woolgar 1979, Barley and Bechky 1994). Not surprisingly, Merton’s (1973) norms of science (communality, universalism, distinterestedness, and organized skepticism) appeared in many of the views expressed by the criminalists I studied. They commented on their own objectivity and neutrality as their casework unfolded, making comments such as: “I don’t have a horse in the race;” “It doesn’t matter to me what the results say.”

Courtroom practices, in contrast, revolve around arguments in which attorneys make competing claims about the match of external facts to their theory of the case. Forensic scientists perceived legal norms as contrasting with the neutrality of science: instead of the scientific pursuit of ‘truth’, lawyers used evidence as ‘proof’ in an adversarial system. They claimed that “all the lawyers care about is winning,” and often worried about how their results would be represented in court. During his keynote speech at a professional meeting, for instance, one forensic scientist reminded his colleagues, “However attorneys use the information, it is incumbent upon us to be scientists. We are the advocates for the evidence. Our mission should be to carry out good science regardless of the outcome.”

**Research site and methods: Ethnography of the Metropolitan County Crime Lab**

The main ethnographic fieldwork for this analysis took place from February 2009 through August 2010 in a crime laboratory in a Western state. Metropolitan County Crime Lab (a pseudonym which I will abbreviate as MCCL) is one of the largest crime laboratories in the state, reporting to the District Attorney’s office in a major metropolitan area. I studied the four applied science units inside the laboratory – Forensic Biology (DNA), Controlled Substances, Toxicology, and Comparative Evidence. Forensic Biology comprised 18 criminalists, including 3 supervisors, and was the unit responsible for screening evidence for biological fluids and
performing DNA profiling on those samples. This unit also managed and monitored the county’s contributions to the CODIS database of unknown profiles and profiles of known felons, which is used, for instance, to develop cold hits. Controlled Substances was made up of 8 criminalists including the supervisor who reviewed all of the narcotics cases. The remaining criminalists analyzed physical drug evidence and also performed comparative and trace evidence analysis. This included shoeprints and other comparative trace evidence such as duct tape, analysis of gunshot residue (GSR), fire debris analysis and pepper spray and dye pack analysis. Several were training to analyze glass and hair evidence.

The Toxicology unit comprised 9 toxicologists, including one supervisor, and the unit was responsible for analysis of drugs in the body. The DUI program for the county was also under this unit’s purview – they managed all the breath alcohol instruments in the police agencies and some members of the group were also certified to testify in court to alcohol and drug effects on the body. Finally, the comparative evidence unit, made up of 7 criminalists and a supervisor, was divided into two subunits: a three person latent fingerprint processing unit and a four person firearms and toolmarks unit. The print unit did not perform fingerprint identification, but processed items for latent prints and took digital photographs that were sent to requesting agencies for identification. The firearms unit performed function testing of firearms, firearms identification, distance determinations, and managed the IBIS database of unknown bullets and cartridge casings.

I spent three to six months in each unit doing participant observation three days a week, although due to chain of custody concerns, I was more of an observer than a participant. I had access to most areas of the lab except the evidence lockers, but I was not allowed to touch any of the case evidence, which kept my participation to a minimum. However, I had opportunities to
practice some forms of analysis. For instance, I processed my own indented writing, I ran my buccal (cheek) swab through the entire DNA profiling sequence, and I test fired firearms both in the lab and at the Sheriff’s Range. I spent time with every analyst in each unit, many for multiple days, as well as every supervisor, as they all went about their regular duties in the lab, and on some occasions, in court. I attended unit, supervisor, and all-staff meetings as well as eight training sessions given by lab members to the agency populations, defense attorneys, and the District Attorney’s office.

During the course of my fieldwork, I attended three professional meetings, including a three-day statewide criminalists meeting, a two-day statewide laboratory managers meeting, and a one-day local criminalists’ continuing education meeting. I also toured three other laboratories in the state, and interviewed the director of each of them. In addition, I visited a county crime laboratory in an Eastern state, where I interviewed the deputy director and spent the day observing the work of the DNA, comparative evidence and controlled substances units. Near the end of the fieldwork, I interviewed a subset of analysts in each unit, as well as every supervisor and the director and deputy director of the lab. These semi-structured interviews focused on career histories, experiences testifying in court, and controversies or changes in analytic practices.

Analytic Approach

I followed a grounded theory approach of comparison and contrast (Glaser and Strauss, 1967; Strauss and Corbin, 1990) in analyzing the data. This iterative approach starts by developing theoretical categories from the data, then returning repeatedly to field notes to refine the boundaries of the categories and understand how they interrelate, while also making sense of these categories in the context of the relevant literature. It was clear that criminalists felt a
tension between science and law, and that these tensions were very acute when they were doing
boundary work with the rest of the criminal justice system. Gieryn (1999: 21) argues that it is
important to examine the “contingencies of each local and episodic” case of boundary work, and
when I did so, what I realized was that the boundary work of criminalists was not just happening
at the boundary of the occupation. Every day I went to the laboratory, criminalists referenced
what would happen outside of the laboratory’s boundary, when attorneys would interpret their
work (in the form of reports or testimony). I therefore coded all of the instances of practices
where criminalists mentioned or oriented their work toward a future expectation from the
criminal justice system.

I turned to the literature in order to compare the criminalists’ practices, which I started to
think about as anticipatory work, with what others had found. In the studies of anticipation work
that I found, the scientists did not work continually in relationships with their partners: Bruns’
(2013) biologists did not always collaborate with one another, and Barley’s (2015) scientists’
work was funded by government grants as well as by their varied applied clients. In the case of
forensic science, the criminalists’ anticipation was a pervasive influence on their everyday work,
and seemed like it was a function of the relationship they had with the criminal justice system in
which they were embedded.

I followed this abductive hunch (Timmermans and Tavory 2012; Locke, Golden-Biddle
and Feldman 2008) by not only coding the practices of anticipation, but examining closely how
these were related to criminalists’ peripheral position within the justice system. Further, as I
explored these practices, it became evident that tensions forensic scientists felt at their
boundaries with the attorneys, judges and others in this system had little to do with task
jurisdictional conflict. What I found was that the culture of anticipation at MCCL was the way in
which criminalists balanced their commitment to science with the needs of criminal justice in order to protect their occupational integrity. Protecting occupational integrity entailed maintaining respect for their occupational values, ensuring the legibility of their methods/process, and sustaining a sense of themselves and their colleagues as good scientific experts. Below, I first describe the threats to their occupational integrity that forensic scientists experienced when interacting with the criminal justice system, which were inherent to their peripheral position. Then I explore the MCCL’s culture of anticipation – the everyday work of pulling in the requirements of the criminal justice system while simultaneously pushing their scientific knowledge outward that forensic scientists hoped would protect their occupational integrity.

**WHEN SCIENCE MEETS JUSTICE: THREATS TO CRIMINALISTS’ OCCUPATIONAL INTEGRITY**

Forensic scientists’ everyday work is to scientifically analyze evidence for use in criminal justice proceedings; however, the process of providing their findings puts them in a position that threatens their occupational integrity. Criminalists are marginal players in the criminal justice system; they do not have the latitude in the criminal justice process to present evidence in the way they would like. In addition to a lack of control over this process, forensic scientists’ values are threatened by the adversarial norms and practices of the attorneys in the courtroom.

Forensic scientists are committed to finding a way to provide useful evidence. If they cannot do an effective job of communicating the results of their analyses, their scientific work is for naught. The impact of their work, and the service it provided, was important to them. Anca, a DNA analyst, described a “gruesome” kidnapping and sexual assault case in which she testified, after which the suspect “was sentenced for a long time.” She said, “I looked at the work I did
and thought, ‘I did a thorough job on this.’ It took me back to why I got into this field to begin with… to give something back and do something good while doing science at the same time.”

As Marina, another DNA analyst, remarked, “I feel like I give back to society in a positive way and in some ways give closure. For me, it isn’t just the next case that comes across the table. That’s somebody’s life that’s been impacted.”

**The peripheral position of forensic scientists.** Forensic scientists’ position within the criminal justice system made it difficult to do this job well. Their scientific work was a peripheral contribution to the process of the criminal justice system in deterring lawbreaking, in which police find those who are suspected of breaking the law and attorneys use their knowledge of law and their rhetorical skill in order for juries to determine suspects’ guilt or innocence. The skills and techniques of law enforcement were vastly different from the scientific techniques practiced by criminalists, and most of the other groups in the criminal justice system also had little scientific training. Thus, while forensic scientists worked in the service of the criminal justice system, their expertise was distant from its main objectives.

Moreover, forensic scientists were marginal members of this system. Criminalists’ testimony on casework was structured to accommodate the court: when they were needed to testify, they were at the district attorney’s beck and call. Advance notice was not always forthcoming; sometimes attorneys called for the criminalists to come to court later the same day. As Andy, a DNA analyst, told me about the attorney in one case, “Originally, he subpoenaed me for Monday, and I had written [on the form] that I wasn’t available then. But he apparently didn’t read the form because on Monday he called me and left one message saying at first that he wouldn’t be needing me, and then later that I needed to come in.” Given this unpredictability, criminalists were prepared to go to court at a moment’s notice. The dress code in the lab required
closed-toe shoes, and although they covered their clothing with lab coats, many criminalists
dressed informally in case of spills. Therefore, they stored business suits and “courtroom” shoes
in their cubicles to be prepared in the event of a last minute summons from an attorney.

And once criminalists were needed in court, they expected to wait. As Schwartz (1974:
853) suggests, in organizations the distribution of waiting time coincides with the distribution of
power; in the criminal justice system, courts routinely “overschedule” to ensure the highest status
person in the system – the judge – is not forced to wait at all. Additionally, district attorneys did
not know how the action in the courtroom would unfold; they could not predict the results of
their own tactics nor the actions of opposing counsel and the judges. Therefore, their estimates
of when a forensic scientist was needed were not very accurate. When Andy did actually appear
for the case whose subpoena he described, he and two other criminalists waited in the hallway
for over an hour outside the courtroom door, only to be told that Andy would not be needed to
testify because they were holding off on charging the suspect.

**Threats to occupational integrity.** The relationship of forensic scientists with the
criminal justice system produced threats to their occupational integrity. Forensic scientists
perceived their findings to be a product of science: as such, it was subject to the uncertainties of
all scientific work with the additional constraint of the “messy” nature of the crime scene
materials they analyzed. They shared certain beliefs about their work: their scientific findings
represented natural truths, albeit within a margin of error; their analysis should follow the
appropriate rules for scientific study; these procedures would lead to reliable results and were
explainable. The courtroom practices of the criminal justice system, in which forensic scientists
tested at the behest of adversarial attorneys, threatened these values.
Criminalists believed in the truth of their findings, and attorneys’ commitment to arguments rather than facts challenged this value. In Tim’s words:

Attorneys don’t think like we do. I have known people who will say anything to win an argument regardless of the cost of winning that argument. So the attorneys think different. For them, it’s all about winning. And it’s just winning now. They don’t care about long term consequences. They don’t care about people’s careers. It’s all about winning this case right here, right now. And criminalists are not that way. The truth for us is going to be true tomorrow, and the next day, and the next day.

While they believed in the truth of their results, forensic scientists also recognized that science is a messy process with built-in uncertainty. Instruments have a degree of error, reagents degrade, and measurements can be inaccurate. Jason, a toxicologist, noted the importance of documenting uncertainty, which was “called out in many documents in scientific fields… it is addressed in places such as ISO and NIST standards.” Thus, in the toxicology unit they kept a laboratory log in which they traced the instruments, reagents, and standards used in every analysis in order to capture measurement uncertainties.

Given their awareness of the uncertainty of science, in the courtroom forensic scientists sometimes felt they were asked to claim that their findings were more definitive than warranted, because attorneys wanted statements that clearly supported their arguments. Taylor described a time when he testified and the attorney asked him on the stand to say that a defendant’s impairment was due to the drugs in his system. He did not feel comfortable doing so, because, in his words, “The problem with the science is that other things could be going on, so I can say ‘probably’ or even ‘likely,’ but I can’t make that leap to state definitively that the person was impaired by drugs.” Although he had told the attorney in advance that he would not state this conclusively on the stand, she then asked him multiple times to do so. He would not. The attorney called him afterward, he said, “and chewed me out and said I went ‘sideways,’ which is
a term they use to mean that you testified on behalf of the other attorney rather than for them. I told her, ‘I’m not on your side, I’m not on anyone’s side, I’m on the side of what the evidence is,’ but she was really angry.” With remarks such as these, attorneys undermined criminalists’ feelings of occupational integrity, challenging their ideals of scientific truth.

Forensic scientists pursued evidentiary findings within a set of established scientific norms and practices. As in all scientific laboratories, they followed protocols, had procedures to avert contamination, and laboriously documented their work (Barley and Bechky 1994). Attorneys challenged their occupational integrity with claims that they violated these practices. Jonah, an experienced DNA analyst, related a time when an attorney in one case questioned his scientific practices, asking, “Did you contaminate something?” Jonah explained the procedures that they took in the lab to try to avoid contamination, but the attorney persisted, asking, “Does contamination occur in your lab?” “This is a curveball,” Jonah told me, “because contamination can occur, and does occur, I would say, in pretty much every laboratory. It’s part of the nature of the beast. I mean we’re working with such sensitive technology. That’s why we have a lot of the measures we do in place to catch that.” Criminalists accepted that the practice of science was messy, and placed faith in the processes they used to manage it.

When attorneys did not understand the importance of scientific processes to the work of criminalists, this challenged criminalists’ values, and they resisted when attorneys pushed them toward drawing conclusions or making statements that violated these processes. As one forensic scientist recalled about watching a colleague in court:

I went to see Al testify a few months ago. And they put up pictures of a crime scene. They kept trying to get him to make some determinations from these photos … It was bullet holes in a truck or something and they were trying to get him to determine angle of entry… Just stuff that you wouldn’t commit to if you had an ounce of sense unless you had personally examined the vehicle.
The attorney asked Al to make expert judgments on the spot using inappropriate methods, which transgressed his occupational values. The attorney “kept going at Al, and he kept saying ‘I’m not going to make determinations from photos’ and I think he finally got to the point where he was like ‘Dude, I have to examine this vehicle myself in order to testify to that!’” The standard practice of firearms examiners prohibited drawing conclusions about ballistics from images, and Al did not appreciate being repeatedly asked to do so.

Finally, forensic scientists’ occupational integrity was threatened because the structure of the testimony process did not allow them to report the science in a complete and straightforward manner. Forensic scientists did not have control of their evidentiary findings once their report left the lab. Courtroom procedure establishes attorneys as questioners who guide the testimony of witnesses; criminalists can only answer the questions that are asked of them and are not supposed to provide information that does not directly answer the question. This could result in inaccurate communication of the evidence, as Jonah noted: “I had a case where the District Attorney didn’t come back and follow up [after cross-examination] with questions, and I left the courtroom feeling like the evidence, the results, were not accurately portrayed or reflected. I was a little bothered with that.”

Criminalists were unable to present the evidence in a manner of their own choosing, and some said this made them feel like a “puppet,” or “a player” in the legal “games” of the attorneys. They felt threatened when the procedures and limits of the law meant they had to represent science in a partial or inaccurate way. For instance, Robin described her testimony in a case in which the district attorney asked her, “So cocaine is a narcotic?” and she said, “Legally, yes.” “Of course,” she told me, “cocaine is not an actual narcotic, it is a stimulant, the complete opposite of a narcotic. But when I said yes, that’s all he cared about! It isn’t correct from a
technical standpoint, but it is correct under the law.” For Robin, it was not only offensive that
the law mischaracterized the chemical properties of the drug, but also that the questioning of the
attorney did not allow her to describe the evidence accurately.

Threats to occupational integrity in which argumentative attorneys failed to acknowledge
the ambiguity of scientific truths and lacked an appreciation for the process of scientific inquiry
appear in a story that Tim told about his courtroom appearance for a comparative shoeprint case.
Based on his analysis of photographs of the shoeprints, Tim had reported the suspect’s shoe to be
a size 10 ½ -11 ½. The prosecutor, who did not like his results, asked Tim to send out the
photographs for another opinion. Joe, the external criminalist, concluded the shoe was a size 11-
12. Tim reflected on what happened next:

Joe made certain assumptions. I made certain assumptions. And, he and I were
totally fine with it. We were discussing our individual reports and from a science
perspective, we agreed that it was a range. Our ranges overlapped. It was
probably in that overlap area, but there was no guarantee. It could have been out.
It could have been in the bell curves. We were fine with this, but the prosecution
and the defense both wanted different answers. So the defense called me, because
their client’s foot fell outside that range. The prosecution called Joe, because they
wanted to get Joe’s opinion because the suspect’s foot fell in Joe’s range but
outside mine.

So when the defense called me, here’s the DA, from our office who I supposedly
work for, trying to impugn my testimony. He put me up as incompetent and took
conversations he and I had that were not part of the case and brought them up on
the witness stand. “So, is the reason you’re not telling the truth here, because
you’re afraid for your job?” That sort of thing. There’s no way out of a question
like that – and he’s being a total jerk and says, “Yes or no, Mr. Macaulay. That’s
a yes, no question.” And then I say, “Your Honor, I don’t think I can answer that
with a yes, no and not be misleading.” Because until somebody teaches you that
trick, the attorneys can lead you down the merry path.

The attorneys in this case undercut Tim’s view that science provides a range of
acceptable answers; moreover, they exacerbated the threat by attacking Tim, impugning his
expertise. As these examples show, criminalists perceived that their values and practices
significantly diverged from those of attorneys, and these differences threatened their sense of occupational integrity when they took the stand to testify.

When their feelings of occupational integrity were challenged, criminalists responded viscerally and emotionally. For instance, Anca, a DNA analyst, was quite upset after hearing from a district attorney that a robbery case in which she testified resulted in a hung jury. She told her supervisor, Carolyn, that she was worried that she hadn’t done a good job testifying, and anxiously described the arguments made by the defense attorney: “They said his DNA could’ve been on the handkerchief and transferred to the gun. And we never tested the handkerchief, we should have done that! But the DA didn’t request for us to.” Carolyn asked if the attorney brought up different scenarios. “Yes,” Anca said, “It was horrible, the way he asked questions: ‘You didn’t test for body fluids, you didn’t test for urine.’ That’s not what we do for a contact case, we don’t even have a test for urine! ‘Well, you could,’ is what he said.” Similarly, Taylor described a time when a defense attorney asked a long series of questions that seemed off-topic, and the prosecutor “was asleep at the wheel” and did not object. He was uncomfortable because, as he noted, “when you start to get to the edge of your limited expertise it becomes really difficult to define what you do know, what you don’t know.” This felt personally humiliating: “I was getting raked over the coals… I sat there and waffled and just got absolutely dissed. I thought I got embarrassed.” Criminalists were disturbed when attorneys challenged their valued processes and standards of science and undermined their sense of being good scientists.

The experiences that forensic scientists had interacting with attorneys and the criminal justice system suggested that science was marginal to the logic of the system, that their values were not respected, and that their time was not as important as that of others. As a result, their occupational integrity was threatened. In order to avoid the feelings of dismay, frustration and
upset that accompanied this threat, forensic scientists engaged in practices that enabled them to participate in the criminal justice system feeling that their occupational integrity was protected. These practices, which I collectively label a “culture of anticipation,” allowed them to fulfill their role to provide evidence in the service of justice while not selling out the science.

THE CULTURE OF ANTICIPATION IN FORENSIC SCIENCE

Having a culture of anticipation prepared forensic scientists to participate in the criminal justice system. Forensic scientists regularly incorporated the expectations of the legal system into their work by crafting language for the court and developing their courtroom voice. At the same time, criminalists aimed to protect the science by helping members of the criminal justice system understand it better. These practices included broadcasting their scientific expertise throughout the criminal justice system through general training sessions, as well as defining the limits of their expertise with respect to findings in specific cases. The culture of anticipation realized through these practices enabled criminalists to maintain their occupational integrity by reinforcing their collective values of scientific truth and the efficacy and legitimacy of scientific procedures.

Incorporating the expectations of criminal justice into their daily work.

Criminalists engaged in a set of practices that incorporated the perspectives of the criminal justice community and the expectations of the criminal justice process into their work. Their main output was a set of findings about the evidence – reports, notes and testimony – that were used in courtroom proceedings. Forensic scientists anticipated the criminal justice community’s reception of these findings by crafting and standardizing language that could be more easily used in these proceedings. Moreover, their daily work also included practices to rehearse their role in the courtroom and become the “voice of the evidence.”
Crafting language for the court. Criminalists could most often be found at their desks in their cubicles, writing up reports of their findings about case evidence. They reported spending about 70% of their time on documentation, and complained sometimes that they spent more time “on the English than the science.” They carefully crafted their reports and testimony for use by the court, standardizing the way they reported findings and processes within each unit, using qualifiers in their language, and hedging in their statements about their expertise.

Most units at MCCL had developed standard terminology to describe and report the analytic processes they regularly performed, in order to explain their findings in a way that could be understood in court. I spent a day with Meredith, a chemist, as she wrote up a report for a gun shot residue (GSR) case. In this case, the gloves she tested had arrived at the lab in a paper bag with a couple of other items in it: a hat and a sock. At the time of the crime, the lab did not find GSR on the swabs from the suspect’s hands. Now the case would be going to court, and the DA requested that the lab test the gloves. Meredith found one GSR particle on each glove. But she would not be able to say that the GSR came from the gloves, because they were packaged together with the other items, and GSR can rub from one item onto another. In her conclusions, she typed: “Particles containing lead, antimony and barium were detected – considered characteristic of gunshot residue.” She followed this with two sentences that she copied from a list of GSR conclusions pinned to the wall above her desk: “The area may have been exposed to a discharged firearm or been in close proximity to the discharge of a firearm. The area may have been in contact with a surface bearing gunshot residue.”

Translating their findings into language that worked in the criminal justice system was important to criminalists. They valued accurate representations of their scientific results, but at the same time they realized that the criminal justice community expected the results to be
understandable and usable by non-scientist attorneys, judges and juries. Thus, the GSR analysts developed and used a “cheat sheet” in their report protocol in order to standardize the wording of their conclusions across their unit’s members in a way that represented an acceptable compromise across these two sets of values. Their use of qualifiers such as “may have been” allowed the criminalists to feel comfortable that they were representing the degree of uncertainty in the conclusions while reporting legible results to the court.

Toxicologists encountered a similar tension with respect to the detection of controlled substances in the blood. One toxicologist, Oscar, explained to me that it was not always straightforward to say when a drug is or is not present. When quantifying the amount of drugs in a sample, there was a lower limit: above the limit, the scientific community agreed that the sample was clearly positive for drugs; below that limit, this measurement was not as reliable. However, in toxicologists’ reports, they did not explain this fine distinction, and instead simply used the terms ‘detected’ and ‘not detected.’ This was initially confusing to Oscar, because he “could detect it at a low level”—that is, he might find the presence of drugs, but the amount would fall below the lower limit—“and then it would be reported as not detected.” This strict distinction contrasted with his understanding of the scientific quantitation process, which allowed for more nuance. When he asked his supervisor why they used these terms in the report, she said it was the language that the district attorneys wanted. “So I realized,” Oscar said, “when testifying, you kind of have to let go of the science, you don’t want to be too literal.” The toxicologists altered their labels for their findings in anticipation of the expectations of the courtroom.

By standardizing their findings into more usable language for the court, criminalists were aware that they were “letting go” of their hold on the science. They were willing to do this in
order for attorneys and juries to more easily understand their findings. Moreover, by simplifying and standardizing their explanations, forensic scientists felt they were less likely to be undermined on the stand. They also tried to protect themselves by hedging about their expertise, defining their terms narrowly to make sure they did not make unsubstantiated claims about their knowledge. For instance, because they did not perform a definitive test in the lab for human blood, DNA analysts did not call the biological material they analyzed “blood.” Instead, in their reports and on the stand, they labeled it a “red-brown stain.” Similarly, although in the DNA unit criminalists often analyzed profiles from roots taken from hair, they took care not to definitively call this material “hair.” Because there was a trace evidence discipline to perform hair analysis, criminalists needed to be certified in hair analysis in order to be considered a hair expert. Those who were not certified would face challenges on the stand. As a result, they always added a qualifier, saying they took a root from a “possible hair” to analyze a DNA. Juries found this distinction a little silly, as Ellie reported. “When I said I was not a hair expert, the jury was looking at me like, “Are you serious, you can’t say it is a hair?” But by hedging in this way, criminalists hoped to protect their credibility by demonstrating that they recognized the limits of the science, and thus avoid attacks by attorneys.

*Developing their “voice” for the court.* Knowing that they would be required to serve as expert witnesses in the courtroom, forensic scientists practiced testifying together in the laboratory. Criminalists’ science degrees equipped them for laboratory work but their education did not train them to serve as expert witnesses and explain their findings about evidence in the courtroom. They viewed their role in the courtroom as being the “voice of the evidence,” and the crime lab had both formal and informal practices for criminalists to rehearse this role. New forensic scientists were encouraged to attend courtroom testimony workshops at their
professional association meetings, and the MCCL held a “mock court” for every criminalist upon their certification to perform casework. These simulations prepared them for testifying, a moment when they expected challenges to their occupational integrity.

By rehearsing during mock court sessions, criminalists learned how to behave as the voice of the evidence in the courtroom and practiced being attacked by the attorneys. For instance, I attended a two-day courtroom testimony workshop at a statewide professional meeting, which was led by three veteran criminalists – Jacob, Sarah, and Donald. The workshop included a day of classroom discussions about testimony, instruction on creating visual aids for the courtroom, and a day of practice in a county courthouse in which each attendee participated in a mock trial. During the mock trials, the veterans illuminated the logistics of testifying while simultaneously enacting the adversarial culture of the courtroom. As the mock attorneys, they assertively postured and challenged the trainees, sometimes posing aggressive or nonsensical questions.

In addition, the veterans made it clear that forensic scientists should convey more than scientific accuracy. If criminalists wanted to be understood, they needed to use precise language that was neither too scientific nor too casual. The veterans therefore pointed out every time the criminalists used a scientific term without defining it clearly. Jacob told one DNA analyst, “You said ‘amylase’ without defining it” and complimented another for explaining concepts well. The trainees were advised not to use slang or street language: “Remember it is ‘cocaine,’ not ‘coke;’ this is not the street.” The instructors also stressed professional neutrality. After one DNA analyst said in response to an attorney’s question in her testimony that she was “looking for the victim’s blood,” Sarah told her, “As a forensic scientist, you are not ‘looking’ for anything. You are examining for the presence or absence of blood, testing for presence or absence. Not looking,
not looking under the bed, not looking for anything, ever.” A credible criminalist is one who is not “looking,” in other words, but “testing.” Finally, forensic scientists should exhibit understanding of court procedures, as Donald, acting as the defense attorney, told one participant: “You have to know the rulings of the court; twice I paused and you jumped in. You have to wait.” Jumping in could result in attorneys cutting them off or undermining their statements. These forms of feedback helped criminalists understand that they could not simply present unvarnished scientific results to the court, but instead should orient their testimony to the expectations of the courtroom audience.

Forensic scientists participated in similar mock court proceedings in the laboratory during their training. They prepared extensively for this testimony with guidance from their more experienced colleagues. When Kerry, a novice DNA analyst, was scheduled for her mock court in the lab, I spent the day with her while she was preparing for it. Other analysts had provided her with lists of questions that might come up in a typical DNA profiling testimony to help her think about what she might be asked. Kerry read carefully through her 60-page report from the case, and like the criminalists in the workshop, she paid close attention to the language, looking for terms in her report such as “spikes” and “artifacts” that she might need to define on the stand. She told me, “We used to say ‘the presence of human blood is indicated’ from the combination of tests that we did: OTOL, stain, quant values. But we’ve been talking about it and we are not sure we should say that, because we never confirmed it was human blood. On the stand, you could say ‘possibly’ but attorneys hate when you say that.” This issue came up again when the supervisors offered feedback on Kerry’s performance in the mock trial. One supervisor concluded, “as a unit we’ll have to come up with a way to address blood confirmation.” These rehearsals helped forensic scientists learn how to translate the science on the stand, creating a
“voice” that was true to the science. Through this anticipation, criminalists could offer polite, lay explanations of the science in the courtroom and sound definitive within the margin of error of their analyses, while avoiding potentially complicated and challenging questions from attorneys which could threaten their occupational integrity.

**Protecting the core of science**

At the same time that forensic scientists incorporated the expectations of the criminal justice community into their work, they projected their expertise into that community in the hopes of protecting their scientific values and work. Many forensic scientists noted the need to “educate” the attorneys and investigators about the scientific processes of their work. As one DNA analyst said, while attorneys may be “very bright, they have no idea what I am talking about, because they don’t do [forensic science] day in and day out.” At MCCL there was a general sense among forensic scientists that the attorneys and police did not understand what the laboratory did: they often complained about submissions of badly packaged evidence and requests for analysis that were either impossible to perform or would not produce probative findings. Criminalists’ education of the community took two forms. They broadcasted their expertise into the criminal justice community by holding information sessions about the analysis they did in the lab and, in their everyday interactions with members of the criminal justice community, they circumscribed the limits of the science with respect to the specific cases and evidence they were handling.

**Broadcasting their expertise: Broadly educating the criminal justice community.**

Metropolitan County Crime Lab had developed what they called “training sessions” for members of the criminal justice community. These were held in the lab and open to everyone in the community: prosecutors, defense attorneys, investigators, and police. In these sessions,
criminalists tried to teach the community about the basics of their work with reference to the underlying science of forensic analysis. They rotated the session topics monthly across the units of the lab, introducing the specific techniques of each unit.

For instance, the training I attended about firearms examination began early one morning in the conference room on the first floor of the lab, with humorous pictures and videos of firearms showing on the screen. About 20 people made their way to seats in the room: defense attorneys, prosecutors, investigators, and eight uniformed officers from the Metropolitan County Police.

Adam, a veteran firearms examiner, began with an introduction of the members of their unit and their credentials and past experience. Then he and Al, another examiner, spent about an hour on an overview of examination types – function testing, distance determination, bullet and cartridge case comparisons – answering questions throughout to clarify both the extent of the testing done and the technical details of some of the work. While discussing distance determination, an examination which relies on measuring the distance that gunshot residue has traveled, one attorney asked, “There’s more [gunshot] powder in a 9mm than a .22, would you get GSR as far as 6 feet out for a .22?” Adam replied, “I can’t say. I need to know the exact gun, what are its characteristics. That would affect it. I’d need the gun.” The attorney asked if the examiners could guess if he gave them the rounds, and Adam, emphasizing the limits to which he could attest, said, “No, I won’t do it. I could pull the firearm out from our reference collection, but it really wouldn’t be the best information. We won’t know the barrel length, I wouldn’t want to do it.”

After Adam and Al finished the overview of the firearms unit’s work, they reminded the audience of some important issues to think about when handling firearms evidence and sending it
to the lab: “Remember, safety first. We’ve received loaded firearms in the lab; it happens. Assume it is loaded and don’t put your finger on the trigger,” “Limit your interaction with the firearm,” “Do GSR as soon as possible, a big problem is waiting for too much time.”

The monthly training sessions were similar across the units; they mostly contained practical information about the analyses performed in the unit. As in the firearms training, forensic scientists also used these sessions to issue guidance to community members about aspects of evidence handling which would affect their ability to do their analyses. In other training sessions I attended, this guidance ranged from “When collecting DNA evidence, do not use plastic baggies,” to the advice in the Crime Scene training to “Collect everything you can before you call the hazmat team or the fire department. We call them the evidence eradication team.” Incorrect evidence collection practices made criminalists’ analytic work more difficult, and sometimes increased the uncertainty of the results. With this guidance criminalists hoped to protect their work process by advising community members that the ways they collected and packaged evidence could be detrimental to getting useful results.

While the criminalists at MCCL intended for the sessions to provide broad information to the entire set of criminal justice practitioners, the district attorneys in the county only sparsely attended: at the four training sessions I attended, district attorneys averaged less than a quarter of the audience. This was disappointing for the forensic scientists, since the district attorneys were their most frequent interlocutors in the criminal justice community. After about a year, the lab director and the criminalist who organized the sessions consulted with the DA’s liaison to the lab, and they instituted a set of private sessions for the district attorneys. These private sessions were held in the DA’s office and included the inducement of a Continuing Legal Education credit, so the district attorneys attended these sessions in much greater numbers.
The content of the sessions was similar to those held for the wider criminal justice community, although the criminalists now focused more directly on reports and testifying, as these were the main interest of the district attorneys. In the first session, the lab director began by emphasizing not only the “services” provided by the lab, but the importance of communication between the two groups. He reinforced the crime lab’s goal of education, saying, “We want you to know what our limitations are, what we can actually do. You need to understand what an exam can or cannot say.” With these sessions, the criminalists informed the criminal justice community about their expertise, providing broad information about their analytic practices in the hope that they would not be asked to make statements or perform tasks outside of these parameters.

However, broadcasting this information was not always effective, and often forensic science knowledge did not take hold deeply enough within the criminal justice system to convince criminalists that their work and values would be well protected. Broad information about processes and evidence handling gave a general sense of the procedures that might be used in the laboratory, but did not address specific measurements, processes, or uncertainties in the findings. Thus it left criminalists feeling only a bit less vulnerable in terms of their occupational integrity.

The dilemma criminalists faced about creating “scripts” for use by District Attorneys in the courtroom underscored these concerns. The DA’s office asked the different units within MCCL to supply them with question scripts to be used for examining criminalists in court. Lab members were ambivalent about producing these scripts. Although forensic scientists did end up writing some of them, they were skeptical about their use. I asked Brenna, a DNA supervisor, about them, and she said,
The DA wants us to make up lists of questions that the prosecutors can ask us in court, in the order they should ask them in. And those might be helpful, but it is pretty difficult to do them for the DNA unit, because there are so many different analyses we do, and different types of statistical tests.

While forensic scientists hoped that the scripts might help with structuring appropriate questions that would help them to present their scientific findings clearly and accurately during questioning in court, by design these scripts needed to be broad. Scripts gave an overview of the possible scientific questions for a form of analysis, but they were not tailored specifically to the analysis of a case, and this could make it more difficult to testify rather than easier. Criminalists preferred to ground their expertise with respect to the evidence at hand by speaking with attorneys about the specifics of their cases.

Forensic scientists had well-grounded concerns that DAs would use the scripts as a substitute for speaking with them about the particular evidence in the case on trial. One DNA analyst complained to her colleagues about a telephone conversation she had with a DA who had asked her to testify: “I told him I had three questions. He tried to hang up after the first one! He clearly didn’t want to hear what I had to say or to answer my questions. It is too bad they don’t let us help them understand what kinds of things to ask; they just want a short script. Talking to us could be really helpful to them.” Criminalists were uncomfortable with this because scripted questions about the general procedures used in analysis had the possibility of being irrelevant to the specific case, thereby opening them up to threats to their standards, processes, and expertise. In contrast, pre-trial meetings and informal discussions of casework enabled criminalists to more directly influence attorneys’ expectations about their testimony.

Defining expertise around specific cases. In addition to broadly educating the criminal justice community through training and scripts, criminalists also regularly tried to explain the limits and constraints of the science as they spoke with investigators and attorneys about cases in
the course of their daily work. Criminalists preferred one-on-one interactions with attorneys
about testimony for specific cases, because these allowed them to give a more accurate and direct
projection of what the science could say. They worried that the attorneys would misrepresent the
underlying science of their findings, either deliberately to support their argument or inadvertently
because they did not understand it.

In pre-trial meetings with attorneys, criminalists could discuss the specific results from
the case and what conclusions could be drawn from them, helping them refine their voice. As
Greg, a DNA analyst, suggested, “What’s really helpful is to meet with them beforehand. I’ve
met with defense lawyers. I’ve met with the DAs, too. It helps with the whole education side,
because you can say something in the meeting and see that the lawyer didn’t get it. Then I think,
‘Maybe I need to step back and ask how I can say it so everybody gets it.’” Criminalists could
use pre-trial meetings to test out and refine their language and explanations of science.

Most forensic scientists agreed that pre-trial meetings not only helped courtroom
communication but also promoted attorneys’ understanding of their scientific constraints. A
narcotics analyst, Taylor, said, “I get the sense from district attorneys that they think they know
what we’re going to say so they just call us in [to court]. And we don’t really get a good meeting
with them ahead of time so that we can explain what’s going on.” He continued by saying that
his “best testimony experiences” happened when the district attorney, “sat down with me and
we’ve gone through all the potential pitfalls of my testimony. And they actually did the right
thing to find out what exactly I could say and what I couldn’t” about the results. Thus, pre-trial
meetings could reduce challenges and make forensic scientists’ expertise easier to relay.

The one pre-trial meeting I observed demonstrated how these meetings helped
criminalists to circumscribe the science and communicate on the stand. Andy, a DNA analyst,
had a case in which he analyzed the DNA on swabs from a revolver that was found by police during a car stop. The DA called Andy the morning that he was expected to appear in court to testify at the pretrial hearing of a suspect whose reference sample matched the DNA profile he found on the grip of the gun. He had specific questions about what Andy could say in his testimony, asking if Andy could say at what time the suspect touched the revolver. Andy explained the limits of his conclusions: “I wouldn’t be able to say exactly when that occurred…the only thing I can really say is that she came into contact with it, I can’t really say how or when.”

Andy went to the courthouse later at the DA’s request, but after waiting in the hallway for over an hour, the DA came out of the courtroom to say that he was not going to charge the suspect that day. He explained to us that she had borrowed the car from someone who lived in another county:

And that’s why I asked Andy those questions about if he could tell when she left her DNA on the gun. If she touched the gun in Suburban County, then we can’t prosecute it in Metropolitan County. Andy can’t say exactly when and where she touched it, and it isn’t against the law here if she says she touched it in Suburban… Andy has educated me enough to know that I’ve got some small issues on this case. I’m no scientist, but he put it in terms for me to understand. So I know what I can and can’t do.

Forensic scientists were more comfortable when they had the chance to explain their conclusions and the limitations of their results to attorneys in advance. Andy was glad that the district attorney in this case had discussed the limitations of the DNA results with him, and therefore better understood how those results could and could not be used in his courtroom proceeding. However, pre-trial meetings were not typical, as Peter, an experienced chemist, pointed out:

I have had DAs meet with me the hour before court and take a copy of the report and say, ‘This is what I want to ask you, what do you think about that? And are
there any other questions you think I should ask?” But that doesn’t happen all of
the time. It is kind of more on the rare side. I realize that sometimes they are in a
rush but still in terms of preparation they should do that.

In my time at MCCL I only observed a single pre-trial meeting, the one Andy had over the
phone. More frequently, criminalists complained that the attorneys did not take the time to
prepare before their appearances by discussing the limits of the case evidence and what they
were able to say about it. When they did not have a sense of what line of questions the attorneys
might pursue about the evidence, forensic scientists were apprehensive, and worried about how
they would stay true to the science and protect their occupational integrity on the stand.

In addition to pre-trial discussions, forensic scientists also interacted one-on-one via
phone and email with inspectors and district attorneys in the process of preparing for and
completing the lab’s analysis of evidence. During these interactions they tried to clarify the
scientific requirements and process of their analysis, in order to educate the criminal justice
community and limit disruptions to their work. One Monday morning in March, Eden, a
supervisor in the forensic biology unit, took me through some of her notes on her backlog of
cases to assign to the DNA analysts. As she dug into the various forms and databases related to
the cases, it became clear that the supervisor’s role entailed repeated ongoing conversations,
sometimes one-sided, with the district attorney’s office.

For instance, one set of items that were submitted for DNA profiling were part of a case
that also included firearms comparisons and GSR analysis. Eden said that when she had first
reviewed the evidence, “My initial concern was around testing this ejected .25 round. My
concern is that this is contact DNA, and the round was ejected onto the ground. What if it went
into a puddle? Who picked it up, and were they wearing gloves?” The messiness of the crime
scene and the low level of DNA would make the analysis more complicated and the
interpretation more difficult. She continued:

In September, I sent him an e-mail asking the DA all this, and asking who he
believed the DNA was from. I didn’t hear back, so I asked the same question a
month later (in October), with even more specifics about why I wanted to know. Then
we played phone tag, and on Dec 22 he called and said hold off. In early
March, I asked again. He said he needed it in a month, so I told him again that we
need a reference sample to check against the potential DNA. Nothing. Currently,
the database says that the trial is on March 30th, which is less than a week from
now… but I’ve done my due diligence. Reading this, I feel like such a pest. I’m
not calling any more. When he calls wanting to know why it isn’t done, I’ll show
him my communication log and tell him this is why.

As Eden’s logs showed, she spent a good deal of her time thinking about what evidence the DA
might need, when it was needed, and whether it made sense for her unit to perform the analysis.
Here, she explained to the DA handling the case that some aspects of the analysis were
problematic with respect to the process of developing a profile – low level DNA and the issue of
contamination would make analysis more uncertain. The delay also impeded the work in the unit,
because they could not proceed with a comparison until they had an appropriate reference
example. Throughout her work on the case backlog, Eden repeatedly reached out to manage the
lab’s processes and shield their work by sharing details about their practices.

These interactions with the criminal justice community could disrupt the laboratory’s
work, challenging criminalists’ occupational integrity and leading to concern and frustration.
For instance, one afternoon Holly, the comparative evidence supervisor, complained to Eden
about a case in which a sheriff requested that the lab check some cartridge cases for both latent
prints and DNA. Eden said, “What? They know that we don’t do latents or DNA on anything
that’s been fired!” Holly said, “I called him about it and he said, ‘It was worth a try.’ Can you
believe that?” Eden and Holly agreed that it would be easier to set limits on their analysis, as
well as guard the laboratory’s work process, if law enforcement representatives contacted them
to discuss what was appropriate evidence for analysis before sending it over. By pushing back on investigators and attorneys who wanted their units to analyze evidence, the supervisors tried to explain the scientific underpinnings that might make the work problematic. However, all of these examples illustrate the difficulty of managing occupational integrity: while supervisors invested time and energy into these interactions, the criminal justice community they worked for could ignore their concerns and explanations.

Although supervisors were often the ones negotiating over requests for analysis, criminalists also resisted some requests, worrying about the scientific findings and anticipating whether the evidence was useful for the justice system. In the chemistry unit, Taylor described a trace evidence case where he had explored the possibilities for analysis and decided it was not worthwhile.

I’ve got this domestic violence case – the suspect basically pulled her out of the car and kicked her in the back, he broke her tailbone. They want me to test for any fibers from her clothing on his steel-toed boots. But that is only a test for association, and it won’t tell them anything more, because they already have both of them reporting the association. They both say that this happened in a parking lot. It can’t prove the action of the kick. So I need to talk to the DA and tell him that.

While Taylor could perform the analysis, he felt that the scientific findings would not help the DA’s case, since the DA had the word of both the suspect and the victim to support their association.

In the forensic biology unit, analysts frequently discussed whether analysis would provide accurate and probative evidence in a case. Maureen complained about a case where the police had submitted hundreds of beer cans for DNA profiling which came from a party where a knife fight had broken out. It would take months to complete the analysis on every can, and she thought it was unlikely to provide insight into the details of the fight. Similarly, a group of DNA
analysts chatted about recent requests for analysis they had received, and one noted, “The police submitted some bottles from a burglary which they picked up off the road, not in the house. They don’t even know if the suspect was there!” Another replied, “I had a case recently with four different [brands of] cigarette butts, they put them all in the same evidence envelope.” The cigarette butts were problematic both because the analysis might not provide useful evidence and also might be inaccurate due to DNA transfer from one piece of evidence to another, contaminating the evidence. By resisting, Taylor, Maureen and the other criminalists shielded their occupational integrity not only by clarifying the limits of their expertise, but by maintaining the standards of their work.

While complaining was more common than resisting outright, forensic scientists were particularly assertive in guarding the value of scientific truth, and they could not be swayed by district attorneys’ pressure to go beyond their scientific results. While I was observing at MCCL, one district attorney tried to convince Tanya, a DNA analyst, to change her conclusions about the results of a specific DNA profile. The analyst involved completely resisted. Several other criminalists were talking about it in a hallway conversation, and one said, “Of course Tanya refused. I would have loved to have been a fly on the wall during that discussion. She’s not someone I’d ask to do something like that!” Similarly, Al, a firearms examiner, told me a story of a past case he worked on in a different laboratory, when he had been pressured to change his conclusions.

I had a gun and the question was, did it go off? No it didn’t, and it hadn’t gone off for a long, long time. The barrels of the chamber were full of dust. There was no way the guy fired this gun. A Deputy DA wanted me to change my report because he didn’t like what I was saying because it didn’t support the prosecution.

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3 This was the only time I heard about anyone being pressured to change their reports at MCCL, although pressures from the DA or other members of law enforcement are reported to be a problem in crime laboratories (Smith, 2012; Giannelli, 2010; Mills and Possley 2001; Thompson, 2015).
So, I basically told him to go fuck himself. If he didn’t like my report too damn bad. So I got a letter of reprimand for my language, which I couldn’t care less about. It went in my file with all of my other letters of reprimand for my language. My report stayed the same. Nobody was going to tell me what to write in my report.

Thus, while they anticipated the expectations of the criminal justice system, criminalists held fast to the scientific truth of their results and their standards of good science, and pushed back hard on the criminal justice community in these cases.

**The culture of anticipation and the vulnerability of occupational integrity**

The culture of anticipation at Metropolitan County Crime Laboratory enabled the forensic scientists to maintain their occupational integrity. Criminalists invested effort inside the laboratory to incorporate the expectations of criminal justice into their findings and testimony. By crafting standard language that was understandable to attorneys, juries and judges, criminalists protected their value of scientific truth, trying to make their knowledge less esoteric while still maintaining the uncertainty of the science. Their hedging practices enabled them to narrow their statements of expertise, which helped to safeguard their credibility on the stand. Similarly, they rehearsed their role as the voice of the evidence in order to temper the science in ways that those in the courtroom could understand and to prepare themselves to explain their practices clearly while facing challenges to their procedures from adversarial attorneys.

At the same time, criminalists were committed to their role as scientists. They hoped to make the community more aware of the science underpinning their work, and they therefore projected their knowledge into the criminal justice system. They broadcast information about forensic science practices into the criminal justice community, offering training describing the laboratory’s work and providing attorneys with scripts of appropriate questions to ask criminalists in court. They hoped that these efforts might improve understanding of forensic scientific procedures and practices in the community, which would help them guard the science
and protect their dignity on the stand. However, criminalists felt that these broad practices were not as effective as their daily interactions with attorneys and police, in which they had opportunities to communicate the limits of their analysis of specific case evidence. These informal interactions were perceived as helping to define their expertise and explain the uncertainty and messiness of their scientific practices, provide representations of appropriate scientific processes, and make testifying more explainable and less personally risky. Together, the culture of anticipation in the laboratory protected forensic scientists’ occupational integrity: the security of their community’s values around scientific truth, appropriate processes and standards, and legibility of explanations.

Their feelings of vulnerability are important to understanding how criminalists prepared for threats to their occupational integrity. Often, criminalists joked and complained with one another about the “craziness” of the behavior of members of the criminal justice system. From Kerry’s comment about attorneys’ hatred of uncertainty to Eden and Holly’s disbelief in a sheriff’s audacious request for analysis, criminalists experienced their interactions with the criminal justice community as disrupting their shared sense of sound occupational values.

I also saw this in how they made sense of courtroom behavior by attorneys. For instance, when Adam, a firearms examiner was testifying in a homicide case, the defense attorney asked him during cross-examination to list out the 27 different gun manufacturers that he found that produced a .25 caliber bullet with the characteristics he found on the bullet that was discovered at the crime scene, insinuating that any of these firearms could have fired the bullet in question. “It could be any one of those 27?” the defense attorney kept saying. Adam calmly replied “Yes” to each of these questions. On redirect, the district attorney, in an apparent attempt to illustrate that a list of 27 manufacturer matches was actually narrow, asked, “How many gun
manufacturers are there?” Adam said, “What do you mean?” The attorney clarified, “In the
database?” Adam replied, “I don’t have that information specifically… but thousands.”
Afterward, on our walk back to the laboratory, Adam said to another firearms examiner, “See,
they can ask any random question when you are on the stand. ‘How many gun manufacturers are
there?!?’ You have to be prepared for anything, you never know what they will ask.”

Similarly, when Kerry was preparing for her mock court case in the laboratory, she spent
time thinking about answers to many potential questions, telling me, “[Attorneys will] also
sometimes ask crazy questions… you have to be careful how you answer.” Forensic scientists
complained about the “random” questions attorneys asked, not only because they were
unexpected, but because they were at odds with their sense of the soundness of their occupational
values.

By crafting their language, developing their voice, and broadcasting and defining their
expertise, forensic scientists shielded themselves and their work from adversarial outsiders who
did not value their science. Their feeling that the questions they anticipated would be partial,
crazy and sometimes hostile reflected their conception of forensic science as a whole, sound
occupation whose boundaries were in danger of being breached by attacks from attorneys.

**DISCUSSION AND CONCLUSIONS**

The culture of anticipation developed at MCCL was intended primarily to uphold
occupational integrity, rather than maintain task jurisdiction or legitimacy. Criminalists were not
competing with other occupational groups for jurisdiction over their tasks of analyzing evidence:
their specialized work required science training to perform and they had an established,
uncontested role in the criminal justice system. Other groups’ accurate and respectful reception
of their findings, however, was vital to their accomplishment of their work. Their feelings of
occupational integrity – the soundness of their values of scientific truth, procedures, and expertise – undergirded forensic scientists’ responses to their interactions at the boundary of the criminal justice system.

**Occupational integrity**

Occupational integrity differs from both task jurisdiction and legitimacy, both of which have been extensively analyzed with respect to occupational competition. We know that occupational groups often compete for control over jurisdiction in an effort to survive and thrive. This may entail rhetorical strategies to set advantageous boundaries in the field (Suddaby and Greenwood 2005) and discursively claim occupational legitimacy (Bucher et al 2016) as well as negotiations at workplace boundaries over the management of tasks (Huising 2015; Kellogg et al 2006; Bechky 2003b). Occupational integrity is rooted in shared values, norms, and standards, not in these competitive jurisdictional dynamics. When criminalists anticipating courtroom questioning complain about random attorneys disregarding the truth of science, they were most worried about communicating and protecting their values, rather than being concerned about competing for the right to do their work.

Conceptualizing how occupational groups maintain occupational integrity deepens our understanding of the drivers of expert occupational dynamics within organizations. Task jurisdiction and legitimacy are important aspects of competition and collaboration across groups that highlight external orientations of occupational members as they think about accomplishing their tasks at the boundary with others. Occupational integrity, on the other hand, while shaped by experts’ boundary activities, showcases an internal, values-oriented explanation for occupational action. Values carry both normative weight and emotional resonance (Hitlin 2003, Kraatz, Flores and Chandler 2020), and are shaped by local, direct experience (Selznick 1957). People use them to judge themselves and others; as such, they are an important source of
differentiation and cohesion for occupational groups (Fayard et al 2017; Anteby 2010; Bucher 1988).

At MCCL, the ideal of scientific truth and the valuing of the efficacy and legibility of scientific procedures were central to forensic scientists’ enactment of their daily work. They were important to the community, shaped criminalists’ emotional reactions to their experiences, and influenced their work practices. While we know that occupational communities are a source of knowledge, standards and values for their members (Barley and Van Maanen 1988), we have a more thorough understanding of how knowledge and tasks influence occupational outcomes than of how they are shaped by occupations’ ideals. This study suggests that occupational integrity is an important driver of action in the workplace that would benefit from further investigation.

The culture of anticipation as an ongoing accomplishment

The culture of anticipation created at MCCL to protect occupational integrity also calls attention to the ongoing nature of experts’ boundary work in complex organizations. Many expert occupational groups work in contexts where they regularly present themselves and their outputs to others but do not directly need to coordinate their work with other groups in the workplace (Huising 2014; DiBenigno 2018). For these experts, what is critical for their work is that their audiences respect and listen to them (Carr 2010). When this respect is threatened, experts are likely to take action and increase the likelihood of successful interaction by anticipating what will happen at their boundaries.

Scholars conceptualize much of the boundary work of occupations as communicative practices that occur in the interaction at the boundary itself. Occupations engage in rhetorical work within their fields that enhances their legitimacy and protects them from the incursions of
others (Gieryn 1983; Bucher et al 2016; Abbott 1998); their members engage in negotiations on the ground that help others understand and use the occupation’s work (Bechky, 2003a; Carlile 2002). Scholars studying scientists have also shown that communicative practices at occupational boundaries are necessary to managing their work. Medical examiners carefully translate the language in their findings about cause of death (Timmermans 2006); biotechnology technicians reach out to their university clients to make sure they know how to use equipment (Barley and Bechky, 1994); and health and safety professionals teach laboratory scientists how to dispose of hazardous materials (Huising, 2015).

In this study we see that, like other professionals and scientists, criminalists do engage in these practices at their boundary: their reports and testimony embody their efforts to effectively communicate to others in the criminal justice system. However, the anticipatory practices of forensic scientists are equally important, and represent a more pervasive form of boundary work, in which the experts are spending a significant portion of their time thinking about the reception of their work product and changing it to meet the needs of others in their organization. Managing their boundaries in the crime lab required an ongoing culture of anticipation in which rehearsals, wordsmithing meetings, and continual outreach and education pervaded the daily work. The pervasiveness of these practices can also be seen among the scientists at the National Center for Atmospheric Research studied by Barley (2014), who also tailored not only their outputs, but their research questions and models in anticipation of the needs of their research partners. These examples suggest a deeper consideration of the relationships that require anticipation work to be more or less pervasive in the lives of experts.

Peripheral expertise, audiences, and structural position
The position of forensic scientists within the criminal justice system suggests several considerations that seem to be motivating the enactment of a culture of anticipation. Forensic scientists’ peripheral status means that their work is structured to induce anticipation. Experts must make an effort to appeal to multiple audiences, and given their different relationships, some of these audiences are more important than others (Anteby and Holm 2021). Crime labs are directly dependent on law enforcement agencies for their tasks: Investigators and district attorneys request analyses of evidence and receive the results from the laboratory. Legal knowledge is at the center of the criminal justice system, and forensic science exists to support it. Investigating the culture of anticipation at MCCL thus sheds light on the importance of the structural position of expert workers within their organizations. Because of their relative structural positions, law enforcement representatives are quick to make requests for analysis while forensic scientists are more careful about pushing back on these requests – they are aware that the district attorney’s office is at the center of the criminal justice system while the crime laboratory is at the periphery. The expertise and knowledge of forensic scientists is also distant from the core goals and activities of the criminal justice system. While the interpretation of evidence can be critical to prosecutions, it is only one small part of the attorneys’ arguments. And because the science is difficult for attorneys to understand, it imposes a burden that they are not eager to bear, as evidenced at MCCL by the district attorneys avoiding the training sessions.

This structural position helps explain the differences in the boundary work done by forensic scientists versus other peripheral expert occupations. For instance, the mental health professionals described in DiBenigno’s (2020) study of the US Army are a peripheral occupation with a similar position to criminalists vis-a-vis the core goals of their organization: their psychological expertise is distant from the core goals of the army. The successful experts in this
study used “rapid relationality” – communication tactics that demonstrated their alignment with the core goals – in order to develop trust and influence with army commanders such that their recommendations were followed. In contrast to these individual strategies, the culture of anticipation at MCCL stands as an ongoing set of boundary practices that were established and enacted communally. Unlike these newly integrated mental health professionals in the Army, because forensic scientists had a settled task jurisdiction in which they were subordinated (Abbott 1988: 70). Having been structurally peripheral experts within the criminal justice community for decades, criminalists always kept their position in mind, and their boundary work had become a full-fledged culture of anticipation.

These differences suggest that further research is needed to explore the variation in the structural locations of experts within organizations. As work has become specialized, organizations increasingly rely on expert knowledge to inform decisions. Expert workers’ integration within organizations is accomplished through multiple types of relationships and the workplace settlements between these groups are fuzzy and require a lot of maintenance (Abbott, 1988; Strauss et al. 1963). By exploring the ways in which these settlements affect the daily work of occupations, we can better understand the implications of the structural position of occupations for their expertise.
References


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