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Embodied Healthcare Intuition: A Taxonomy of Sensory Cues Used by Healthcare Providers

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Although healthcare providers’ decision-making is informed by data and protocols for care, recent research suggests that individuals’ intuition—which integrates previous experiences with situational awareness and sensory knowledge—also plays a large role in directing action. Drawing on two different datasets from research on EMS providers and nurses in clinical nursing simulations, this article introduces a taxonomy for the various cues that trigger intuitive action and unpacks how intuition manifests at different stages of care. We argue that healthcare providers rhetorically navigate a wide range of both external and internal intuitive cues, and that external cues draw on sensory engagement with bodies, technology, and the environment as well as collaborative interpersonal exchanges. Intuition, then, is more than an unconscious ability to inform action—it is a type of intelligence that develops from experience, and from the ability to be attuned to the surrounding environment and material conditions of a workplace. By creating a taxonomy for articulating intuition’s complex and diverse cues, this article aims to provide both rhetoricians of health and medicine and healthcare providers with an impetus for recognizing and valuing its key role in patient care.

**Keywords:** intuition, embodiment, healthcare providers, nursing, emergency medical services (EMS)
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Introduction

Before reading this article, take a few seconds to look at the image in Figure 1. What do you notice? What questions would you have about a person who lives here and their healthcare needs?

If you are a trained emergency medical services (EMS) provider who is dispatched to this elderly male patient’s home during a weekday, you might notice the following details:

- Pill bottles on the dresser
- Piles of newspapers and other papers
- Dust-covered figurines and mirrors
- A made bed
- A baby gate

Figure 1. A scene from a potential patient’s disheveled bedroom. Photo taken by the author, Elizabeth A. Angeli.
Then, these details would prompt the following questions that lead the provider to decisions and actions, like medical treatments and transport:

- Are the pill bottles expired? When were they last filled? Is this patient taking his medicine? What medications is he on and what conditions do these prescriptions treat?
- Does he need assistance in caring for his house? Does somebody else live here who can help him or who might be contributing to this unkempt living condition?
- Is he able to do laundry? Is he wearing clean clothes?
- The clothes seem to be mostly women’s clothes, and there are perfume bottles. Is this patient married or does he have a female roommate? Might these items belong to a deceased wife, which may indicate this patient is grieving?
- The baby gate in the corner suggests that there might be a grandchild or a pet involved in this patient’s life. Does child protective services or animal control need to be called to ensure their safety and well-being?

EMS providers know to ask these questions based on their training, their experience, and their “gut feelings” or intuition. A mainstream understanding might attribute intuition to an individual and locate it primarily in a single person’s mind (Ruth-Sahd & Hendy, 2005; Moulton, et al., 2010). However, we define intuition as a deliberative process of integrating previous experiences with situational awareness and sensory knowledge distributed across objects and environments, as well as people (Klein, 1999). This process is often intangible and unexplainable, yet scholarship in healthcare and provider education point to its ubiquitous role in medical decision-making and the need for additional research on this phenomenon (Woolley & Kostopoulou, 2013; Ruth-Sahd & Hendy, 2005; Moulton et al., 2010).

As a rhetorical investigation into healthcare intuition, this project is interested both in understanding the various rhetorical actants (both human and non-human) that prompt intuitive care and in analyzing how providers translate intuitive knowledge to one another. A range of work in the rhetoric of health and medicine (RHM) has focused on the patient’s embodied experience in medicine (Arduser, 2017; Emmons, 2010; Kirkscey, 2018; Scott, 2003; Segal, 2012). This focus on patient experience can often lead
to a critical stance of medicine as “a powerful, productive site of ideological construction” that has the potential to undermine collaborations between healthcare providers and rhetoricians (Reed, 2018, p. 17). Meanwhile, healthcare providers often prioritize data-driven care, based in protocols designed according to the latest research (Teston, 2017). In this article, we focus on the provider’s embodied experience and how this experience informs action, and in doing so, we address two gaps: focusing on and valuing providers’ embodied experience in RHM and acknowledging and fostering the critical role of intuition in medical decision-making. Given that about a third of the participants in our research projects were novices, our analysis also has a pedagogical orientation with a focus on how intuitive skill is developed and cultivated in differing healthcare contexts.

This article is informed by current work in materialist and embodied rhetorics and uses a performative phenomenological lens to call for greater attention to the role that physical objects and bodies play in cuing intuitive action (Meloncon, 2018). As such, our guiding research questions include: What does intuitive action—action that is taken based on an intuitive cue or feeling—look like across different datasets? How do healthcare providers learn to use intuition to guide their actions, decision-making, and communication while caring for patients? How does the surrounding environment and context influence and facilitate intuitive action? To answer these questions, we draw on two field studies: one with nursing students immersed in nursing simulation training and one with EMS providers, licensed Emergency Medical Technicians who work outside of the hospital setting. Data collection included videos of simulations, patient charts, notes made by participants, recorded field notes, survey responses, and interview transcripts. While diverse, this range of data and contexts provided us with multiple pathways into analyzing the sources and functions of intuition in healthcare. Data variation was needed in part because the unconscious and often unarticulated nature of intuition makes it a particularly challenging phenomenon to capture and study. Overall, we position this research as part of a call for more work in RHM that integrates data from different contexts, and we see this project as offering one methodological model for such work.

Drawing on our diverse datasets, we use two main frameworks to propose our taxonomy for the various cues that trigger intuitive action: Beverly Sauer’s (1999, 2003) analysis of embodied sensory experience in the workplace and the rhetorical concept of *phronesis*. In turn, our taxonomy unpacks how intuition manifests at different stages of care. We argue that
healthcare providers rhetorically negotiate a wide range of both external and internal intuitive cues, and that external cues draw on sensory engagement with bodies, technology, and the environment as well as collaborative exchanges with a range of participants. We also discuss how intuitive knowledge is shared among providers, even in a context where data-based findings are consistently prioritized. Our hope is that by creating a taxonomy for articulating intuition’s complex and diverse cues, we also provide both scholars in RHM and healthcare providers with an impetus for recognizing and valuing its key role in patient care.

**Material and Embodied Rhetorical Frameworks**

Because we argue that intuition is distributed across objects, environments, and people, our work is attentive to a wide range of rhetorical forces beyond the rational human actor—including nonhuman elements such as the environment, objects, texts, and unconscious bodily elements like gut feeling. Recent work in RHM has drawn on materialist frameworks to account for the role of nonhuman rhetorical actants, ranging from gut bacteria, to stem cells, to MRI dyes (Bennett, 2010; Teston, 2017). Much new materialist work argues for a view of objects as mattering beyond their mediational role in human action, but we ultimately position this project as an embodied humanist project. Given our primary focus on how healthcare providers learn to navigate a multi-sensory clinical environment in their care, we attend to nonhuman actants as mediators because—much like both Sauer (1999) and T. Kenny Fountain (2014)—our research questions are still ultimately questions about human learning and decision-making.

That said, attending to bodily action that includes but also extends beyond the rational, human mind is a version of posthuman analysis that is more closely aligned with our own goals for this project. Previous research on embodied rhetorics does not see bodies as isolated entities either, but instead is invested in understanding the complex relationships between bodies and context. For example, Kristie Fleckenstein’s (1999) theory of the “somatic mind” articulates how thinking and learning processes can never be separated from their specific environment and moment in time. Taking an interconnected view of mind, body, and environment also calls into question traditional understandings of expertise as strictly mental knowledge. Extending Jennifer LeMesurier’s (2014, 2016) work on how both discursive metaphors and familiar movements can trigger bodily memories and actions
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for dance students, our study considers how intuition might be triggered by particular bodily senses or environmental interactions as well as conversations among collaborators. Recognizing this diversity of instantiations of intuition across senses, materials, and people helps us highlight both the affinities between these different ways of knowing as well as the distinctions that make different kinds of intuition unique.

It is also important to acknowledge, however, that individuals’ backgrounds make certain kinds of intuitive cuing more likely while limiting other possibilities. As LeMesurier (2014) explained, the memories and attachments stored in our bodies are tied “to certain affiliations or investments, attachments that make some rhetorical paths more or less appealing than others” (p. 364). These familiar rhetorical pathways create opportunities for what Sara Ahmed (2014) referred to as “misattunement,” a result of the histories that individuals bring with them into new situations: “one might enter the room with certain learnings. To be attuned to some [people] might simultaneously mean not to be attuned to others, those who do not share one’s learnings. We can close off our bodies as well as ears to what is not in tune” (pp. 17–18). In the conclusion, we consider the ways that relying on intuition can also lead to stereotyping and bias by healthcare providers and the role that healthcare pedagogy might play in countering these familiar pathways.

In our datasets, though, we noticed more often than not that cues and intuition were transformed into responsive rhetorical action instead of stereotyping. To help us understand this transformation, we turn to the rhetorical concept of **phronesis**, which is commonly understood as “practical wisdom.” Phronesis has been examined in the medical setting as a way to explain how intangible forces guide medical decision-making (Braude, 2012; Montgomery, 2006). In this piece, we follow Kathryn Montgomery’s (2006) definition of **phronesis**: phronesis can be understood as clinical judgment, allowing physicians to “combine scientific information, clinical skill, and collective experience” to decide a course of action for a patient’s care (p. 5). These different types of knowledge also resonate with Sauer’s (1999) categories of expertise in her research on embodied workplace knowledge in the mining industry—pit sense, engineering experience, and scientific knowledge. These categories, which we use to inform our own taxonomy below, describe a spectrum of expertise that begins with direct physical interaction with the environment and extends to the advanced interpretation of mediated data drawing on professional scientific knowledge.
Overall, our datasets demonstrate how intuition is a part of clinical judgment (phronesis) that is developed through data, experience, and a series of environmental, bodily, technological, interrelational, and internal cues that we present in this piece. To build clinical judgment, our participants developed the ability to recognize and distinguish between these cues and to leverage them in their care. Previous work in material rhetorics (Bennett, 2009; Teston, 2017) and embodied rhetorics (Ahmed, 2014; Fleckenstein 1999; LeMesurier, 2014, 2016) has provided a theoretical basis for recognizing and valuing the aspects of intuitive cuing that exist beyond individual, rational processing. Meanwhile, research on professional communication (Sauer, 1999; Fountain, 2014) has offered a means for considering the collaborative nature of intuitive action—how it is learned and shared among providers. By bringing these frameworks into conversation with the rhetorical concept of phronesis, we can better understand how through training healthcare providers honed the skills to recognize when gut feelings are based on experience instead of stereotypes, preventing misattunement and effectively developing clinical judgment.

Methods

In this piece, we draw on two datasets from studies that examined healthcare providers: nursing students immersed in simulation labs and EMS providers who work in unpredictable environments. Both projects were approved by the human subject review board at the institutions where they took place and by the authors’ current institution. As different as these situations may seem, both sets of participants are responsible for sifting and sorting through a deluge of data about patients and the environment and rely, in part, on technology to guide them through decision-making. Intuition, then, facilitates how participants make decisions and how they draw on cues from patients, the environment (a simulation room or a patient’s location), and technology. We are not the first to find triangulating data across contexts to be vital to the process of understanding intuition. Indeed, Lisa Ruth-Sahd and Helen Hendy (2005) described a combination of observation and surgeons’ accounts of their processes as helping them to study cognitive processes of “slowing down” in the surgical operative context. However, we do see our cross-contextual, multi-study approach as relatively innovative, especially within the field of RHM.
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In addition, Lisa Meloncon’s (2018) methodology of performative phenomenology guided our analysis of findings. This approach emphasizes how researchers can capture immersed embodied experiences through attending to what is said in an interview or observation and what is present in the space, objects, and gestures that accompany that action. Of course, this framework could not specifically answer the question of how we should move from different kinds of texts that documented healthcare practices to data points that would help us account for the presence of intuition. After introducing our field contexts below, we describe two phases of data analysis that helped us to account for intuition’s role while highlighting both similarities and differences that arose because of our different contexts and types of data.

FIELD CONTEXTS

The simulation project drew on a year of qualitative research, which included gathering field observations of clinical nursing simulations and instructor-led debrief conversations, interviews with focal students who agreed to follow-up conversations after observations, video recordings of simulations, and a range of texts including patient charts. Clinical nursing simulations are widely used to train undergraduate and graduate nursing students in technical and communication skills. In the simulations that were the subject of this research, junior year nursing students were immersed in a predesigned patient scenario and asked to collaboratively provide care for a robotic manikin patient. A simulation typically included three groups of two to three students each, providing care for approximately 20 minutes; the patient’s condition would worsen over the course of the three groups’ caretaking. Campbell observed ten groups of students participating in three different simulation scenarios: a geriatric simulation with a diabetic, postoperative female patient; a medical surgical simulation with a young, postoperative male patient; and a pediatric simulation with a male infant with a respiratory infection.

During every simulation, the simulation coordinator sat on the other side of a one-sided window where she could view care and program the manikin to respond appropriately; she could also talk to students as the patient using a microphone connected to the robot’s voice box. Alternatively, she could respond to student questions or intervene as the instructor using an intercom into the room. Meanwhile, students were immersed in a high-tech suite that included a telemetry system, a medications database,
and oxygen equipment as well as assorted supplies needed for care. Activities included negotiating a plan for care based on the physician’s orders, administering medications and tracking vital signs, and documenting interventions. That said, simulations did not include an electronic health record, so patient care was documented on a large shared whiteboard using a template that students designed at the beginning of their simulation (Campbell, 2017). Overall, while the manikin and simulation suite could not perfectly mimic a real-world clinical environment, simulations focused extensively on attuning students to cues from the patient and the environment that could redirect their care. They also provided numerous opportunities to practice communicating intuition to other providers in both verbal handoffs and written documentation.

The EMS project involved 16 months of participant observation, interviews, and surveys to better understand the shifting environments in which EMS providers write. Participants included EMS providers with experiences ranging from six months to over 30 years in the field: one emergency room nurse who was a former paramedic, another a paramedic who also worked as an emergency room nurse, and another an emergency room physician who was the EMS medical director. All 15 participants completed surveys, and 12 participants completed interviews, each of which lasted 45 to 90 minutes. Additionally, before this study began, Angeli was enrolled in an EMT-Basic course and earned her EMT-B certification during the study’s duration. As an EMT-B student, she completed a seven-month course and clinical rotations in the emergency department and on ambulances where she cared for patients.

Data included field notes from participant observation in the emergency room and on the ambulances, completed surveys, interview transcripts, and templates of patient care reports, which are required medical forms that EMS providers complete at the end of every 911 response. Angeli was unable to observe synchronous communication practices due to institutional review board delays. In response, Angeli amended the original research design, which included observing participants communicating with patients by modifying the critical decision method (CDM), an interview technique that offers researchers proxy data when they are unable to observe synchronous writing practices in medical disciplines. As Angeli (2019) detailed elsewhere, modified CDM provided proxy data points, pieces of information that the original research design would have captured in situ. In modified CDM, participants developed a sketch of a 911 response, writing down the
information they shared verbally throughout a response and highlighting the verbal information that they transferred to a patient’s medical record to illustrate the relationship between spoken and written communication. The sketches, then, became inventional aids during interviews, creating an external representation of thought (Kirsh, 2009). They also offered Angeli and participants shareable objects that represented past decision-making and writing choices, allowing her to learn more about in situ, unobservable communication practices.

**First-Round Coding**

Given the extensive differences between our two research contexts and our embodied knowledge of these contexts as long-term researchers, we ultimately made the decision not to cross-code one another’s data. Instead, we worked individually to apply our collaboratively developed coding scheme to each data set. Lisa Ruth-Sahd and Helen Hendy (2005) describe a similar process of selecting surgeons for their study that were in the same specialty as their principal investigator to “enhance her ability to detect subtle nuances of the slowing down phenomenon and to understand the intricate technical and cognitive operative details” (p. 1572). We also focused data analysis on interviews and observations, which offered a wide range of access to intuition in different instantiations. Additionally, they served as parallel sources of data for us to compare, given that Campbell had access to patient charts from simulation, while Angeli did not. As we discuss more in the implications, with cross-contextual projects like ours, it is vital to consider how datasets compare and align in developing both research questions and methods of analysis for a project.

Our first round of data analysis took a deductive coding approach. Angeli reviewed transcripts of interviews with participants and Campbell reviewed fieldnotes and interview transcripts to identify moments where intuition was visible. For example, participants often referenced “gut feeling” or “experience,” mentioning that these moments influenced patient care and documentation. By comparing these intuitive moments across datasets, we were able to develop a heuristic for unpacking intuition’s role at five different stages of care—anticipate, assess, plan, act and reassess, and document (see Angeli & Campbell, 2017).

These stages may differ across medical specialties, but at their core, they generally include five broad steps. First, participants in our projects surveyed
the patient’s history or the patient’s environment to obtain a general picture of the patient’s chief complaint; in doing so, they began to anticipate what type of care the patient will need. Second, using this information, participants assessed a patient’s condition. Third, they used the assessment to plan treatment. Fourth, after planning treatment, participants acted on their plan and reassessed the effectiveness of these plans, adjusting where needed. Fifth, they documented treatment plans and information that guided decision-making throughout these stages of care in two ways: by writing in the patient’s medical record and by verbally transferring care to another healthcare provider. Although a detailed discussion of these stages is beyond the scope of this paper, they are worth mentioning for two reasons. First, the stages informed our coding process, and second, by using these stages, we were able to tease out when participants referred to their intuition most during care, allowing us to see connections among intuitive moments and action.

**Second-Round Coding**

During the second round of coding, we wanted to take a more systematic approach and code a segment of each of our datasets to ensure reliability of our findings using our initial scheme. Ultimately, Angeli coded all 12 of her transcripts using NVivo, and Campbell coded nine 30-minute simulation sequences (one from each of the three groups providing care for all three simulations). Campbell used ELAN, which she has found to be more conducive to working with video clips in order to code video recordings on multiple tiers. Based on our preliminary findings, our coding began with the following tiers.

1. Stage of Care: Segmenting data according to the five stages—anticipate, assess, plan, act and reassess, and document.
2. External Intuition: Coding that focuses on physical and nonphysical experiences with the patient and the patient’s environment, building on Sauer’s (1999, 2003) work with miners.
3. Internal Intuition: Coding for references to memories of previous experiences, individual feelings, and individual embodied sensations.

Our coding process was iterative, and these tiers continued to develop each time we met to discuss experiences with coding. Ultimately, we focused on participants’ uptake of cues (such as looking at a heart rate monitor)
rather than the creation of cues (such as writing a note to share with another provider) because our studies were not set up to examine how participants created cues for other healthcare providers to use. Instead, our data provided information about how our participants used cues to act. Then, looking at these cues, we added a number of subcodes for external intuition (namely: bodily, technology, environment, interrelational) that provided a helpful taxonomy for distinguishing between the kinds of cues that triggered external intuition in different moments. While we remained interested in how intuition appeared at different stages of care, the types of intuition cues ultimately became the focal point of our analysis, and thus we use that taxonomy to guide the organization of findings next.

**Taxonomy of Sensory Cues That Guide Intuition**

In this section, we detail the four cues that emerged from data analysis and that ultimately guided our taxonomy for how different kinds of sensory cues trigger intuitive action. Drawing on Sauer's (2003) analysis of the sensory experiences of miners, engineers, and scientists, our project examined intuition as it emerged at three levels: 1) direct, physical engagement with the patient’s body or immediate environment (bodily and environmental cues); 2) direct engagement with professional tools, documentation, or spaces (environmental and interrelational cues), and; 3) mediated engagement through technological tools that communicate patient data (technology cues) (see Table 1). All three types of intuition can buoy all five senses, so that a provider might become cued into a problem by palpating the patient’s skin, smelling Febreeze in a room, or hearing a change in the beeping of a telemetry machine. Although these modes of intuition were dispersed by occupation in Sauer’s project, we found that nurses and EMS providers had to negotiate across all three in their work.

Intuition, then, is more than an unconscious ability to inform action—it is a type of intelligence that develops from experience, and from the ability to be attuned to the surrounding environment and material conditions of a workplace. In other words, intuition provides a way to explain the unexplainable aspects of a situation—to turn feelings and cues into a clinical decision or an action, like deciding to advance to mechanical suctioning of a pediatric patient’s nasal passage. Intuition is a part of clinical judgment or phronesis. As a part of phronesis, intuition is developed over time and largely by healthcare providers learning how to recognize and act on cues.
Table 1. A taxonomy of sensory cues used by healthcare providers

<table>
<thead>
<tr>
<th>Cue</th>
<th>Definition</th>
<th>EMS Example</th>
<th>Nursing Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental/Bodily</td>
<td>Cues from the surrounding environment, including the patient’s body</td>
<td>An EMS crew responding to a car accident notes the car’s state as an indicator of patient safety (environmental)</td>
<td>Students find an infected wound with bandages soaked in urine and start assessing for signs of a virus (fever, vomiting) and preparing a catheter (bodily)</td>
</tr>
<tr>
<td>Technology</td>
<td>Cues from technology that mediated information about a patient’s condition</td>
<td>EMS crews gather medical data from a stethoscope to reveal lung, heart, and bowel sounds, and telemetry machines to determine cardiac activity</td>
<td>Students are unable to find a medication dosage for an infant in the medication database system and are prompted to question the pharmacist’s orders</td>
</tr>
<tr>
<td>Interrelational</td>
<td>Cues triggered by written or verbal information that was shared with participants by stakeholders involved in the patient’s care</td>
<td>EMS providers learn to sort through various and conflicting accounts that bystanders might share to be attuned to the relevant details of a patient’s situation</td>
<td>A student begins their shift by assessing a patient’s breathing because the previous care team has indicated (verbally and in the patient’s chart) that this is a potential problem area</td>
</tr>
<tr>
<td>Internal</td>
<td>Cues from an individual participants’ felt sense about a situation or intervention</td>
<td>EMS crews note that a parent’s account of SIDS does not match up with their internal sense of the infant’s situation or injuries</td>
<td>A student spontaneously comments to the patient, “It’s kind of around lunchtime so I’m going to take your blood sugar real quickly.”</td>
</tr>
</tbody>
</table>

**Environmental and Bodily Cues**

First, intuitive knowledge can be developed directly through sensory encounters with bodies similar to what Sauer (2003) described as “pit sense”—“an embodied sensory knowledge derived from site-specific practice in a particular working environment” (p. 137). When miners feel changes in pressure or hear the sound of falling rock, they draw on previous experiences
to interpret those sensory experiences and intuit what might be wrong. Modifying this concept for our research site, we identify medical intuition that draws on physical cues from the patient’s body. Bodily cues capture moments when participants referred to the patient’s body as a source of information to make decisions and provide patient care.

Second, providers can receive intuitive cues from the environment and professional tools, such as an IV line. Sauer’s (2003) second level of expertise, “engineering experience,” accounts for how engineers gain knowledge from “physical signs or indexes embodied in objects and materials” (p. 134). This knowledge resembles what Fountain (2014) calls “trained vision”—which occurs as an interface of objects, bodies, and machines—and necessitates that students combine scientific knowledge with local embodied experience. For healthcare providers in our research sites, environmental cues describe moments when participants referred to items, objects, or cues from the surrounding environment, like the simulation room or an emergency scene. In our studies, we noted that bodily and environmental cues were often intertwined; patients are in the environment and have a symbiotic relationship to it. For example, an EMS provider might notice that a patient is struggling to breathe (bodily cue) and the house smells of stale and new cigarette smoke (environmental cue).

In simulation data, both bodily patient cues and environmental cues appeared most frequently during the assess and act/reassess stages. This finding is perhaps unsurprising because these are the stages during which students had the most direct physical contact with the patient and his or her environment. In the geriatric simulation, bodily cues included the patient’s broken glasses, her desire for modesty during care, the appearance of an infected wound (with bandages soaked in urine), and the proper physical procedure for sterile wound cleaning and catheter care. In one interesting example, a student who was about to begin cleaning the patient’s wound was called over by another student to help with a catheter procedure. With the bodily cue of the open wound visible, she recognized that she should not leave it uncovered but also did not know how to balance this demand with the competing demand of assisting her team member. Thus, as she abandoned wound care to help with the catheter, she called out to no one in particular, “I’m sorry this is unprotected!”

Meanwhile, in the medical surgical simulation, bodily cues were focused on finding and identifying the patient’s blood clot in his left ankle (which
was fabricated using a warm rice pack wrapped to his ankle), helping him
to breathe through an incentive spirometer, and again practicing sterile cath-
ereter care. Given the unique simulation context, bodily and environmental
cues could result in misdirection because of the lack of realism of the mani-
kin body or the simulated clinic space (Campbell, forthcoming). Even when
the manikin body was modified to simulate a physical feeling (like in the
case of the warm rice pack), students could still misinterpret these physical
cues or anticipate that they would not be available. For example, one stu-
dent asked the instructor if the ankle “felt warm,” to which she replied via
the overhead speaker that they should be able to physically tell. Meanwhile,
with the incentive spirometer, students would frequently instruct the patient
to breath out instead of into the mechanism. Since the manikin could not
physically expel air, the instructor would have to verbally inform them that
the spirometer was not working properly in order to cue them into the error.

While the infant patient could provide a few bodily cues—including a
grunting noise to indicate respiratory problems and the ability to turn blue
when oxygen levels dropped dangerously—the majority of intuition cues in
the pediatric simulation were environmental. Students were expected to
check that the side of a crib was up when they walked away from the baby
and if it was down that they always had at least one hand on the infant. To
simulate a chaotic pediatric ward, instructors also provided other environ-
mental cues such as a toy on the floor of the room and important information
on the chart of the next-door patient to attune students to the environ-
ment. Students could also acquire environmental cues from the equipment
they worked with, as when a student recognized that she had grabbed the
wrong needle for an injection after looking at it and attempting to prepare
a medication.

Similar to pediatric patient care for nurses, noticing and remembering
bodily and environmental cues is especially critical for EMS providers if a
patient cannot speak or has cognitive deficits that impact accurate recall, as
in the case of a patient suffering from Alzheimer’s. In these cases, EMS
providers “try to determine what’s going on by physical exam, watching
facial expression . . . to see if their face changes when you’re [palpating] cer-
tain areas to see if there’s pain, because some of them don’t. You know,
body position” (participant interview). These bodily cues, then, provide
EMS providers with information that guide their next steps as they move
through the stages of patient care.
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Although observations suggest that EMS providers drew on environmental and bodily cues during all stages of patient care, during interviews they discussed it most during the document stage, suggesting that these cues influenced their writing process and communication during transfer of care. To document these cues, participants relied on key details that they observed from the response. An EMS provider described a scene and how he would explain it to a nurse so that the nurse could continue effective patient care:

[The patient] could be compensating, all of a sudden something ruptures, and then they crash. That happens. So again, we’re trying to paint that picture. So yeah, the patient looks okay, but you [the nurse] don’t understand, this is what the car looked like. There was [a] two-foot intrusion into the patient compartment, you know, or the dashboard was rolled, or it took us 45 minutes to cut him out. You know, all of that stuff. They [the nurse] aren’t there, so that’s the picture we try to paint them. Again, that helps them think, “Okay, these are the injuries we need to look for as well.”

These visual cues of the car accident scene describe the patient’s environment and body with the goal of allowing other medical providers to treat the patient. Participants needed to notice and remember these cues during the first four stages of patient care in order to document them.

Technology Cues

In addition, intuitive cues can also be mediated by technological tools that process patient data, similar to how Sauer (2003) described “scientific knowledge” as “physical forces, particles, materials, and interactions that are sensed or perceived as data in language, physical tracings, and inscriptions. Scientists read and interpret data to formulate knowledge that is literally invisible to the physical senses” (p. 134). Thus, mediating technologies are a key component of the backstage work that facilitates intuitive knowledge (Angeli, 2019; Teston, 2017). Mediating technology might provide seemingly “transparent” cues, such as the increased beeping of a telemetry machine as a patient’s heart rate rises, but healthcare providers still draw on the felt sense of their particular context and their knowledge from previous experience to make sense of these cues, engaging phronesis. And the
cues themselves still bare the traces of the human and material performances that enabled them.

Technology cues had a steady presence in all stages of care but had more occurrences during the assessment stage in EMS data. During this stage, EMS participants relied heavily on an assortment of medical data that provided mediated cues about a patient’s condition, including a stethoscope to reveal lung, heart, and bowel sounds, and telemetry machines to determine cardiac activity. Ultimately, this mediated information provided cues that helped participants “play detective” as they paired the data gathered through technology, a patient’s body, and the environment with their own experience. Using this pairing, participants determined courses of action regarding caring for a patient care and documenting a response.

Meanwhile, intuition was not coded as frequently during the document stage in nursing simulation data, with an exception in examples where intuition cues came from technologically mediated sources. In several instances when students were documenting a patient’s vital signs on the board, they used the telemetry machine as a source of information. This action meant that they were more likely to notice problematic trends in the patient’s status during these moments and intuit that something was wrong. For example, in one medical surgical simulation while a student was documenting care, the group noticed the patient’s decreasing oxygen levels and began to anticipate the need to transfer him to the intensive care unit, which happened only minutes later.

Aside from instances where the telemetry machine provided intuition cues, some simulation groups were also attuned to a pharmacist error by the medications database system that was provided in the simulation room. During the pediatric simulation, the pharmacist (played by the instructor) would put in an order for ibuprofen even though babies under six months should only be given acetaminophen. While some groups recognized this error through internal intuition—remembering prior experiences or classroom learning—other groups only came to sense that something was wrong when they used the medications database to search for a dosage and did not find information for infants under six months. For some groups, the database provided a cue that triggered their memory about ibuprofen or caused them to call the pharmacy again to follow up. Other groups, however, simply recalculated the dosage for a six-month-old infant for an infant of a younger age, not recognizing the technological cue.
INTERRELATIONAL CUES

Especially in medical situations where a team is involved in care, and the patient and patient’s family play an active role as informants, intuition relies on collaborative and interpersonal cues, typically passed between participants in conversation or through writing. Similarly, Sauer (2003) recognized the role of intuition for engineers when interpreting one another’s accounts and documentation. She quotes an engineer as he describes his process of using a report written by a colleague to guide his decision-making: “We take what’s given about the accident, read into it what we need to make sense out of it, trust our instincts” (Sauer, 2003, p. 151). In our analysis, interrelational intuition could come from provider cues, patient/family/bystander cues, and instructor cues, and thus participants relied on the experience of others to guide clinical judgment.

In the simulation context, provider cues often took the form of triggering prior learning since all nursing students were enrolled in classes and clinical placements together. For example, students would question each other if an assessment did not match their expectations based on previous experiences. In one instance, a student reported the circumference of the infant’s head as 14 inches. Her peer responded, “14 inches? I think it’s centimeters.” Similarly, when another student reported that the patient should be receiving 14 ml/hour of IV fluids, her peer called into question that quantity. In both cases, a “felt sense” that measurements were off was distributed across the group, leading them to question their initial findings and revise accordingly.

Another way that intuition was shared between providers is when students drew on the handoff report from a previous group to prioritize their own interventions. For example, during the assessment stage a student inquired into the patient’s breathing by saying, “We heard that you had some shortness of breath earlier.” This attention to potential respiratory problems was not triggered by anything the patient said or by bodily or environmental cues. However, its origins are also clear—the student is drawing directly on the handoff conversation with the previous group to cue her attention to breathing. Documentation on the whiteboard patient chart from prior groups could also serve as an interrelational cue. For example, in the medical surgical simulation, one group of students located a warm protrusion on a patient’s leg and ordered an ultrasound to confirm a blood clot; however, they did not receive confirmation of the clot by the end of their shift.
Campbell and Angeli

To capture their intuition without diagnosing the clot they emphasized in their whiteboard chart—pain, lack of pulse, and swelling. Ryan, who was part of the incoming group, noted his burgeoning ability to interpret this documented interrelational intuition, reflecting, “I can look at the board and see like, ‘Oh they had calf pain and they also grouped that it was swollen at the same time. I think they’re thinking a DVT [Deep Vein Thrombosis], you know I’m also thinking a DVT.”

Finally, in clinical simulations the instructor (speaking for the patient or family member) was often strategic about highlighting key information in order to help students learn to prioritize the most important patient or family member cues. For example, the male medical surgical patient would frequently act uncomfortable if female nurses attempted to provide catheter care and would often explicitly seek out male nurses to ask them questions about the catheter. This action was intended to attune students to the potential gendered concerns that they might encounter with different kinds of patients. During one act/reassess phase a female student suggested to another female student that they begin catheter care. Remembering the patient’s earlier conversation with the male nurse, the second student corrected her saying, “It’s best if Kevin does [catheter care].” This statement shows how interrelational intuition can move across participants, from a patient cue to a provider cue, during the course of care.

In a similar way, EMS providers relied on intuition to negotiate cues received from patients and family members. Participants discussed moments when statements by a patient’s family member impacted patient care. At times, patients did not want to call 911 for help, but family members insisted on it because of health problems they observed. In these moments, these family member statements informed EMS’s action, especially when they needed to convince a patient to agree to be transported to the hospital: “Okay, yeah, we understand you [the patient] didn’t want to come here, but your family indicated that you’d been having chest pain for two hours.”

In addition to patient cues, EMS providers also worked to attune one another to key information when they transferred care. Elaborating on the necessity of intuition in shaping the handoff conversation, an EMS medical director, who also is an emergency medical physician, described how important prior experience is in identifying which information should be translated across providers: “Our good paramedics and EMS staff know the things I want to hear [as a physician], you know . . . and that comes with clinical experience, too. I mean, they know what I don’t need to
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know about.” Here, he notes how the ability to sort through the “noise” of a situation and identify the right information to communicate to other providers—which is part of clinical judgment or phronesis—is based in repetition and practice.

INTERNAL CUES

In contrast to the range of external cues discussed above, internal cues for intuition were based on the individual providers’ felt sense about a situation or intervention. In observations of nursing simulations, internal cues were hard to identify because they happened in the mind of the individual and therefore were rarely articulated. In EMS conversations, however, participants described internal cues as emerging as “gut feeling” or a “funny feeling on the back of your neck.” Overall, data analysis suggests that internal cues arise from the interaction of experience, content knowledge, trust, and pattern recognition (Klein, 1999), which follows Montgomery’s (2006) definition of phronesis when healthcare providers “combine scientific information, clinical skill, and collective experience” to act (p. 5).

When internal cues were visible in the nursing simulation context, it was typically as a spontaneous statement, observation, question, etc. that could not be tied clearly to any previous observation or conversation. That said, internal intuition showed up the most during the assess and act/reassess stages of care. For example, in the geriatric simulation, one student spontaneously noted, “You know what, it’s kind of around lunchtime so I’m going to take your blood sugar real quickly.” With other groups, they may have been cued to test blood sugar by a note in the patient’s chart, conversations with an outgoing group, or the patient’s complaints about a headache. Given that none of these were contributing factors in this instance, however, the comment can only be attributed to the student’s previous experiences and learning that caused her to consider the possibility that the diabetic patient might have low blood sugar. Campbell’s interviews with focal students bare out these assumptions because students frequently made connections between the actions they took in simulations and the experiences they had at their clinical placements and in the classroom.

Meanwhile, in EMS interviews, internal intuition was mentioned the most during the document stage, often described as intertwined with environmental and bodily cues, as well as interrelational cues from the patient or family members. Participants commented that in order to treat patients
and to communicate, they “play detective” when they enter a scene to determine if what they are being told, say, by a family member, actually matches up with the scene that the paramedic is observing. These moments were the convergence of experience, trust, and situational awareness to put pieces of a puzzle together to voice what “feels off.” The coupling of situational awareness and internal felt sense about a situation is particularly important in instances of suspicious behavior or foul play, as evidenced in a participant’s reflection on being called to a sudden infant death (SIDS) patient.

You know, if it’s a SIDS case, [if the parent says] ‘I found him like that’ or ‘The kid went unresponsive; he fell off the couch and went unconscious.’ Okay, well, you know, if it’s a two-year-old, he fell that far onto carpet off a couch, no history, that doesn’t match up. What you’re telling me doesn’t match up to the injuries we see.

Here, the paramedic draws on interrelational cues delivered by the parent, environmental cues about the spacing of the couch, and bodily cues about the infant’s injuries to determine the veracity of the narrative. Guiding the negotiation of all of these cues, however, is an internal sense that something might be off about the situation. Other participants also emphasized the importance of learning to trust that gut instinct during care: “You’ve got those instincts; it’s trusting your instincts and going, ‘Okay, something is wrong,’ and trusting yourself, your knowledge, that ‘Okay, I’m going to do something different here.’” For many, the difference between an experienced and new provider is the degree to which they are able to successfully navigate a range of cues for intuition, relying on their sense of a situation to guide clinical judgment.

Implications

For the Study of Embodied and Material Rhetorics

This project has implications for scholars in RHM and embodied and material rhetorics, given the relationship our findings suggest among intuition, the healthcare environment, and the body. Previous healthcare research on intuition has defined it as an individual’s preconscious and automated response to a situation (Lieberman, 2000; Moulton et al., 2010). However, by looking at our datasets, we can see that intuition is not an isolated or spontaneous moment of inspiration, but is instead part of a pattern of practices.
that informs care on a consistent basis. Seen this way, intuition can be understood as an impetus for action that results from the relationship among cues distributed throughout an environment and prior experience. These findings follow work from material rhetorics (Rice, 2015; Rickert, 2013; Teston, 2017) and decision-making science scholarship (Klein, 1999) that acknowledge relationships among the environment, experience, pattern recognition, human and nonhuman actants, and intuition.

Furthermore, these datasets provide an opportunity to understand how rhetorical concepts guide action. As we have discussed, serving as clinical judgment, phronesis allows healthcare providers, especially in novel situations, to draw on intuition and experience to navigate care—that is, they draw on their situated, embodied intelligence to act. In addition, this research speaks to another concept, metis, which has been linked to discussions of phronesis in rhetorical scholarship (Detienne & Vernant, 1974/1991; Pope-Ruark, 2014). While our analysis for this piece focused on linking phronesis to medical intuition, we see potential for future rhetorical work that is interested in relationships among sensory knowledge, embodied action, and health communication to also incorporate metis. Here, we preview some possible directions for that work.

Metis is rooted in the art of timing, experience, and awareness (Hawhee, 2004; Letiche & Statler, 2006; Dolmage, 2009), and those who use metis to inform decision-making and action are guided by the “wisdom of experience” (Kopelson 2003, p. 130). Decision makers combine this wisdom with timing and what we would today call situational awareness—how the context of a situation impacts and influences action. Thus, metis also helps us think about how healthcare providers—who work in a data-driven, quantitative sphere with bodies-in-context—draw on embodied resources to treat patients and document care (Dolmage, 2009; Teston, 2017).

The ability to present moments drawn from experience and intuition alongside quantitative evidence about a given situation, one participant commented, is what separates a “street smart” healthcare provider from a “book smart” healthcare provider, with the former being more desirable than the latter. Rather than using complicated theories or technology when faced with unpredictable situations, “street smart” healthcare providers rely on the “wisdom of experience” and intuition, which takes time to develop and can be challenging to trust in the face of numeric values and other “hard” evidence. Seen this way, while phronesis is the larger process guiding intuitive action, it is enacted and developed through metis in particular moments.
Phronesis draws on the ability to recognize and respond to various cues that are distributed across internal and external contexts, and when developed over time, it becomes habituated intuition. In the healthcare setting, clinical judgment involves the integration of phronesis and metis so that healthcare providers can attune to various cues that guide patient care (Cahalan, 2016; Montgomery, 2006). Future work could build on these connections in considering how healthcare providers develop intuitive skills that are variously mediated by practical wisdom and innovation.

Furthermore, our datasets allow us to see how clinical judgment can be understood as a metistic moment as shaped by an “intelligent ability” that emphasizes “practicality [phronesis], success, or resourcefulness” in a particular context (Detienne & Vernant, 1974/1991, p. 11; Hawhee, 2004, p. 46). As part of rhetorical invention, metis translated and transformed the confluence of cues that participants encountered into clinical judgment, which then prompted action. As such, we see the taxonomy we outline above as informing other contexts of interest to both RHM scholars and to scholars studying work outside of healthcare. Because this work builds on how embodied knowledge informs communication, the taxonomy could be imported to other settings to understand the relationship among phronesis, metis, material conditions, intuitive action, and communication practices.

**FOR RHM RESEARCH METHODS AND DATA ANALYSIS**

One of the things that was unique about this project’s design was the choice to work across two different datasets and two different types of data (interviews and video recordings) from two very different contexts. Ultimately, we hope that this article might provide the impetus for similar work in RHM, because we feel that cross-contextual comparisons have much to offer the field when it comes to studying difficult to describe sensory phenomenon like healthcare intuition. Here, we discuss several key takeaways for RHM scholars interested in doing similar work.

First, we found it important to value the contextual knowledge that each of us had individually about our research sites having spent a year or more collecting field data and, in Angeli’s case, having EMS training. As Meloncon (2018) asserted, a performative phenomenology approach encourages accounting for and valuing our embodied experiences as researchers. Admittedly, such an approach might ultimately fly in the face of what is considered best practices for RAD (replicable, aggregable, and data-supported)
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research, which scholars have been advocating for in writing studies work (Haswell, 2005; Driscoll & Perdue, 2014). However, for scholars invested in doing qualitative, cross-contextual work, we believe it is vitally important to honor the contextual knowledge they have about their participants and their sites throughout the process of data analysis.

Secondly, we recommend taking an iterative and flexible approach to coding that allows researchers to develop a coding scheme that is both applicable across contexts and that can capture the complexity of their subject of study. As described in our methods section, our initial analysis focused on stages of care, a framework that translated well across both contexts but ultimately did not enable us to attend to the provider’s experience of intuition in the ways that we hoped. The taxonomy offered in this paper, then, emerged through a systematic and iterative process of applying those codes across both datasets with frequent check-ins about its effectiveness and frequent revisions. This inductive approach to coding helped us to arrive at a scheme that was both applicable to our individual contexts and relevant to our shared project’s research questions. Thus, we recommend against imposing an external framework across contexts, since we believe that doing so would shortchange the unique advantage of having multiple datasets to inform one’s coding.

Finally, when working across contexts and with multiple kinds of data, researchers may feel empowered that any research question is within their research. We began this project particularly interested in questions about how healthcare intuition was documented in formal medical writing such as patient charts. However, it is important for researchers to be reflective about what their particular datasets can address, even when there are multiple types of data and contexts in the mix. In our case, interviews and observations offered a wide range of access to intuition in different instantiations, but it rarely showed up in documentation specifically. Meanwhile, though Campbell had access to patient charts from simulation, Angeli did not have a parallel data source from her context. Thus, our datasets did not give us access to documentation in a comprehensive enough way to make broad claims about practice. Recognizing this limitation helped open us up to questions about what we could see in both of our datasets about intuition. Meanwhile, as we continue to gather data for new projects, we keep open the possibility of studying documentation of intuition. Overall, we hope that this project will serve as an impetus for future work in RHM and look
forward to seeing what the field can gain from more cross-contextual qualitative research.

FOR HEALTHCARE PEDAGOGY

The ways that intuition is defined in healthcare, as something that is “a hunch” and a behavioral response, limit how it can be understood and taught (Lieberman, 2000; Moulton et al., 2010). Reducing intuition to an individual response undercuts the complexity of its interrelated, distributed nature that we outline above. Even though intuition is abstract (we can’t easily see it or perfectly describe it), we can understand how healthcare providers use cues from their senses, environment, technology, and interactions with others to shape action based on their experience and intuitive feelings. Recognizing that intuition is a learned skill also creates opportunities to alert future providers to possibilities for misattunement and to address strategies for avoiding bias and stereotyping in care.

The taxonomy of sensory cues developed here serves as a heuristic that can help healthcare providers be aware of these cues and that can be incorporated into healthcare provider training. By teasing out these cues, we challenge healthcare providers to approach intuition as conscious and distributed. This perspective on intuition changes the capacity of healthcare providers and educators to discuss it, teach it, and study it—that is, they can value intuition at all levels of healthcare practice (Ruth-Sahd & Hendy, 2005). In addition, by openly discussing and teaching intuition, instructors also have opportunities to help students consider intuition’s relationship to their individual histories with others. Particularly in discussions of internal intuition, they can call students’ attention to how their “gut feeling” about a situation might be tied to biased assumptions about particular groups, individuals, or situations.

To raise students’ awareness of cues, educators might incorporate reflective writing activities into simulation and clinical rotations. After completing a patient interaction, students could write a narrative of the experience, much like students write in a subjective assessment of a patient report. As part of this narrative, students might attend to the cues—environmental, bodily, technology, interrelational, and internal—that guided their decision-making and action. This activity is intended to cultivate their awareness of how these cues manifest in their patient interaction and provide them with
a chance to develop how they pay attention to and act on them. It could also create opportunities for openly discussing misattunements by unpacking moments in which cues were misinterpreted. For example, in one nursing simulation a student noticed that the patient was having trouble speaking and his speech was garbled. This bodily cue suggested to her that he might be having a neurological reaction, and she immediately began a full neurological assessment. However, the patient was actually having trouble speaking because he had an incentive spirometer in his mouth. During the classroom debrief, the instructor helped the student to consider how her extensive work as a Certified Nursing Assistant in a neurological unit had led to this misattunement. This discussion provided an effective opportunity for all of the students to consider how their educational and work histories might at times interfere with the proper interpretation of patient cues.

Finally, we encourage instructors in a range of healthcare contexts to facilitate conversations about what medical documentation systems such as electronic health records are capable of capturing and what kinds of sensory knowledge are left out. Developing strategies with students early on for incorporating less data-driven information into their communicative practices can set the groundwork for flexible and innovative communication in their future workplaces and careers.

Conclusion

In an afternoon pediatric nursing simulation, Carol, Megan, and Julia are the first three nurses to care for an eight-week-old pediatric patient who has been admitted for respiratory symptoms. The baby quickly begins crying after their handoff (interrelational/instructor cue), leading the team to focus on suctioning his nasal secretions. Carol begins to work the manual suction, while Julia, noticing it is not working properly (environmental cue), directs her on proper technique: “Push it down and then insert it, then release.” Meanwhile, Megan remembers that they should be wearing gloves during suctioning (internal cue) and brings a pair over for Carol. Seeing the baby has secretions on his face (bodily cue), Megan suggests the team use a washcloth to “wipe away some of that.” As they continue to work, their instructor comes over the loudspeaker to tell them that the “secretions are very, very, very thick” (bodily/instructor cue). With this, the team realizes they will need to advance to mechanical suctioning.
As this snapshot of a typical minute in the simulation room demonstrates, a team of nursing students (or in other cases an EMS team) is constantly negotiating a wide range of intuition cues to facilitate care. Individually, providers are responding to signs from the patient’s body, the environment, technology, and their own prior experiences to guide action. Meanwhile, these cues are distributed across the team as they prompt one another and receive cues from other participants (family members, an instructor, etc.) to inform decision-making. Certainly, not all of this action is happening on a preconscious level in line with some scholars’ definitions of intuition (Lieberman, 2000; Moulton et al., 2010). However, it is also unlikely that providers could fully articulate or describe the impetus and rationale for a lot of their actions in this moment; their responses to cues are instantaneous as they sort through a wide range of conflicting information.

Overall, we see attention to intuition in healthcare as crucial to taking a holistic view across fields of the work that providers perform every single day. A focus on intuition encourages medical scholars to expand their prioritization
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of data-driven decision-making and to recognize the numerous ways in which providers are always leveraging embodied experiential knowledge in care. Our hope is that by developing a taxonomy for intuition cues, healthcare providers and educators might come to notice and value how and when intuition guides their communication and documentation practices.

Additionally, by attending to providers’ embodied experiences with patient care, we call RHM researchers to take up three lines of inquiry. First, our datasets suggest that the relationship between phronesis and metis is evident in healthcare practice and, given their close relationship, it can be challenging to identify what medical moments are guided by metis or phronesis and how exactly these concepts manifest in healthcare. Although our analysis applied the concept of phronesis to intuitive cuing, RHM researchers might pursue these ideas further to tease out the relationship between these two concepts and thus contribute to our understandings of how they guide medical practice. Second, we call into question RHM’s often critical stance towards medical institutions and caregivers. We recognize the way that not only patients’ but also providers’ bodies are an active part of healthcare and medical practice, a recognition that can create more opportunities for collaboration with both groups. And ultimately, we call on RHM researchers to further explore how intuition manifests in documentation contexts so that these critical, intuitive moments can guide healthcare practice and decision-making.

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