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LECTIO PRÆCURSORIA

Practices in Medical Device Innovation: Navigation and Enactment as Social Practice Trades

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When I was a young girl growing up in the US Midwest, my father worked for a large corporation. He worked in an exciting department where they used computers, which at the time were strange and foreign things. Working as an engineer since the 1950s, he thought it would be great for me to learn how to use a computer and signed me up for a class specifically designed for the children of employees at that large corporation. I was so excited! When I got there, I was the only girl in a group of about 20 kids. The teacher noted this; everyone noted this. The teacher then told me I could go sit in the back of the room, while he and the boys worked on coding in BASIC. For a few lessons, I sat in the back, struggling to hear, but following along. Then, at the third or fourth lesson, I started to look around the huge, hall-like space we were in—full of desks and chairs and huge computers—all lined up. I remember wondering, not about BASIC, but about what they did there, these people. I wondered how they worked, what they worked on—were they talkative, were they friends outside of work? I turned on the computer sitting on the desk where I sat, and tapped away, pretending to work. After some avid tapping, the green letters on the screen told me the computer had locked up. I moved on to the next desk and did the same thing. And, again … and again. This was my first real encounter with engineering, and I remember thinking to myself how much cooler it would have been if my father had been an anthropologist or a pilot.

Many years later, I was working in an engineering department, still not an engineer, but working within and leading projects. But, something had changed: I did not take the time to wonder, as I had when I was a young girl; I just worked and went home. This changed with my PhD studies, because then, the wonder returned. I looked around my workplace and at my co-workers, all engaged in work or not—and wondered to myself what was going on under the blanket of work. It was this wonder, this question, which directed my research and data analysis (Mantere and Ketokivi 2013; McAuliffe 2015). You may ask: Researching daily life, how is that done? Can it be relevant? The answer is, **yes**, it is relevant, even interesting, and theory-rich, and it can be accomplished using a practice theoretical approach (e.g., Schatzki et al. 2001; Orlikowski 2010; Engeström 2000; Feldman and Orlikowski 2011).

To look at everyday life as it unfolds, as things happen over and over again in ways both expected and unexpected during the interwoven lifeworlds of people is the subject of interest for practice researchers (e.g., Schatzki et al. 2001; Nicolini 2017; Orlikowski 2000; Schatzki 2017; Blunden 2010; Bourdieu 1977; de Certeau 1984 [1980]; Feldman and Worline 2016). Philosopher Theodore Schatzki (2002: 87) defined practice as 'a temporally evolving,

open-ended set of doings and saying linked by practical understandings, rules, teleo-affective structure (meaning the doings and sayings)—the meanings and motivations, and general understandings' at a site (see also Loscher et al. 2019). Practices are further described as embodied interactions and interspaces between subjects and their mental, emotional, and physical states (Küpers 2013). Shared practices are lived experiences, involving learned or acquired knowledge (Barnes 2000) and the creation of a collection of accomplishments. Social practices are comprised of both activities and participants. As such, stories from and of working life increase understanding, even subjective understandings, of visible and invisible organizational realities, assumptions, and tensions (e.g., Orlikowski and Scott 2008; Orlikowski 2010; Tsoukas and Chia 2011: 1–21; Räsänen and Trux 2012; Buch and Andersen 2013, 2015; Clegg et al. 2018). Practices, therefore, can be examined at the level of what is said and done, as investigations of routines or through the establishment of what occurs at some level of life as it happens in daily life (Miettinen et al. 2009; Loscher et al. 2019). Since pre-Aristotelian times, people have looked at exactly these things. These happenings in and of life can be as simple as the personal phenomenology of eating an apple—the texture and taste, the feel of the apple, the freshness, the tart juices hitting your tongue (van Manen 2007)—to the almost dancelike movements construction workers make as they lower their heads to avoid a passing beam announced only by another crewman's whistle (Gherardi and Nicolini 2002). In the early 2000s, academics came together and called for a turn to practice (Schatzki et al. 2001). This turn was more of a formal call to examine the what and the why of the world. The call to examine practices was embraced by scholars, and this official turn to

practice served as a goal post for practice theory formalisation. Yet, both before and indeed after this turn, no one practice theory or one set of methodologies, vocabularies or analyses emerged for those examining practices using a practice theory lens. However, there are mature as well as developing practice theories, and all practice researchers look at the social in their examinations, not just actions, because if one looks only at the actions, the social—the root of practice theory—is lost. Historic pluralities offer a richness for the study of practices, in part to be defined by the researcher.

Thus, while practice theory and practice researchers are 'new' in the grand timeline of things, practices have been embraced by academics interested in why and how of social—the intertwined tornado of events occurring at all times—represent the nexus of practices (Schatzki 2005). There are more scripted and defined ways to study practices. For instance, Engeström's (2000) activity theory is complete with guiding schematics. In addition, practice theorists such as Wanda Orlikowski (e.g., 2007, 2008), who graciously follows practitioners in the field, pays attention not only to her subjects and data, but also to herself as a researcher without ever naming herself as a practice theorist per se.

One thing all practice researchers agree upon is that to examine reality as it happens the researcher must 'be there' in the moment. That is, the researcher must be where events unfold. Ethnography (Bate 1997; Fetterman 2009; Barron 2013; Davies 2002; van Maanen 2011) is a common method for researching practices, accompanied by the need for long-term engagement with and in the field. This requires time (Ricoeur 1976; Schatzki 2012: 13–26). As a method, ethnography also has drawbacks (e.g., Fine 1993), because the researcher is present in an environment from which they are

usually absent—that is, a foreign arena, such as the construction sites Silvia Gherardi and Davide Nicolini (2002) studied. Not only was Gherardi not a construction worker, but she had to learn the basics from the ground up, remaining an outsider. I have often thought of this: if a researcher came to our house to watch our family, I would always be aware of their presence. I would have the same awareness of a researcher observing me at my workplace.

My research interest was closer to me than a construction site. I turned to study the practices of my own workplace (Doloriert and Sambrook 2012; Fine et al. 2011; Kemmis 2009; Räsänen and Trux 2012; Aarnikoivu 2016). Can this be done? Yes, it can, and it is a research area of interest: researching your own profession. Academics, especially academics in the Nordics, have examined their own workplaces, the hallowed halls of academia during moments of change, during the personal development of becoming academics, and during the day-to-day life of work in a higher institution of learning (e.g., Järventie-Thesleff et al. 2016; Räsänen 2009). I worked in a research and development (R&D) unit within a company for years in various departments and in various projects—not as an engineer, but as a specialist and as a team leader (see Blomquist et al. 2010 and Buch and Andersen 2015 for similar examples). During my PhD studies, I learned about practice theory, ethnography, and embeddedness as a researcher, and to study from within, to be a native studying the familiar as an insider, while reaching for the level of outsider as well. This nativeness has its challenges (van Maanen 2011; Anteby 2013; Davies 2002; Cunliffe 2016): but, through reflection and reflexiveness (Yanow and Tsoukas 2009; Alvesson and Sköldberg 2009; Alvesson 2009), the road becomes clearer. As an insider researcher, ethnography becomes what some call at-home ethnography

(Järventie-Thesleff et al. 2016)—you are in the familiar and you have tacit knowledge, enjoy the advantages of pre-knowledge, and spend less time familiarising yourself with the site, your familiar 'home' (Järventie-Thesleff et al. 2016). However, the researcher must then also review these elements, and constantly 'check' oneself against these considerations throughout all steps of the research project (Anteby 2013; Zahavi 2007, 2019 [2018]). Engineers and engineering work is fraught with external assumptions and, given the closed nature of a corporate-centred R&D (e.g., Buch and Andersen 2013, 2015; Buch 2016; Cicmil et al. 2006; *cf.* Vojak et al. 2006), access for most would be difficult. I was granted permission by the company to conduct my research so long as I did not share any company technology secrets. No one really understood qualitative research—that is, research without numbers, variables, variances, and repeatability. However, it turned out that my coworkers were quite interested to talk with me and discuss their work and work life. So, there I was, a PhD student at work and researching my own workplace: R&D. We were a newly formed team tasked with creating a wireless patient monitor for hospital use. The team was cross-functional, mostly comprised of men and mostly engineers or mathematicians and physicists.

My study took place not only in the office spaces, but also in the clinical setting in the hospital, where engineers from the team would go to learn about clinical work hoping to add further understanding to their engineering work. The engineer makes and the clinician uses; but, how do these two vastly different professions work together to create something? I was able to visit the hospital during concept discussions, to shadow staff and to ask questions. As I stepped into my researcher shoes, I was filled with questions—I did not focus on managerial issues

or thoughts, but solely on the workers (Räsänen and Trux 2012). I took time to look, to listen; I took pictures (Quattrone et al. 2021), I walked around and listened some more. Eventually, I became increasingly interested in how the team would focus on customers, or try to focus on customers, and sometimes even wonder who those customers were—assumptions regarding understandings dominated many facets of the work (e.g., Savolainen and Hyysalo 2021; Sjögren et al. 2018; Smith et al. 2019). After some time, I began interviewing, observing more, and interacting, all the while keeping very detailed diaries. I had one diary I called, 'My Diary of Unusual Things', things which struck me as an insider as unusual. These things eventually became additional points of interest for me. I identified with what Swedish professor Mats Alvesson (2009) had said, that, through insider ethnography, you are like a radar and always on. Even while performed the work tasks I was responsible for within the company, I had a notebook or post-its with me to record events. I was always scanning, always ready, document-ing life as it unfolded in the workplace (Revsbæk and Tanggaard 2015).

After mapping out a story of the everyday, I turned to my coworkers and talked with them in relation to learning, their work, and their understandings of their work and our work life. We discussed co-creation, innovation, blocks to their work, how they work, and how they understand the product they are creating amongst many other things. I went on visits with the team as a part of the team to discuss with clinicians what they want in patient monitoring, how they use monitors, describing any stumbling blocks they may know of, and the needs they could identify. We also repeatedly went to the hospital to visit closed spaces otherwise only available to staff, such as operating theatres and intensive care units. All the while, I kept

my notebook close, took pictures when I could, drew sketches when I could not take pictures, and found myself iteratively examining the sites and myself. I reminded myself to remain in the moment, to exist in the moment, and to engage with the moment as a researcher and as a worker. I continued to collect stories of work and what happens during it in addition to completing my assigned work.

I created an ethnography (Leppälä 2022) of this little-known arena and of the time of innovation within a corporation and during co-creation sessions. From this ethnography, I identified three large organizational themes which are, you could say, ruling or dominating the site. These three large organizational themes are knowledge, time, and dissonance, under which the site practices fall—think of them as an umbrella. I then returned to the data and examined the stories, particularly focusing on things which were surprising or not directly work-related—things did not unfold as expected. Now, it was time for a deeper dive, a reflexive and reflective journey into why or how things happened, as well as the forces controlling them (Cunliffe 2016). I thought of the philosopher de Certeau (1984) [1980], who wrote of practices and examining them through metaphor. He described the examination of practices as looking down from a high skyscraper at the world below—looking at the mass of activity—then swooping down and being *in* the activity, in the world, and then swooping up to the top of the skyscraper. This same type of positioning and repositioning is what Nicolini (2009, 2012) describes as zooming in and out. Near. Far. Together. Apart.

I regarded the research data through the framework of practice theory, whereby I had to simultaneously step back and remain immersed. Where do the practices come from in general in these creative and knowledgeable people?
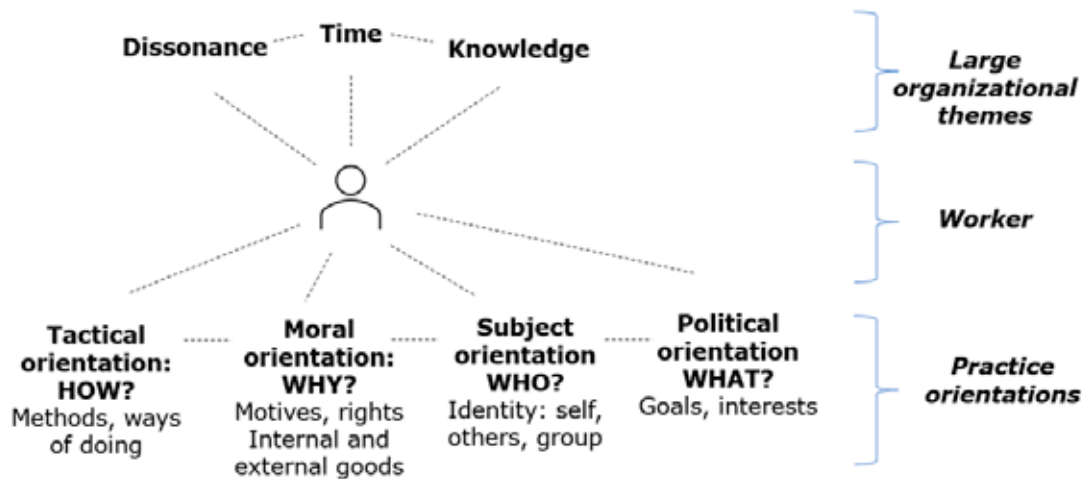
Figure 1. Relationship of large organizational themes and practice orientations (Leppälä 2022).

I thought of the three large organizational themes—the umbrella—which gave way to a skyscraper view, a zoomed-out view. I then zoomed in, to get close. I examined the data from quite nearby—at the street level, so to speak—through four philosophical lenses, or nuances which are innate stances in all humans—in you and in me. We all have moral, tactical, subject (identity), and political stances (Räsänen and Trux 2012; Räsänen 2015). All four of these stances, these practice orientations, are within all of us simultaneously. Normally, one dominates, rarely in equilibrium with one another (Räsänen 2015). Scholars have examined one stance or practice orientation, such as political stances, as power within organizations (e.g., Salovaara and Bathurst 2018; Fleming and Spicer 2014; Gottwald et al. 2018). I retained all four and combined them with the three umbrellaed stances—the large organizational themes—so as to consider an expansion of the nexus of activities from Schatzki's (2001, 2017) practice theory. This allowed me to also create a nexus of practices at the large organizational theme level and at the personal practice orientation level. In doing so, I established a movement between

these macro- and micro-level phenomena, a negotiation which is ongoing, which we all used to validate ourselves as actors in the site (Figure 1). I combined these three large organizational themes—knowledge, time, and dissonance—with four innate practice orientations into a matrixed combination to examine the details.

I interconnected the themes, finding 12 combinations of ways to regard each event about which I wrote (Table 1). Ultimately, I created a map of phenomena, with each large organizational theme of knowledge, time, and dissonance individually connected to the four practice orientations—those we all have—of moral, tactical, subject, and political stances (Räsänen 2015; Räsänen and Trux 2012). I created a three-by-four combination map to connect the dots, to view it from above. By doing this, I could then separate the phenomena, see which combinations dominated, and identify the changes from the initial position of 'working as expected' through the sayings and doings that occurred. I found that there was a lot more to work, work as expected by managers and assumptions regarding what happened during work.

	Case:	Time as a practice theme	Knowledge as a practice theme	Dissonance as a practice theme
Practice orientation	Political			
	Moral			
	Subject			
	Tactical			

Table 1. Table assessment tool (Leppälä 2022).

My study revealed that co-creation did not occur as theory suggests, that patient area applications of innovation were not always embraced. As work unfolded, so did drama, tensions, and dramatic episodes, all contained at the work level of employees. Through the combinations of the large organizational themes and practice orientations, through the practice lens, through the immersion, and following the staff at two sites, the reflexive journey as an insider and outsider, an understanding emerged regarding the why behind the events which did not unfold as expected. I found that practitioners navigated and enacted social practices at work as acts of trade—they traded, they exchanged their own personal practice orientations and the large organizational themes when tensions arose to challenge their knowledge-worker identity. All these things made them turn their attention away from work tasks, initiating navigation through the field of large organizational themes and practice orientations. Through the mapping, I was able to track and follow movement within the nexus, and analyse the steps taken to enactment by a worker to achieve an equilibrium. Equilibrium was achieved through acts of social practice trade, a term I created for my dissertation.

This form of ethnography, being an insider 'at home' in my natural work environment represented a rather deep commitment, a highly personal commitment, and a surprisingly difficult commitment. During my research, I also worked on my own tasks as an employee. It was, however, an excellent deep dive for me to see what was really going on—to open my mind, not as a blank canvas, but as a canvas upon which I was aware of presumptions and biases, the 'I know' mentality. It was an organizational ethnography (e.g., Voyer and Trondman 2017; Watson 2012), during which I was engaged, deeply reflexive, and with my eyes and ears open. This involved zooming not only in and out, but also moving from side-to-side and into myself as a worker, a person, and a human. My dissertation includes short essays from my diary entries, offering my own thoughts and attempts at coming to terms with surprising things such as my own mortality while visiting the hospital as an engineering team member. The very last words in my dissertation are from my interview prompts for myself, ending with, 'Be quiet and listen'. The sensitivity required to zoom in, out, and sideways comes from listening to what you hear, but also from those quiet moments in your head. These were rather immersive dives into the data, theory, and self.

Traditional ethnography is normally a story by a non-native about a strange and distant culture (van Maanen 2011 [1988]): writing and analysing yourself and about your own—if possible—can bring deep insights and understandings (van Maanen 2011). This research, with its practice theory approach, examined the practices and phenomena of an engineering cross-functional team

from the inside during early medical device innovation. Through the novel combination of the large organizational themes and practice orientations, and their mapping of even closer-knit combinations, I was able to see how the organizational actors navigated through these phenomena and enacted new or adapted practices—as acts of social practice change. The things which puzzled me in the data became clear through this framing, through a practice lens, and through the assessment based on large organizational themes and innate practice orientations. Qualitative research (Eriksson and Kovalainen 2016) focuses on developing what might be, and that is the case with this research. These findings are advances in practice theory, in ethnography, and in understanding early medical device innovation within a corporate innovation programme. Yet, I extended the concept of a nexus of practices through the intertwining of large organizational themes and real-world personal practice orientations, and by combining these two dimensions into a tool for the assessment and examination of ethnographic material, making visible the unseen nexus of within, to shine a light on it, then noting how people navigate through themes and orientations. This resulted in a personal journey, enacting social practice trades as they attempted to find an equilibrium during social practices in work and work life.

This journey was longer than the years it took me to complete the actual research, most likely starting with that computer class I enrolled in long ago which started my wondering. Through this research, I learned what happens at the worker level within R&D at this site, what co-creation during early medical device was like at this site, what the day-to-day work and work life was at this site, and also how the worker existed in that lifeworld. I learned how they understood what they were making and how they understood or not the clinical field for which they were making the devices. I found stories that interwove and made the area much richer than just that within which we all simply worked on assigned tasks (Weick 2007). Although, at one site, practice research then allows for comparisons to other sites, even to other practices. The research tells us about daily work and work life and offers us an understanding of how workers at all levels understand themselves better, work to understand social practices and social practice trades, and how they navigate and enact social practices at work and in work life during early-stage medical device innovation in a corporate R&D unit.

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