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Finding your Sea Legs: Exploring Newcomer Embodied Learning in an Extreme Context

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ABSTRACT Embodied learning involves developing not only socio-technical know-how but also the bodily capacity to execute practices competently. In extreme contexts, newcomers encounter threatening experiences that may incapacitate their ability to participate. How newcomers develop the bodily capacity to participate in such situations is a research area that requires further attention. Using ethnographic data from a study of novices working in the risky context of seafaring, we show that newcomers encounter threat experiences (imagined, immediate, and attenuated) that trigger them to engage in three types of body work: priming, battling, and enduring, from which they develop the capacity to participate. Our analysis suggests a model of newcomer embodied learning in practices in an extreme context and contributes to embodied learning literature by showing: (1) body work directed at capacity to participate, (2) the mutually constitutive relationship between body work and threat experiences, and (3) the temporal complexity of embodied learning anchored in the body work and threat experiences.

Keywords: body work, embodied learning, extreme contexts, legitimate peripheral participation, newcomer learning, practice-based studies

INTRODUCTION

In high-risk contexts, inexperience can be fatal (Ly et al., 2017). Media representations of inexperienced pilots crashing in bad weather conditions, and climbers dying on Everest because of a lack of preparedness and inadequate physical fitness point to the pervasiveness of this phenomena within organizations and elsewhere (Kelland, 2019; Li, 2014). Sometimes, inexperience is dangerous because newcomers do not know how to go on in a situation they have not experienced before. Other times, inexperienced practitioners

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may know 'what to do', but find that their bodies are incapable of performing the action or ill-prepared to cope with the challenges being faced (Keesman, 2022). For example, Ly et al. (2017) note that 'freezing' is more common in novice fire-fighters than in those with more experience. More broadly, human errors in high-risk settings (e.g., aeronautics and shipping) are attributed not just to a lack of technical skill and know-how but also, and importantly, to the newcomer's lack of bodily ability to cope with emerging challenging situations. For instance, Perrow (1999) notes that forced marine operator errors, that is, errors induced by working conditions, occur even when technical skills have been mastered and are caused by issues such as fatigue. How newcomers learn to cope with such physical challenges and develop their bodily capacity to participate competently in a practice is an area that requires further understanding.

Extreme contexts, such as high-risk settings, are environments where organizations are vulnerable to sudden, often unanticipated events that could have significant material, psychological, or physical consequences for the organization's members (see Hällgren et al., 2018; Hannah et al., 2009). Newcomers may face proximate physical threats, and the mistakes they make in performing their work can literally become matters of life and death (Roberts, 2018). In such contexts, the body is central to skilful performance, whether in terms of responding to high-adrenaline, life-threatening events, or by maintaining vigilance and the safety of operations in periods of boredom and fatigue (De Rond et al., 2019; De Rond and Lok, 2016). These contexts provide an ideal site for examining newcomers' embodied learning. Not only is embodiment central to learning, the role of the body may be more pronounced and hence more observable by researchers. Recent research in extreme contexts has started to generate greater understanding of embodied learning and embodied sensemaking (Bouty and Godé, 2022; Meziani and Cabantous, 2020). However, much of this work focuses on how actors acquire the necessary technical skills for performing a practice well (Bouty and Godé, 2022). There is still much to be understood about how newcomers develop the capacity to participate in situations that are physically and emotionally challenging, let alone to do so with the technical skills that are necessary for performing well.

Practice-based perspectives of learning inform our study. These view learning as the result of embodied participation in practice (Gherardi, 2009), in that participating in a practice is an effortful accomplishment (Beane, 2019; Bharatan et al., 2022). Nevertheless, the purposeful effort that enables the body to perform is an area that requires further attention, as is the body work that is entailed in enabling participation while the body strives to overcome physical challenges (Lawrence et al., 2023). Hence, our focus in this paper is on the body work pertaining to the functional body; that is, we understand embodied learning by focusing on the body as it relates to bodily doings (Lawrence et al., 2023).

In this paper, we report findings from a seven-month ethnographic study of deck cadets within the context of operational seafaring in the merchant maritime industry, a risky context where errors can have catastrophic consequences (Roberts, 2018). Seafarers, in some countries, for example, the UK, have been noted to be more than 20 times more likely to experience accidents and fatalities compared to shore-based professions (Devereux, 2022; Roberts et al., 2014) and there is concern that fatalities are being underreported (Diakun, 2023). Seafaring is considered 'amongst the most hazardous of occupations' (Ek et al., 2014, p. 179) not just because of human and

organizational factors which make it risky (Perrow, 1999) but because of the remoteness of the ocean environment which exacerbates the risks involved; when things go wrong at sea, help is not readily at hand (Shah et al., 2018). Furthermore, work on the ship is both physically dangerous and physically demanding, with seafarers handling heavy machinery, and equipment, working long hours in a confined environment, and working against the tremendous natural forces (Çakır, 2019), making it an example of a setting where the body plays a disproportionately important role in the accomplishment of participation. This paper follows the journey of cadets (newcomers) from their on-shore training through to their experiences of ship-board practice. Our analysis shows that as well as learning technical know-how, newcomers also engage in embodied learning to cope with challenging situations that threaten their ability to participate. We find that cadets encounter three types of threats: imagined, immediate, and attenuated. On encountering threats, cadets engage in different types of body work to adjust their bodies to better handle the threats, thereby developing their capacity to participate in the practices of seafaring.

We develop from our findings a model of newcomer embodied learning in extreme contexts. In so doing, we make three main contributions to the literature on embodied learning. First, we reveal the body work entailed in developing the capacity to participate in a practice, which is necessary for embodied learning. Second, we show how newcomers' body work in extreme contexts is constitutive of and constituted by endogenously-felt threat experiences. Third, we show how embodied learning is temporally anchored in body work and in the emerging experiences of threat.

THEORETICAL BACKGROUND

The Body as a Site of Learning and Knowing

We follow practice-based theories of learning that view learning as situated in practice and deriving from ongoing participation in a practice (Gherardi et al., 1998; Lave and Wenger, 1991; Nicolini et al., 2022). From this perspective, 'knowing' is the ability to act with 'requisite competence' within a community of practice (Gherardi et al., 1998, p. 274). For newcomers, such knowing is developed though opportunities to participate in practice, working alongside more experienced colleagues. As newcomers participate, they learn 'how to go on', or progress in the performance of the practice (Gherardi, 2009; Pyrko et al., 2017), as they engage as 'legitimate peripheral participants' within the practice community (Gherardi et al., 1998).

A practice-based view of learning through participation invites a focus on the role of the body in the performance of practices (Bouty and Godé, 2022; Gherardi, 2009). Scholars note that 'learning and knowing are grounded in our practical, bodily, emotional experiences' (Yakhlef, 2010, p. 410). Building on the work of Merleau-Ponty, these scholars point to the importance of a tacit, non-verbal, pre-reflexive knowing of performance, which is ingrained and sedimented bodily (Pyrko et al., 2017; Strati, 2007; Yakhlef, 2010). For Merleau-Ponty, for example, motricity is the original intentionality (Merleau-Ponty, 1962, p. 139), being represented through 'I can'

rather than 'I think that'. A movement is learned when it is understood by the body (Merleau-Ponty, 1962, p. 140); as such, the body is a 'mediator' for the world (Merleau-Ponty, 1962, p. 146). For example, Cook and Yanow (1993) note that flute makers gauge the quality of a flute by look and feel. Similarly, the roof tilers described in Strati's (2007) study feel with their feet. As such, according to Yakhlef (2010, p. 424), 'Embodied learning emerges as a dialectic relationship between our bodily capacities and the resources, affordances and constraints made available in our situated circumstances'.

Practice perspectives on embodied learning also reject Cartesian dualist assumptions of the mind/body divide; from this perspective, participation requires the whole body (Küpers, 2005; Merleau-Ponty, 1962). The rejection of Cartesian dualisms means that the body needs to be addressed holistically (Meziani and Cabantous, 2020), incorporating a sensitivity to more cognitive phenomena, such as emotions and attention, in relation to the bodily responses (see Côté, 2005; Hopkinson, 2015). Perception, for example, 'is both intentional and bodily, both sensory and motor, and so neither merely subjective nor objective, inner nor outer, spiritual nor mechanical' (Merleau-Ponty, 1962, p. xiii); perception is thus a way through which bodies orient to, and mediate, experiences through participation. For example, Yakhlef and Essén (2013) argue that as practitioners (in their case, care workers) gain more experience, their ability to respond flexibly to situational cues and to pick up more nuanced cues increases. Latour (2004) uses the example of the training of 'noses' in the perfume industry, noting that during their week-long course, newcomers learn to differentiate between smells. This literature highlights that for embodied learning, the body's capacity to participate with requisite competence is important and that, conversely, participating in a practice reshapes the body such that the body is able to participate competently.

The Role of the Body in Accomplishing Participation

Previous work on embodied learning has focused on the task-related bodily doings that enable the proficient accomplishment of practice (Bouty and Godé, 2022; Coupland, 2015; Willems, 2018). For example, Coupland (2015) notes how rigorous physical exercise, diet, and training in the sport of rugby produces a 'rugby body' that enables players to perform their tasks with skill. Similarly, Bouty and Godé (2022) and Willems (2018) focus on coordination, albeit in very different contexts. Bouty and Godé's study of the coordination practices of a military air display squadron shows how coordination practices and bodies mutually co-construct each other. Willems (2018) shows how railway train despatchers engage with their senses in order to coordinate activities. These studies have broadened our understanding of the embodied learning required for competent practice.

We also know from a practice perspective that participating in a practice is not straightforward; it is an effortful accomplishment (Beane, 2019; Bharatan et al., 2022; Lave and Wenger, 1991). For example, Beane's (2019) study reveals how surgical residents have to resort to covert learning practices when transitional opportunities to practise surgery were disrupted by technological advances. Bharatan et al. (2022) reveal the ways in which sea cadets, as newcomers to the shipping industry, need to work

through the structural arrangements of shipboard practice in order to gain access to participation that was otherwise denied to them. These studies have been useful in problematising certain taken-for-granted aspects of practice-based learning theories, such as whether or not newcomers have the opportunity to engage with a practice in the first place.

In similar vein, newcomers must work, and work hard, at *making* their bodies capable of participating. Quite how the body becomes capable of participating in a practice is an aspect of embodied learning that requires further study. Extreme contexts have great potential to provide insights in this regard. For example, studying the fast-response practices of police work, Schakel et al. (2016) note that when practices switch suddenly, individuals' 'thinking and acting is affected at a primary, rudimentary level. Individuals may freeze; they lose touch with themselves, their environment, and co-workers' (Schakel et al., 2016, p. 939). Here, the body becomes incapable of acting or participating in the practice of policework. As Sergeeva et al. (2020, p. 1251) show in their study of surgical practice, acting competently involves not only the socio-technical, task-related skills of performing surgery, but also the 'ability to concentrate and stand for long hours at the operating table, and the bodily control to suppress nausea, fainting, or revulsion when encountering blood and gore during the most gruesome procedures'.

These studies point to an aspect of participating in a practice that is intertwined with (yet distinct from) technical know-how; that is, the body's capacity to act. There appears to be a difference between the skilful hand movements required to make a surgical incision (the body's technical know-how) and the ability to stand for long hours and withstand stench and fatigue (the bodily capacity to act). Although both are required for a newcomer to be able to participate in a practice, the literature on embodied learning has focused primarily on the former. Yet, as the extreme context literature (e.g., Schakel et al., 2016) illustrates, sometimes the body finds it difficult to participate in the tasks demanded. At times, the body may be incapable of doing, or it may be inadequately prepared for immersion in practice (Ribeiro, 2012), unable to produce the responses required to participate skilfully or, indeed, to participate at all. There is therefore also a need to understand the work newcomers do in order to develop their bodily capacity to act such that they can participate in, and learn from, practice.

Developing a Functional Body through Body Work

Organizational body work literature focuses on the purposeful efforts that actors and organizations engage in to reshape the body. Lawrence et al. (2023) note three foci on the body; the functional body (focusing on what the body can do), the meaningful body (how the body is seen, such as in gender identity), and the material body (the 'flesh and blood' aspect of the body). In this paper, we focus on the functional body; specifically on how it enables and constrains participation in extreme context practices. Body work involves focusing on how the bodies of organizational actors develop to enhance, say, learning and skills (Beane, 2019, cited in Lawrence et al., 2023). Body work can be done by an actor to the self, such as in the managerial athleticism

identified by Johansson et al. (2017), in which managers work to make their bodies athletically fit in order to portray a set of managerial norms. It can be interpersonal, such as where experts train newcomers in certain mechanistic movements to reshape their bodies (Bouty and Godé, 2022; Hopkinson, 2015), or it can be performed through organizational practices, like the rugby training practices in Coupland's (2015) case. It can also be a combination of all of these. For example, Michel's (2011) ethnography of investment bankers finds that the bankers embody organizational control when they discipline themselves to work long hours, without rest, and always be 'on' (Michel, 2011). These varied types of body work are usually triggered in some way, whether from a perceived need for bodily change, in response to bodily changes, or to meet role demands (Lawrence et al., 2023). Relatedly, Bouty and Godé (2022) argue that prior work in training (Müller, 2018; Spencer, 2009) has focused on how 'bodies are technically, physiologically, sensorily and symbolically prepared and educated *to* practice' [emphasis added], including through 'resistance to pain', 'movement', and 'self-care' (Bouty and Godé, 2022, p. 1773). Looking at preparation in isolation enables us to learn about the reshaping of the body to gain particular skills for a task (Hopkinson, 2015; Spencer, 2009; Wacquant, 2004). Nevertheless, the body work that is necessary for wider participation in a practice at the times when the body may struggle to 'go on' is an area that requires further exploration.

Extreme contexts provide an ideal site to study the body work entailed in embodied learning because the body plays a 'disproportionately important' role (Hällgren et al., 2018, p. 142). There are many different kinds of extreme contexts (e.g., emergency related, disaster relief, extreme events) but the organizations in extreme contexts share a vulnerability to sudden, often unanticipated, events that could have significant material, psychological, or physical consequences (see Hannah et al., 2009). Lawrence et al. (2023) note that in 'physically demanding work settings body work is performed to shape the functionality of the body'. For example, McGill et al. (2015) look at how physical training can prevent back injuries and help police officers better engage in high-intensity activity bursts. To engage in embodied learning, newcomers in extreme context organizations must adjust their bodies to cope with challenging or threatening situations so that their bodies have capacity to act in the face of threat (e.g., the capacity to move rather than freeze). Our research question is therefore: *How do newcomers develop the bodily capacity to participate in practices in an extreme context*?

METHODS

Research Context

Operational seafaring provides the site for our empirical study. It is an environment where physical and mental risks prevail due to the high-stress, safety-critical nature of the work, which is characterized by social isolation, with seafarers working between 3 and 11 months at sea (Sampson and Thomas, 2003) and a lack of segregation between work and non-work times in a confined ship (Hystad and Eid, 2016). These already hazardous working conditions can be exacerbated by extreme weather and hostile sea

conditions (Çakır, 2019). While safety reports have noted a reduction in accidents, Roberts (2018, p. 21) emphasizes that 'potential risks within this industry in terms of personnel safety and environmental impact can be of catastrophic magnitude'. Hence it meets the criteria set by Hällgren et al. (2018) for a risky context: 'characterised by near-constant exposure to potentially extreme events such that an unusually great degree of emphasis is inevitably placed on the reliability of systems' (Hällgren et al., 2018, p. 117). Previous work on dangers in seafaring has stated that 75 per cent of all accidents at sea are caused by human error (Dominguez-Péry et al., 2021) in comparison with the airline industry where pilot error is around 60 per cent (Wang et al., 2018). Studies in the shipping industry have shown a lack of skills followed by fatigue as the main cause of human error (Islam et al., 2017), making it important to learn how to produce a competent performance.

Research Setting

Our research was conducted across three sites and two organizations within operational seafaring. We collected data at two maritime training centres, one UK-based (Ship Start Training Centre[1] or SSTC) and one Philippines-based (Crew Co Training Centre or CCTC), alongside one containership (MV-Sea-Line). CCTC and MV-Sealine are both part of CrewCo, whereas SSTC is an independent training centre catering for several different shipping companies. Access to all research sites was formally negotiated with gatekeepers, including the owner of CrewCo, the head of the training programme, the director of CCTC, the captain of MV Sea-Line, and the principal of SSTC. Participation was sought by sending the gatekeepers a letter explaining the research and the possible benefits of participating. Once formal access had been granted, informal access was negotiated and re-negotiated during field work with the instructors, cadets (newcomers seeking to become officers), and crew.

Cadets at SSTC and CCTC follow similar learning paths, with shore-based training being interspersed with two 10-month sea-service contracts. During their shore-based training, cadets learn maths and physics theories and how these apply to navigation and other nautical subjects. They also undertake practical lessons (for example, deck work and chart work) and participate in simulation exercises, such as bridge watchkeeping.

Between the shore-based learning periods, the cadets work as deck cadets on board the ships. MV Sea-line is a container ship that sails in coastal European waters. She is a small liner vessel (conducting back and forth coastal voyages) with a 12-person crew under Crewco management. She is one of the ships where cadets spend their sea-service contracts in order to gain practical experience on board. During their sea-service contracts, cadets are expected to work as part of the crew, spending their first sea-service contract as cadets and the second as deck ratings (i.e., support crew). The ranks and responsibilities of the different participants is outlined in Table I. On the deck, cadets participate in ship maintenance and cleaning, port operations (such as keeping gangway watch, mooring, unmooring, and anchoring) and cargo operations (such as loading and unloading, securing the cargo). Usually, these practices are undertaken as part of the deck-work team and the cadet works under the supervision of the Boatswain (colloquially

Table I. Ranks and responsibilities of deck department

Rank	*Responsibility*
Deck Officers	
Captain	Overall, in charge of the ship. The legal representative of the ship-owner. Final responsibility for safety, security of the ship, and compliance with statutory requirements. Ship's business.
Chief Officer	In charge of the deck department. Responsible for cargo planning and safe carriage.
Second Officer	Navigational watch at sea. Cargo operations, upkeep and maintenance of navigation publications, medical officer on board
Third Officer	Navigational watch at sea. Cargo operations, upkeep and maintenance of life saving and firefighting equipment on board
Cadet	Follow chief officer's instructions and complete tasks prescribed in company training manual/training record book. [Please note while the cadet is officially a novice deck officer, their work spans both the deck officer and deck crew roles]
Deck Crew	
Bosun	In charge of deck crew Deck equipment maintenance. De-rusting/painting, lubrication, cleaning Mooring, unmooring, cargo stowage/securing Security/anti-piracy
Able Seaman (AB) / Ordinary Seaman (OS)	Part of the deck crew Navigational watch lookout. Steer the ship manually when required (helmsman) Deck work as directed by Bosun, mooring operations, cargo operations such as loading/unloading the cargo under supervision, shipboard maintenance and upkeep.

referred to as the Bosun) who is the person in charge of deck work. On the bridge, cadets act as part of the bridge team. Under the supervision of the officer on watch, they act as a helmsman and steer the ship.

Data Collection

The data for this paper come from an ethnographic study conducted over seven months. The first two months of data collection took place at the SSTC in the UK, where data was collected by going to the field site one or two times a week for a period of two months. Then, over a period of five months, data were collected across two sites at CCTC and on the MV Sea-Line. During this time, the first author lived and worked within the field sites, spending four months at CCTC and one month on board MV Sea-Line, collecting data via non-participant observation, interviews, and informal conversations with CrewCo staff.

At SSTC, observations focused on the shore-based training of cadets in maritime and engineering, as well as on their practical training in the form of fire-fighting and personal

safety training. At CCTC, classroom training was observed alongside practical training, simulation training, and a ship visit. On MV Sea-Line observations were undertaken to understand how cadets began to participate in the operational seafaring practices of navigation, seamanship, and deck work.

Semi-structured interviews were conducted at CCTC with cadets who were asked about their sea-service training, as well as with deck officers on shore-leave who were asked about their cadetship experiences. These interviews were supplemented with an 'Interview to the Double' (ITTD) section (Nicolini, 2009) to elicit information about daily tasks, routines, and challenges on board. Documents such as cadets' project workbooks and daily training records were also used to understand experiences of their sea-service. Semi-structured interviews on MV Sea-Line were conducted with officers and ratings of all ranks, as well as with cadets, to interrogate their experiences of work and learning. Data were represented in field notes, observational memos, interview transcripts, and copies of documents, as well as photos and audio-recordings of observations where possible. Table II summarizes the data collected.

Data Analysis

Our broad research focus was to understand the situated learning and training of newcomers, drawing from a practice-based theoretical lens. This guided the data collection and sensitized the research team to empirical novelties that, in turn, directed subsequent data collection (Glaser and Strauss, 1967). On completion of data collection by the first author, the authorial team moved iteratively between the literature and data to complete the analytical process, as outlined below.

The body's central importance to learning was evident from the initial analysis. We observed that seafarers – that is, cadets, officers, and ratings – spoke frequently about their bodies in the context of doing their work. For cadets, especially, their lack of physical 'fitness' to work on the ship was deemed an important marker of their newcomer status. The ability 'not to be tired, just like them' (i.e., the experienced crew members) and to develop their physical capacity was felt to be an important signal of learning and progression.

Stage 1. We started our data coding with instances of 'fitness' in relation to the capacity to act (e.g., 'it was easy', 'I felt comfortable', 'they trusted me to do the job'). We found that most participants noted being, at some point, unable to act as required to participate in practices: 'it's very difficult to move'. While some part of this was a lack of know-how ('I didn't know

Table II. Data collection details

Location and time	*Research method*	*Numbers*	*Duration*	*Total time*	*Data volume*
SSTC UK 2 months	Observations	18	1.5–5 hours each	35.5	54 pages
CCTC Philippines 4 months	Observations	30	3.5–7 hours each	158.5 hours	439 pages
	Interviews	28	30–120 minutes	21.9 hours	792 pages
MV Sea-Line 1 month	Observations	30	0.5–2.5 hours	53.5 hours	132 pages
	Interviews	10	30–120 minutes	10.98 hours	356 pages

where to stand and what to do') cadets noted other, less task-focused, bodily limitations to their capability to participate, such as freezing, 'going blank', or being 'too scared'.

These initial observations led us to engage more deeply with the embodied learning literature, a promising avenue for our analysis. Using instances of freezing and 'going blank' as a starting point, we widened our coding to other markers where the body was deemed not to have the capacity to participate competently. Our unit of analysis became individual learners (specifically newcomers) as they sought to develop capacity to participate. Our focus was on practices common to the learner that made demands of the body's preparedness. For example, participants noted being 'too exhausted', with 'fatigue' being mentioned repeatedly. Similarly, words such as 'bleeding', 'pain', and 'hurt' were indications that the body was struggling to participate. We also noted certain emotions that indicated bodily discomfort (e.g., 'I was scared', 'I felt angry') and we focused on these emotions when they impacted ability to act (e.g., 'I was too scared to move', 'I was too nervous to touch'). These struggles indicated that newcomers faced challenges in taking the next step towards embodied learning, which directed our attention to the work needed to accomplish embodied learning. We coded these as 'emotional cues of bodily struggle' (e.g., fear), 'physical sensations indicating that the body was not fit enough for task performance' (e.g., pain or tiredness), and 'narratives and photos indicating future struggles to participate' (e.g., depictions of physical injuries, accidents, or death), as explained further below.

Stage 2. We noted differences in how cadets spoke of their emotional and physical responses to a given situation, as well as differences in the effort needed to overcome felt inadequacies. Challenges were experienced as 'threatening' in different degrees. For example, certain situations caused cadets to flinch, while in others, cadets were too scared to perform a task at all. We noted that the magnitude and immediacy of the bodily challenges being experienced, as well as the felt preparedness to cope, enabled and constrained capacity to participate. For example, in a mooring operation, the threat that the 'rope might take me' created an acute response: 'I was too scared to move'. In contrast, a photo of glass piercing an eye following an error shown during classroom training warranted a 'cringe'. In the latter case, the bodily threat was not imminent but was imagined by newcomers, being both temporally and spatially distant: 'I somehow disregarded some of those safety rules in training when I was not in the real world' (Cadet, Interview 8). From our coding process, three analytic themes for threat experiences emerged: imagined threat, immediate threat, and attenuated threat, each of which had different emotional and temporal orientations, as summarized in Table III.

Stage 3. We noted adjustment and progression in bodily learning. Cadets' experience of similar situations changed over time, with operations that were initially felt to be dangerous becoming described as 'routine'. For example, the cadet who narrated their 'hair raising' experience upon first sighting the ship talked of 'boredom striking' once they had been working a few months. Our data showed the purposeful efforts – physical and emotional – that cadets engaged in to overcome their bodily struggles; these adjusted their bodies to become capable of participating. At times, instructors

Table III. Data illustration table: threat experiences

Threat experience	*Data illustrations*
Imagined Threat	The cadets are undertaking simulation training on the manoeuvres the ship makes when someone falls overboard. The instructor takes them through different manoeuvres, each to be used in different situations 'The next manoeuvre they perform is the Anderson turn. The quickest way to reach the **man overboard**'. [CCTC Field Notes]
	Capt. G. narrates a story to the cadets during their class on **piracy** in the Singapore strait, and how some captains would put glass shards on the deck to prevent pirates from boarding the ship. [CCTC Field Notes]
	Capt. R narrates an incident to the cadets during their class in which the **Able Bodied Seaman (a member of the crew) and the Chief Officer died** while securing cargo lashings during a storm. [CCTC Field Notes]
	Capt. G narrates an incident from his sailing days to the cadets during class in which he refused to take on dangerous cargo on his ship, but another friend was not aware, and the cargo caused an **explosion on board**. [CCTC Field Notes]
Immediate Threat	I6 C4: 'When I'm on board I think about my trainings here. I think about the practical [training] the berthing, the ropes, the lashings. I forgot them all'. I: 'Really?'. I6 C4: 'Yes! I forgot everything! I don't know why maybe when you're in the ship you're lost, you have to adjust, you don't know what to think, you don't know what to do, **you're out of your mind**'. [Cadet, Interview 6]
	'I was so very nervous to touch the equipment and it was only slowly that I became comfortable with using the equipment the **first time** I doubted the equipment, I was **very, very, scared to touch** [it]'. [Cadet, Interview 2]
	I4 C2: 'No, no, no, only inside work **we cannot sleep we cannot eat**'. I: 'Were you seasick at this point?'. I4 C2: 'Yes [laughs] I **could not adjust** myself it was a constant cycle of diarrhoea and vomiting. It was my **first storm**'. [Cadet, Interview 4]
	'And also the nature of the work, it's very hard like in bad weather, it's very **difficult to move** because of the rolling and movement of the ship'. [Officer, Interview 18, reference to cadetship]
Attenuated Threat	'The two months after I got on board when I started duty, **I realize something I feel somewhat lazy**. Why do I feel like this because, **before I was allowed to go to the bridge I was excited to go the bridge but now going to the bridge but I felt lazy**'. [Cadet, Interview 6]
	Capt. R says, 'At high sea there is under load and the crew can be bored, you have finished watching all the films, or you have finished all the book it can be very **boring**'… **The edge of routine**, he says, can cause boredom. 'It's easy to become over-confident in such situations'. [CCTC Field Notes]
	'You go a little bit down. It's something like you are a little bit **complacent** because **you have already been there**'. [Officer, Interview 13, reference to cadetship]
	'That was my third block already and the ship had no third mate and he trained me to do the watch… Yes. it was **not so difficult** for me to adjust **because I had already the feeling, I had already experienced that time**'. [Officer, Interview 15, reference to cadetship]

used narratives and simulations to highlight the work that cadets would need to do to manage their bodies' fatigue, stress, and lack of sleep. Similarly, during their sea-service experiences, cadets noted the purposeful efforts they needed to make, such as 'forcing the body to follow commands'. By attending to these data, we noted a series of what we termed 'micro-learning processes', defined as the purposeful efforts to accomplish participation.

The literature on body work was useful here in directing our analysis. We began looking in our data for purposeful actions taken by, or done to, the cadets to adjust their bodies. For example, at the training centre cadets were made to exercise and engage in simulation training to prepare their bodies for future work; on board the ship, when cadets were scared of losing a hand to the mooring rope, they focused on doing small actions on command. We then started teasing out nuances and probing the data to account for differences between these purposeful actions; we thus identified different micro-processes, detailed in the findings below.

FINDINGS

This section details the body work that cadets, as newcomers to seafaring, engaged in when faced with different experiences of threat, in order to develop and refine their capacity to act with 'requisite competence'. The types of body work differ based on the experience of threat in that situation and they are aimed at different outcomes. Through our analysis, we found that cadets engaged in three distinct types of body work, illustrated in Table IV.

Although the three types of body work are detailed sequentially below, we see them occurring episodically and intermittently as newcomers experience threats pertaining to newly encountered and evolving situations. Importantly, we see experienced threat not as exogenous to bodily coping – such a view would be out of step with our practice-based approach – but rather, threats are felt by newcomers *in relation to* their embodied learning and bodily coping. In other words, the experience of threat (and the way it is felt bodily) and the body work entailed in embodied learning are mutually constituted.

In what follows, we show how the three kinds of body work are intertwined with different threat experiences, moving through: (1) priming body work, where the threat experience is imagined while the cadets engage in preparatory work; (2) battling body work, as cadets grapple with an immediate and magnified experience of threat to the body; and (3) enduring body work, as cadets adjust their bodies (to some extent) such that a once-present threat is experienced as reduced in magnitude. Table V summarizes the details entailed in which the body work occurs. It identifies the type of practices (e.g., shore-based training practices or sea-service training practice), location of the practices (e.g., shipboard or on-shore), timing of the practices in relation to the cadetship (e.g., prior to sea-service experience or during their time at sea), and the practitioners involved.

Table IV. Data illustration table: body work

Body Work	*Microprocesses*	*Illustrations*
Priming Body Work	Narrative mediation of possible body work	The training instructor G introduces himself and says that he was in the Royal Navy posted on the Trident and Hunter Killer submarines for 27 years. The presentation starts with famous pictures of ships sinking, they include MTS Oceanos and Costa Concordia. He then divides the cadets into groups and gets them to discuss the reasons and **advantages of drills [repeated physical training exercises], which include preparation, legal requirements, and the ability to escape safely**. [SSTC Field Notes]
		They [the cadets] and the training instructor, Capt. O, then discuss what to do in a situation where a friend or a person you're in charge of meets with an accident. I can see that the cadets are **agitated by this topic and there is some resistance to the idea that they should leave that person behind while they call for help, even if it means certain death for that person**. Mr T says no matter how harsh it sounds, sometimes sacrifices must be made. [SSTC Field Notes]
		Capt. C instructs the class, fatigue has the same effects as alcohol… he tells them to '**eat well**'. '**Fitness**', **he notes, is important, adequate self-monitoring is also important**. [CCTC Field Notes]
	Sensitizing to body inadequacies	The training instructor T, says that to manage claustrophobia e.g., in a bulkhead, **breathe through nose and not through mouth**. [SSTC Field Notes]
		The training instructor then demonstrates how the **cadets should use the walls to find the door if they can't see** [during a fire on board]. He puts out his right hand and with the back of his hand he sweeps the wall. With his left hand he sweeps the front so as not to bang into anything. Alternating both hands, the foot in front sweeps the floor. [SSTC Field notes]
		'Good experience and it [the exercise] helped me to **increase my stamina**, Like, before like I can't even run one round and after [I could] run like rounds continuously and push ups… good… physical fitness basically, you can **improve your physical fitness**' [Cadet, Interview 32].
	Developing awareness of bodily preparation	'Through practical trainings, for example like safe mooring, **they train us because it's very dangerous** like when docking or undocking if you hit the rope, it may kill you or cause some major injuries in your body'. [Officer, Interview 18, reference to cadetship]
		'So, I said it's good [the training] because you are being prepared for what will, you are being **prepared on your future work** on board'. [Cadet, Interview 7].
		'It involves risks, **your life will be at risk** when you are in there [on the ship] so **I think it's really necessary you know how to work in this kind of place** or what shall you do in this kind of event so that when you're in there you won't experience accidents'. [Cadet, Interview 11]
Battling Body Work	Overriding instinctive bodily responses	'[During the deck work] I understand what I am doing, and I am **very careful to do what they're doing** and **very attentive** to what they are doing'. [Cadet, Interview 1]
		'He [the Bosun] would approach me then and he would **tell me what the correct way is to do it [operate the winches]**. He was really guarding us in terms of our safety'. [Cadet, Interview 9]

(Continues)

Table IV. (Continued)

Body Work	*Microprocesses*	*Illustrations*
	Engaging with sensory overloads	'He [The chief officer] taught me and then after he taught me, he just went away, walked away and then **tested me if I could stand it my own**. I mean, fast cargo operation, it is the first time'. [Cadet, Interview 3]
		'At first yes at first when he [Captain] shouted, but then **I realize that if I was dominated by the shouting, I got even more scared and I lost focus** and then I **might not be able to do this again**'. [Cadet Interview 6]
		'He [Bosun] is in charge of the controlling the winch so if something goes wrong with what I am doing **he will shout at me. But I know that it is for my safety**. Because he knows that if I do it in the wrong way **I will have an accident**'. [Cadet, Interview 9]
	Commanding the body to produce required response.	'It's **very, very hard** [the lack to sleep] **but I do not complain** because I told myself that this was part of training and **someday, I would experience more than this**'. [Cadet, Interview 6]
		'The Bosun who is already about 60 years old, so I am the youngest. One AB is about thirty and two OS who are about 65… it's just that of course they are a little bit weak now because of the age, so **I do the hardest work**. [laughs] **So I learn**'. [Officer Interview 13, reference to cadetship]
	Developing tolerance for ongoing challenges to the body	I: 'So what do you usually, do you go to sleep or do you go to the rec room?'. I17-O8: 'Sleep because **I really need to rest** because already, I wake up at six'. [Officer, Interview 17]
		'We already do a lot of physical work but in the morning, **I do exercise**, a little bit stretching'. [Officer, Interview 21]
		'Yes. I take a break, then after this break I take a little bit nap to my cabin so **because if you do this job every day then you get tired. That's why you need some rest**. I take a little bit rest so I can take more energy and watch again, 20.00 in the evening. So, I do not feel sleepy or tired so I can do the job'. [Officer, Interview 22, reference to cadetship]
	Repeated performance alters sensitivity to emerging situation	'Before the mandatory rest hours [by regulation minimum 10 hours of rest] and despite the fact that we have this kind of situation [overwork] I still find time to go up to the [bridge] and learn. Because **you cannot go lazy, you can't go tired**. Because your **future depends on it**'. [Officer, Interview 15, reference to cadetship]
		'It plays on your mind **what is going to happen** but slowly once or twice when you actually hit, when you're in a dense traffic area that is the time when you start gaining confidence. At open sea, you don't, you hardly have to do anything, but when you have a lot of fishing vessels and lot of other ships. But **once you do it, the second time you do it then you start getting confident**'. [Cadet, Interview 32]
		'Yeah, that would be to be **alert every time** and manage your time, your rest hours that is the most difficult part, whether you choose to rest or your pleasure'. [Cadet, Interview 5]

(Continues)

Table IV. (Continued)

Body Work	*Microprocesses*	*Illustrations*
	Adjusting sensory balance in situational threat	I: 'And at what point did you become comfortable with keeping the watch? At what point did the nervousness, go away?'. I15-O6: 'Well, when **I know already when to call the master. [laughs] That's when I was very confident**. Because the important thing is knowing when to call the master. I mean, the accident happens because it's too late to call the master. So, there was always the checkpoint that okay…'. I: '… You need to call the master now'. I15-O6: 'You need to call the master'. [Officer, Interview 15, reference to third block cadetship] 'There [during the navigation watch] I thought that **you have to be fully aware of what was going** on in your surroundings, especially during the operation on the coast'. [Cadet, Interview 8] I21-O12: 'You must first stay on the watch; you must check everything. You must proceed so that everything is familiar, do your observation. Yes. Because at night no other work, no electronics allowed'. I: '… And how do you deal with the boredom of doing well, you know, nothing for a period of four hours?'. I21-O12: 'No, it's not boring because you are using electronics, radars, yes. **We are observing**. **Checking that the equipment is functioning well**. **So, it's not boring work, but it's four hours, only four hours, very short**, yes'. [Officer, interview 21, Interview to the Double]

Imagined Threat and Priming Body Work

Prior to boarding a ship and immersing themselves in the practices of operational seafaring, cadets become aware of some threats they may experience in the future when they are at sea. Thus, during training, cadets are repeatedly made to imagine, often vividly, future situations of physical danger.

I8-C6: And then I was partly scared and partly excited to apply my learnings and …

I: … And why were you scared?

I8-C6: I was scared because we always get talk in topics that there are lots of dangers in this profession and just a simple move could jeopardize the whole operation in the maritime industry. [Cadet, Interview 8].

Here, threat is imagined because the cadets, as novices, have not yet had direct experience of the situations they are being asked to consider; other data illustrations of imagined threat are shown in Table III. The imagined threat is invoked in multiple ways, but primarily through narratives, images, and the use of simulations regarding dangers at sea.

Narratives around physical dangers to cadets' bodily selves are often crafted during training by more experienced seafarers who recount their past experiences. 'Sea stories' are told of encounters of 'piracy' and 'explosions' (noted in Table IV) or even of how the daily aspects of life at sea (e.g., heat) can become a problem (e.g., sun stroke). For

Table V. Details of newcomer body work in practices

Threat Experience	*Body Work*	*Practices*	*Location*	*Time*	*Practitioners Involved*
Imagined	Priming	Shore-based training practices: Simulation training, Practical training, classroom narratives	Shore-based training centres	Prior to 1 Sea-service contract and between sea-service contracts	Cadets (batch) and shore-based training instructors
Immediate	Battling	Sea-service training practices: mooring operations, port operations, coastal navigation, adverse weather situations	Ship at Port, near coast or in adverse weather or other crisis situation	Sea service contract, primarily first contract at sea when practices are experienced for the first time	Cadet (single) and deck ratings (Bosun, AB, OS) Deck officers (captain)
Attenuated	Enduring	Sea-service training practices: deck operations, routine shipboard maintenance, watchkeeping duties	Ship at sea	Sea-service contract (after 2–3 months of being at sea) or during second sea-service contract	Cadet (single) deck ratings and deck officer on watch

example, engine room temperatures are described as almost unbearable and cadets must use their bodies to spot signs of possible illness in order to protect themselves, as in the following.

The instructor then asks if any of the cadets have taken salt tablets. He says that if they taste their sweat and it isn't salty then they must increase salt in their diet. [SSTC Fieldnotes]

Narratives and images of potential dangers make the possible future clearer and enable the cadets to connect more easily to future threats, risks, and dangers. Narratives mediate a range of possible bodily responses and enable the body to participate in a mediated manner in the actions that may be needed when encountering future threat (e.g., by preparing for shock).

The instructor uses images and stories to talk to the cadets about the importance of protective equipment. I can see the cadets visibly cringing at an image of an eye with a metal bit stuck in it. The next slide has pictures of mutilated genitals to show the importance of putting on the safety harness correctly. The instructor tells 'us girls' and 'the squeamish' to look away. [SSTC Fieldnotes]

Imagining future threats through narratives and images primes the learners to become aware of the role their bodies play in performing the tasks, of the inadequacies of their newcomer bodies in the environment, and of the preparation needed for their bodies' safety. The body work, as with the threat, is oriented towards sensing discomfort and weakness as the body begins to feel inadequate. The narrative above, for example, primes the cadets for the vulnerability to injuries in their future work, attuning the body to potential danger (e.g., eye with a metal bit stuck in it, mutilated

genitals). This priming creates bodily awareness through an instinctive reaction to the narrative (e.g., visibly cringing) grounded in the emotions of fear or surprise; the threat is felt in the now, as the cadets imagine their own potential eye injury. This indicates a lack of bodily preparedness for the situations described in the narrative and a nascent feeling that effort is needed to re-shape the body for future work (e.g., protecting the body with safety equipment). Priming bodily awareness of vulnerability is part of the body work needed to build the degree of robustness necessary for the capacity to practice at sea.

As newcomers, the cadets are not able to fully gauge their body's inadequacy, thus shore-based training is geared towards making cadets aware of bodily needs and bodily readiness. This entails re-shaping their basic fitness levels so they can meet the physical demands of their future work. For example, cadets have regular health checks in which their body mass index (BMI) is monitored. As a cadet notes, this requirement causes the cadets to exercise so they can meet the BMI requirement.

I5-C3: From time to time, we go to the gym, do exercise and every Saturday we do exercise.

I: That's compulsory? No?

I5-C3: Not really. But we are asked to monitor our weight so we have to do exercise because we cannot go above the BMI that is required on the scales. [Cadet, Interview 5]

Simulation training enables cadets to project bodily into a work situation through imagining threats. In simulations, the cadets are enacting a possible future scenario; perhaps it is a situation that is novel, or it may be one that is too risky for them to first encounter on board, as in the vignette below. Cadets are asked to enact an imagined scenario as though it were happening in the present. The simulation thus becomes immersive role-playing, facilitated through the materiality of the simulation room with the navigation tools and the screens. The imagined scenario enables immersion into bodily threats they may encounter 'in real life', allowing the body to react to the threat in a controlled and supervised manner.

In this exercise the cadets are simulating being officers on the bridge to learn anchoring practices. The cadets are divided into two groups: Group 1 enacts the simulation, while Group 2 and the instructor observe and enhance the simulation scenario to see how their colleagues react. There are large screens that simulate the view from an actual bridge, showing the sea, other ships, and land mass. There is a command centre with an overhead panel, a helm, navigation charts, a phone, binoculars, as well as navigation equipment such as electronic navigation charts, the radio and radar systems. Four cadets take up four bridge team functions – a captain, a helmsman, a lookout, and a passage planner. On the screen you can see an approaching ship.

Capt. D. starts the simulation exercise.

Capt. D 'MV 1, MV 1 this is traffic controller, come in'. The bridge team (Group 1) responds, and Capt. D asks them to 'proceed to the anchorage point'. The instructor then turns to Group 2 and encourages them to provide distractions over the radio. One of the Group 2 cadets uses his phone to blare a popular song into the radio. This, Capt. D

says, is what the radio Channel 16 sounds like, especially near the Singapore Strait, with a cacophony of different orders and noises coming over the radio. The officers need to pay attention to what is relevant while tuning out distractions as they listen for the commands from the port about how to navigate their ships in congested waters towards their anchor points. Capt. D wants to recreate this to provide dramatization and distractions to see how the cadets react. He changes his tone of voice and pretends to be the Chief Engineer asking for shore leave when they get to Singapore. Simultaneously, the radar gives an alarm, the captain checks it and responds. It bleeps again. There are multiple auditory inputs from the navigation equipment and over the radio in the form of alarms and noises. After a while, Capt. D pretends to be the traffic controller, and asks the captain to prepare the pilot ladder to a height of 1 metre above water for port authorities to ascend. Captain repeats command but gets the length of ladder above water wrong. The traffic controller repeats command saying height reading is wrong; the captain repeats the correct reading, and the communication loop is closed. Then traffic controller radios in again 'traffic controller to MV 1 – going too fast, going too fast, slow down – what are you doing?'. Here the distractions and the multiple commands start to work on the trainee captain, who has forgotten to reduce the ship speed and he therefore overshot the anchoring point. The ship is now in danger of running aground. [Vignette]

The above illustrates a typical bridge simulation aimed at familiarizing cadets with anchoring a ship. However, along with the technical know-how of anchoring the ship, the cadets are becoming attuned to the auditory stimulations that may be present (pop music over the radio). They are developing their senses to allow them to sift through the auditory confusion in order to discern which sounds are important (radar gives an alarm) and which are background noise (chief engineer asking for leave). The cadets are training their ears to respond to the sensory distractions and produce a competent response (to prepare the pilot ladder). Their bodies are being prepared to encounter high-traffic areas in which they must contend with small fishing vessels, other cargo ships, noises, and lights, and which require them to sift through a multitude of sensory information.

Through simulation training, the learners engage in body work that starts to change their bodies and makes them increasingly aware of the need to reshape their bodies still further to cope with future threats. For example, another exercise is a watch-keeping simulation, in which cadets abide by the round-the-clock watch shift timings that operate at sea. This primes their bodies, in that they get a taste of what their future work entails and the degree of readiness it requires.

The cadets arrange themselves according to their watch timings – 0000-0400, 0400–0800, 0800–1200, 1200–1600, 1600–2000, 2000–0000. It's a practical bridge watch-keeping session that lasts for 24 hours, 5 days of this week, with the cadets rotating according to their watch times. The instructor says that the changes in sleep patterns and tiredness will help simulate the real-life situation they will face on board. [CCTC Fieldnotes]

Priming body work, incorporated into the training practices of seafaring, thus trains cadets to anticipate bodily threats and alerts them to the safety inadequacies of their body, from which they can achieve competent performance.

Immediate Threat and Battling Body Work

Although the training centre primes the need for body work, many experiences of being at sea cannot be simulated. One cadet explained:

You won't know whether you are sea ready or not and there is nothing you can do actually. You can't read up on stuff and you can't do anything to prepare yourself for that. You just have to you go there you experience it. [Cadet, Interview 32]

When cadets join the ship at sea, they confront strong physical and emotional reactions to the new challenge, which warrants concentrated effort to push or reshape the body to cope with rapidly changing situations. In certain high-risk, never-before-experienced situations, cadets are faced with immediate threat (e.g., a loss of limb from a flailing rope, or storm-induced seasickness resulting in 'diarrhoea and vomiting'). When faced with immediate threats, either to the body or in the task, newcomers control and subjugate the instinctive responses of the body in order to participate competently. We term this as 'battling body work'. Take, for example, the following situation:

I17-O8: The problem [was we didn't] know the weather at that specific time because we were already two months [in that location] and at that time [there was] very strong current, [the port had provided] only one mooring man, he tried to pull the rope but he couldn't because of the strong current, and that the rope also heavy to…

I: … To pull.

I17-O8: Yes.

I: Especially for an individual person.

I17-O8: Yes. So, the captain said that you need to put the headline on the bollard because the vessel was starting to drift… and then the mooring man, he could not take it and then he…

I: … Let go.

I17-O8: Yes. And at that time the bow throttle is working, and it sucked the rope in, so it was really dangerous for me because the rope might have been broken… Because I was the one holding this rope at that time. [Then] suddenly…

I: … There is a big push.

I17-O8: Yes. [imitates the sound] Oh! It's… Ah, stress. Maybe it would have broken [the rope], so I ran. [Officer, Interview 17 – reference to cadetship]

The example highlights the threats present in routine operations on board, where mistakes (not having more than one mooring man) can turn a risky manoeuvre into a life-threatening situation. In physically intense work that even the more experienced are unable to handle (i.e., the third office tried to pull the rope but couldn't), newcomers

are not adequately prepared for the dangers and their instinct is to 'run away'. In such situations, the immediacy and unexpectedness remind the newcomer further of the inadequacy of their body to respond competently. Moving away, running, freezing, or jerking back, may be uncontrolled, instinctive responses, anchored in acute emotions, such as fear (e.g., cadets noting 'I was scared to touch', as illustrated in Table IV). The imminent threat and the acuteness of the body's response compel the body to engage in 'battling' body work. This battling is prompted by a need to 'correct' the involuntary response such that the body becomes capable of acting, as illustrated below. The body, and certain specific actions, become foregrounded, as body work is oriented to the immediate and imminent threat, and the physical imperative to complete a task.

Mooring operation is very, for the first time, is very complicated and risky. So, at that time everything was so fast, [I] just stopped, I didn't know what to do and then Bosun of course he was shouting, shouting at me what to do and it was my first time there, I didn't know really what to do. I was afraid that maybe the rope might take me. So, the Bosun shouting and scolding me… And then, OS, was there. He guided me what to do, about what to do with the mooring, what to do with the knots, how to operate the winches. I was very thankful for him. [Cadet, Interview 4]

In the example above the immediate threat is that 'the rope *might* take me'. The body's instinctive response here is to shut down: 'I just stopped'. This demonstrates that the bodily capacity to act competently in the situation is lacking, which is also evidenced by the Bosun's response of shouting. The awareness of shutdown triggers a response from the cadet and others ('he guided me what to do') to override the instinctive response.

In such situations, there is a compounding of emotions entailed in body work. The cadet's fear of letting go of the rope is compounded by the Bosun's angry shouting. Subduing such emotions is part of the work to develop the bodily capacity to act. One cadet notes this aspect in their recounting of a high-stress situation where they had to steer the ship under a bridge in a strong current, facing the immediate threat of sinking or damaging the vessel:

I6-C4: I already know how to steer but to encounter waves that was different. I remember that time I encountered waves and the ship go there [indicates left instead of right]. Because the current is very strong and because of the waves.

I: Was it very difficult to steer the ship?

I6-C4: It's not difficult but you need to be familiar with the movement… So the ship's moving here [left] and I need to go there [right] and I was moving the steering little by little because I was scared [but] it was not enough. The captain shouted, 'give more, give more!'. I gave more and that was a thing. Fortunately, I passed under the bridge, and the captain said the important thing is to know how to follow the command. [Cadet, Interview 6]

In this example, the cadet is scared, both of the risky manoeuvre and of the ship's lack of response to the steering. Here, the instinctive response of the newcomer is to move slowly and carefully ('steering little by little'). However, this instinctive response

does not produce the competent performance required to steer the ship safely ('it was not enough'). As such, there is work that needs to be done to the body; in this case, focusing on the captain's commands ('give more, give more!') and pushing the steering harder than feels right. As such, body work can be a form of abstracting (Merleau-Ponty, 1962), whereby learners work on, train, and command the body to produce the required response when the body does not 'grasp' the situation in a competent manner. In situations of immediate threat and acute fear, the body work may involve moving the body to someone else's commands. Consider, also, the following:

> In the mooring operations the Bosun always told me focus on him and on the winch and nothing else. When he says give up, I just look at his hands, when he says give up, I just give up [i.e., let go of the rope]. [Cadet, Interview 24]

In order to produce a competent response, the cadet engages in body work by disregarding their own cues or instinctive responses. Instead, they train their senses ('I just look at his hands') to almost 'blindly' follow the commands of more experienced personnel ('When he says give up, I just give up') in situations that felt threatening enough to compromise the body's capacity to act. Here the focus is on specific actions rather than the overall mooring operation; the cadet is attending to the rope and to the action of letting go. The senses are attuned to specific actions (eyes are on the Bosun's hands, and ears are focusing on the particular auditory signal from the Bosun) so they can be oriented to the immediate threat.

Another aspect of the battling body work is pushing the body through sensory overloads, such as pain.

'We needed to navigate to the port [because of a strong typhoon]. So, we took the pilot ladder from the forecastle, and we put the ladder on the starboard side. Then after that, for I don't know how many voyages, Taiwan, Hong Kong, Thailand, Vietnam, we transferred the pilot ladder from starboard to port side. Then from port side to starboard side and back and forth. And the pilot ladder made from manila rope is very heavy when wet, so it's difficult to carry so we are five people taking the heavy pilot ladder. When you wake up everything hurts… The Bosun asked me if I can make a pilot ladder and I said yes… but it's very, very, difficult because you can use gloves but if you tie the pilot ladder with gloves it's very slippery then it takes time to tie it, so you need to remove the gloves and your hand bleeds. For almost two days your hand is swollen. But we successfully made two pilot ladders over four days'. [Cadet, Interview 4]

The work here is to put the body willingly into situations of discomfort and engage with the sensory overloads – in this case pain ('everything hurts') and bleeding. Technical know-how here is important. However, the work of pushing the body to go on despite bleeding hands is just as important. Certain physical sensations (the pain from carrying manila rope) signal that the body is not fit enough. Similarly, the sensation of pain and bleeding of the hands suggests that the newcomer body is being pushed beyond its capability ('for two days your hand is swollen'). In normal circumstances, bleeding and pain of a certain magnitude signals that the body is being pushed beyond its limits ('it's very, very difficult') and needs to rest and recuperate, and yet in this situation, the body has to carry on performing the task.

Attenuated Threat and Enduring Body Work

Cadets in their day-to-day life on a ship also face attenuated threats as illustrated in Table III. These are not immediate and/or may reduce as cadets' bodies become adjusted to the work and focus on coping over an extended period of time. Here, the body work engaged in is enduring, because the challenges are less acute but more pervasive and on-going, as noted below:

> Cadet: 'Before it was very different because for example [on the ship] there is a lot of work… There's too much work, too many jobs, my body could not handle it'.
>
> I: 'Did you fall sick or were you just tired?'.
>
> Cadet: 'No, I didn't fall sick I was just tired, still coping'. [Cadet, Interview 24]

Body work is aimed at enabling cadets to sustain on-going challenges and (re)align the body to meet the fluctuating situational demands. It becomes less focused on immediate action and encompasses wider situational demands that amount to backgrounded bodily threat. Some of the attenuated threats require the cadets to sustain their engagement in an arduous practice so as to reshape the body to become more able to tolerate the on-going demands. Life at sea is challenging; indeed, even its mundane day-to-day routines are difficult. The newcomer's lack of bodily adjustment is presented through falling ill, being overly tired, and even being seasick.

> I21-O12: First experience as on board? First time on board?
>
> I: Yes.
>
> I21-O12: Is worst experience. This first experience is seasickness from since we are from land and at sea so seasickness from first. And next is climates in different countries. So, seasickness and different climates [Officer, Interview 21]

These challenges are not immediately threatening, but they have the potential to become so. They threaten the cadets' ability to participate in ongoing work. For example, participants note that the work itself was physically demanding enough to account for basic fitness on board.

> We have no elevators on board so [I have to walk] seven kilometres every day, this is already a little bit of basic exercise. [Officer, Interview 21]

Similarly, the body adjusts and adapts to working in hot and cold conditions. Through repeated performance, the body develops tolerance.

> When I can say that I can, when I can do it like them, when I don't get tired easily, just with them. Because at first, I get tired easily because I'm doing heavy jobs, lifting something, doing something, it's… I get tired easily, unlike them, I can see that they are so powerful… Later, I can, I can show them that I am just like them. [Cadet, Interview 5]

In instances where this endurance is not developed, more targeted body work is engaged in because the cadets desire to become members of the community through participation ('I can show them I am just like them'). For example, a pervasive, on-going threat is fatigue from lack of sleep, which requires enduring body work. Fatigue can have numerous causes on board a ship.

The causes of fatigue on board are noted by the instructor. It can include everything from long working hours, increased workload due to reduced manning, sleep debt, perceived lack of risk or interest, and boredom. Diet can also cause fatigue, including sleepiness after a meal. Lack of fitness and movement, the instructor notes that someone who is fit is at less risk of fatigue. The instructor goes on to note that fatigue is dangerous because it creates tunnel vision, degraded vigilance, diminished personal safety, people take more risks because the brain isn't functioning at 100 per cent. He notes it has the same effect as being under the influence of alcohol. [CCTC Fieldnotes]

Fatigue and tiredness are common on board for newcomers, but also for experienced practitioners. Due to the dangers it poses, fatigue needs to be endured for the body to continue to participate competently. For example, as illustrated in Table IV, cadets avoided complaining about fatigue because they would face 'more than this' 'someday'. On the confined environment of a ship, there is no escape from work. As such, if there is work to be done – if, say, the ship is mooring at a series of ports in quick succession – cadets' sleep becomes compromised. Body work is required to remain 'awake and alert' while dealing with tiredness.

> I: And what would you say was the most challenging or the most difficult aspect of your time at sea?
>
> I5-C3: Hmm. That would be to stay awake and be alert. Because the job at the sea and somehow you don't sleep although we have many rules regarding this resource it is not followed because [of] commercial pressure. [Cadet, Interview 5]

This enduring body work include tactics such as strategic napping or eating a snack before resting so that the body is able to get proper rest. During interviews, multiple participants note that grabbing a snack before going to sleep was important, as illustrated below.

> At 17:00 I eat. After eating I sit a little bit in the mess, sitting and then after 30 minutes I go back and rest. Same procedures every day the same. But at midnight I start again. I wake up 23:30, for 30 minutes I take coffee and then I start my work again on the bridge. [Officer, Interview 12]

However, body work is not simply an individual effort; it is enabled and constrained by organizational arrangements, as noted in the example below:

> Food before sleep is recommended, but some cadets had no access to food after their shifts, while others had access to a pantry. [SSTC Fieldnotes]

As this example illustrates, sleep quality is improved if there is access to a food pantry for cadets and officers whose shift times end after the galley has closed. Furthermore,

given the multiple triggers for fatigue, there is no guarantee that body work will be successful. As seafarers move up in rank, the increased responsibilities and workload may further reduce sleep quality. For example, during the field work on MV Sea-Line, the first author was staying in a cabin designated for the third officer. As with all officer cabins, the room had a panel of alarms that would go off, even at night, if there was an issue on the bridge or engine room. These alarms disrupt sleep patterns. Somebody who is not part of the community of practice can ignore the alarms but an operational seafarer must attend to them.

As the body develops a tolerance for repeated on-going challenges, threat can become felt as attenuated. As one cadet notes, the work becomes easier and more comfortable the more they participate in the tasks.

But after going with them [more experienced crew], doing the lashings, I learned what they are doing and look at them, follow what they're doing, and everything is easier from what I am doing before. [Cadet, Interview 5]

There is a degree to which aligning the body to situational and attenuating threat is conducive to competent participation. The body no longer 'shuts down', even when more challenging threats are faced. Through repetition, task performance develops a history in which the cadets have successfully handled certain challenging situations. For example, the cadet who reported not being able to let go of the rope in the mooring operation in the example above, went on to tell us:

> 'When I did the mooring, I was improving and improving until Bosun couldn't say nothing anymore. It was like basic instinct what to do during the mooring operation'. [Cadet, Interview 3]

Yet, attenuated threat can also be problematic. This was noted by cadets as commonly exhibited through feelings of 'boredom', 'laziness', and 'complacency'.

'Because it's four hours where you're just standing especially when you're steering so that four hours feels like a whole day on the bridge'. [Cadet, Interview 6]

Boredom can mean that a potential or emerging threat is missed. This is especially likely at open sea, where there is not much sensory stimulation and everything looks the same. This is exacerbated, as one interviewee notes, by the isolated and confined nature of life on board the ship.

'But boredom strikes every time,… For example, you want to read a book. After five pages you get bored. Or probably doing so many things… you get bored, you get bored… It was boring in a way because in eight months you will be together with 14 people, same people, same food, same, all the same everything'. [Officer, Interview 13 – reference to cadetship]

Boredom in such a risky context requires enduring body work because it is a signal that the body is, once again, not adequately prepared to participate should the need arise. As such, the emotion of being bored acts as a trigger for potential body work. As bodies adjust, their sensitivity to the emerging situation around them alters; certain sounds and sights become habituated and unseen. This backgrounds noises and visual cues from focal awareness. For example, in the interview extract below, a Captain notes how the movement of containers was spotted by a 'vigilant' junior third officer and not by himself because he was not paying attention.

So, at that time 10 o'clock, so you see young people they are so very vigilant around… and the junior third mate said, 'Captain, I saw some containers moving, so this is about 100 metres, the crates'. 'Yeah, really?'. And then when I try to observe also, I see that the fibreglass container was really moving. [Officer, Interview 19]

Some of this habituation is normal and it is one of the reasons there are always at least two people on the navigation bridge in most situations. However, such habituation can also skew the senses; as one of the instructors at CCTC noted, 'we only see what we want or expect to see'. For example, if an alarm goes off habitually, it may become ignored. As one of the trainers noted, a cause of human error is when an 'Alarm goes off and nothing happens over and over again until one time the alarm actually signals something'. [CCTC Field Notes]

In a risky context the attenuated threat experience can become a threat in itself. This was noted in a training session for officers, where the instructor was explaining why the feeling of boredom on the ship can be a threat.

If you feel bored or tired, you may not recognize the problem or deliberately overlook it. It can be even more dangerous to be in −3 (inattentive at a critical phase) than in +3 (alarmed). Your actions are affected by how you feel about the state of the ship. Capt. R… asks 'how can you maintain the state of the ship to its acceptable limits?'. Capt. R says, 'make yourself busy, if you're bored, if you're in −1, (potential danger)'. [CCTC Fieldnotes]

The numbers in the example refer to the state of the ship (i.e., the risk status on board): +3 = alarmed, +2 = concerned, +1 = optimum, −1 = bored, −2 = inattentive, −3 = inattentive at a critical phase. The state of the ship thus refers to the ranked threat experience and to the perception of risk on board for the individual. As noted in the training centre illustrations, boredom and complacency have to be worked on such that seafarer body and ship always operate as though there is a degree of threat present or possible. One officer notes:

> When the sea is calm, that's no problem, when it is calm on day two and day three, then I tell them, the sea is too calm, bad weather is coming. [Officer, Interview 20]

Enduring body work in this case involves readjusting the sensory balance to an emerging situational threat, such as 'bad weather is going to come', in order to enable the body to act with requisite competence. This is done through re-engaging the senses and reorienting them to the situation at hand and the situation to come. Hence, cadets are encouraged to find something to do, to 'make yourself busy', 'to observe', to 'to check the equipment' so that the feeling of boredom goes away and the senses are engaged for the potential danger which might warrant 'calling the captain'. The body works to re-align with the emerging situation, enabling situational awareness, as the following example shows:

> Capt. C brings up situational awareness, as the most important and most elusive aspect of being at sea. It involves having a sense of that is happening around you, not only where you are but also where you are supposed to be and being watchful for threat. Situational awareness is developed through connecting the present with your

past experience. Yet, relying too much on the past can make you complacent due to over familiarity. If situational awareness is lost, Capt. C notes, tools and tricks can be employed, e.g., visual cues, such as the photos, auditory cues such as the dead man alarm. Capt. C. gives the example of Antari, a ship that ran aground in 2008 because the chief officer was keeping watch alone for six hours and the dead man alarm had been switched off. If you sense a loss of situational awareness, Capt. C tells them, 'Fall back mentally and physically to a point you know is real, step back, communicate and recover the big picture'. [Vignette]

As this vignette shows, there are material aids that provide sensory cues, such as the dead man alarm[2] on the bridge, which alert practitioners to complacency. Talking to the other members of the bridge team, helping officers complete checks for the logbook, or completing training books also re-engage the senses and gear the body back into action.

And how to deal with it is to have a perception that there are so many things to do, there are so many things to learn so what I manage is that I wrote everything that I need to learn, and it is so many, and I wasn't able to complete that until I finished my contract. [Officer Interview 13 – reference to cadetship]

Readjusting the body's sensory balance shifts the body from a complacent orientation towards past events and 'old' situations – that is, the feeling that nothing will go wrong because it has not yet – and realigns the body to the present situation. In essence, it involves seeking ongoing 'newness', rather than being tied to historic situations.

DISCUSSION

Our study addressed a particular aspect of embodied learning: how newcomers develop the bodily capacity to participate in practices in an extreme context. We found that when newcomers are faced with different felt experiences of threat, they engage in different kinds of body work (priming, battling, and enduring) which adjust their bodies to cope better with challenging situations and develop their capacity to participate. These aspects of body work are summarized in Table VI.

Literature on body work has shown that organizations, especially those engaged in physically intense activities, require actors to engage in purposeful efforts aimed at re-shaping or readjusting the body (Lawrence et al., 2023). We suggest that these purposeful efforts are heterogeneous; they are informed by the body's past, oriented to the body's future, and require engaging in the present moment (Emirbayer and Mische, 1998). Thus, newcomers learn through body work to anticipate their present bodily inadequacies by projecting to a future situation (priming), or to subjugate their bodily responses to an immediate threat such as shouting and pain (battling) to enable future participation. In addition, they realign and adjust their bodies to ongoing demands (enduring) by breaking their habituated orientation to the past and re-adjusting their 'body memory' (Ball, 2005) in order to enable ongoing bodily situational awareness which is oriented towards present participation. Looking more closely at the 'work' involved in priming, battling, and enduring body work, our study details the micro-processes that enable newcomers to develop specific capacities to participate.

Table VI. Body work for developing capacity to participate

Body work	*Temporal Orientation*	*Threat Experience*	*Microprocess/outcome*
Priming	Future imagined in the present	Imagined	Narrative mediation of possible body work Developing awareness of bodily preparation Sensitizing to body inadequacies **Anticipating bodily efforts**
Battling	Present with immediate future	Immediate	Overriding instinctive bodily responses Engaging with sensory overloads Commanding the body to produce required response **Subjugating body responses**
Enduring	Past shaping the present	Attenuated	Developing tolerance for ongoing challenges to the body Repeated performance alters sensitivity to emerging situation Adjusting sensory balance in situational threat **(Re)aligning body to situational demands**

All practices are temporally orientated (Emirbayer and Mische, 1998). However, newcomers in particular have limited past experiences when they begin to engage with a practice community. Nonetheless, through priming, newcomers can imagine bodily engagement with threats that they may encounter; they can thus learn to anticipate threats and their reactions to them. This enables the body to develop defensive mechanisms in advance. While these threats may be imagined, they are based on reliable accounts from experienced others, such that the learner's body becomes immersed in an anticipated future, sensitizing reflexes, awareness of sensations, and readiness. This learning foregrounds the body's adequacy for completing a practice. Although the threats are imagined, they are nonetheless felt. Lawrence et al. (2023) note that body work is triggered through a sense of bodily inadequacy. In priming, the body engages in an open-ended and recursive process of anticipating (through simulating or in-dwelling). Alternative courses of action can be tentatively enacted in the face of anticipated situations, probing one's bodily ability to respond and act.

Battling, in contrast, focuses on subjugating bodily responses, bringing the body under control in the face of imminent threat. Our study of an extreme context makes this aspect of body work particularly visible. In other work, Michel (2011) speaks of the subjugation of the body as a form of organizational control that investment bankers succumbed to. Similarly, the physical training of rugby players or boxers (Coupland, 2015; Hopkinson, 2015) focuses on controlling bodily performance through learning specific bodily skills (for example, punching in a particular way). To participate, the newcomer body often has to suffer but still go on (De Rond et al., 2019; Wacquant, 2004). Previous accounts of extreme context work note that in situations of crisis, when a threat is felt to be immediate, the body 'takes over' (De Rond et al., 2019; Schakel et al., 2016). This is the pre-reflexive 'grasping' of the body in relation to the situation (Merleau-Ponty, 1962) linked to a bodily knowing of

its capacity to act (Merleau-Ponty, 1962; Weick, 1988). In our case, without significant experience of the situation, the body may 'take over' but in a way that constrains rather than enables participation (for example, freezing or turning away). Battling body work subjugates these bodily responses, such that the body is able to participate in situations that are felt to be beyond its ability to cope. Battling body work entails bracketing out wider situational threats (such as the mooring operation) to focus on bodily manoeuvring for the task at hand (holding the rope when bleeding), which requires the overriding of instinctive responses (to let go). Here 'old timers' assist by monitoring the wider situation on behalf of the newcomer so that the latter can decrease the complexity required of them and battle solely with getting their body to execute. Rather than focusing on the judgement and deliberation typical of emerging actions (Emirbayer and Mische, 1998), the learner seeks to command their body to execute desired responses. As such, battling involves controlling natural bodily responses so that more can be asked 'from the body' (De Rond et al., 2019, p. 10).

Conversely, enduring is aimed at aligning and realigning the body to the on-going situation. Previous work on bodily training (Müller, 2018; Spencer, 2009) has focused on the role that repetitive drills play in 'forging' (Bouty and Godé, 2022) a particular body, as habits become embodied (Spencer, 2009, p. 125). In our case, participation in practices, as well as more strategic body work (such as napping), allowed newcomers to develop a longer-term tolerance for on-going challenges, which enabled them to participate habitually in the routine, day-to-day practices. Repeat performances in practices reshape the body and alter sensitivity to emerging situations. De Rond and Lok (2016) note that the medics they studied in a war zone were bored during periods of inactivity. Boredom is an emotion experienced even in extreme context settings, especially, we would argue, in risky contexts where there is ongoing (but relatively infrequently realized) potential for catastrophe (Hällgren et al., 2018). Boredom and complacency are part of the changing threat experience that develops through repeated performances. Countering complacency requires not just intellectual stimulation, but also bodily reengagement with the emerging situation – a bodily competency in its own right. Through enduring body work, we suggest that the experience of threat is re-awakened by re-engaging the senses, such that the body is able to orient more intuitively to focus on ever-changing situational demands.

Theoretical Contributions

Drawing these insights together, our model (see Figure 1) depicts newcomer embodied learning in an extreme context. The model shows how body work both constitutes and is constituted by the experience of threat, and that it is temporally anchored. Weick (1988) notes that beliefs about capacity can expand sensemaking. Similarly, we find that a situation may be experienced as more or less threatening depending on the bodily capacity to cope (see Hannah et al., 2009). As the notion of the situated curriculum (Gherardi et al., 1998) suggests, newcomers progress their participation from the periphery of practices to the core, during the course of which their roles and responsibilities change. They may encounter challenging situations for which they do not have bodily schema to draw upon, or a situation may unexpectedly develop

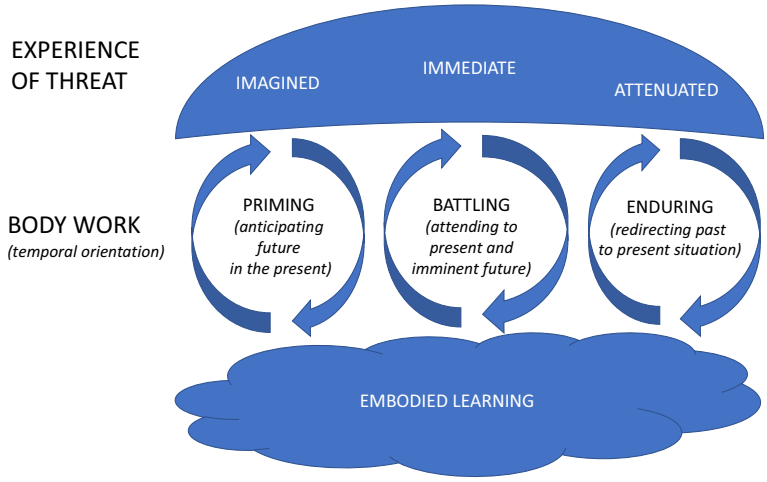

Figure 1. Newcomer embodied learning in an extreme context

for which they are unprepared. Simply put, situations may be un-experienced. Our model reveals the body work that newcomers engage in to develop the capacity to participate. This, in turn, changes their threat experience from, for example, something that their bodies once actively avoided, to something attenuated and actively engaged in.

Developing the bodily capacity to participate entails embodying the threat experience such that it becomes 'sedimented' (de Rond et al., 2019). The experience of threat is, thus, also a form of 'bodily knowing' (Yakhlef, 2010) which is refined through, and for, participation in practice. Embodied learning, as our model shows, entails integrating the recognition and assimilation of threat (Wacquant, 2004) with the anticipation of future needs. In so doing, the inherent uncertainty of the future (Beckert, 2013) narrows into specific realistic and plausible events (such as navigating a ship through a storm, or metal shards landing in one's eye) that motivate present learning. Directing the body towards possible future threats in the present can shape the successful mastering of the practice. Similarly, past performances can alter the body's sensitivity to an emerging situation; a form of body memory that needs attentive readjusting to remain responsive to sudden future risks.

Our model contributes to literature on embodied learning that has emphasized the need to train bodies to acquire the sociotechnical skills for accomplishing practice. Importantly, this literature has shown the interplay between agency and the body through body work (Lawrence et al., 2023; Lawrence and Phillips, 2019). Technical know-how becomes embodied through repetition, tactile development, and sheer effort (Müller, 2018; Spencer, 2009; Wacquant, 2004). Our paper contributes by highlighting the body work entailed in allowing newcomers to develop the capacity to merely participate in a practice, let alone to do so skilfully. We do this by developing understanding of how bodily experiences of threat or danger shape, and are shaped by, embodied learning processes. Threat places situational demands, requiring the body to engage in practice while apprehending danger and physical harm. In this sense, body work is directed at

successful participation in a practice, as well as at protecting and safeguarding the body for on-going participation. Our emphasis is important because it focuses attention on three key dynamics of embodied learning.

First, we show that embodied learning goes beyond task skills (Müller, 2018; Spencer, 2009), and can be directed at developing bodily fitness for participation through improving the bodily capacity to act (Merleau-Ponty, 1962; Weick, 1988). This builds on conversations within embodied learning literature concerning how practices are accomplished through doings (Bouty and Godé, 2022; Willems, 2018). Importantly, these bodily doings may be directed at situations which are imagined and in the future, yet which become incorporated into the present, creating a sense of continuity; thus, the bodily experience is felt in the here and now even if the threat has not yet realized or is derived from the habituated contingencies of the past. The accomplishment of practices such as coordination (or in our case, navigation) rests on the newcomers developing the capacity for purposeful action in the face of threat, such that the body learns to cope with challenges and improves its situational awareness.

Second, by relating threat experiences to body work, our model shows how body work develops the capacity to participate despite the body's instinct to the contrary. Building on Cunliffe and Coupland (2012), learners engage with their bodies, not only as sites to control, but also as entities that need to grow into an anticipated organizational arena. Moreover, learning emerges through immediate engagement with threats within the organizational context. The body learns to anticipate threats, developing awareness of how the unprepared body may succumb to inadequate performance in certain situations and developing defensive mechanisms in advance. Learning also emerges through immediate engagement with threats within the organizational context, as many of the natural bodily responses need to be subjugated to accomplish successful practice. With the body needing to balance the countering of a threat with successful participation in practice, embodied learning entails developing bodily responses that accord with the prevailing norms of the emerging situation. As threats become attenuated, bodily learning can help overcome complacency, which is important because limited awareness increases risk and danger. Similarly, situational cues can reorient bodily instincts to become sensitive to a range of appropriate responses.

Third, we expand insight on the temporal complexity of embodied learning by showing how it is temporally anchored in body work and threat experiences. While embodied learning exists in 'the present', the threat with which the body engages is not always manifest. Through our findings we show that the future, present, and past situations (imagined or experienced) are interlinked in the processes of body work. Drawing on Beckert's (2013) insight into how future expectations shape present action, anticipated threats can build expectations of what will be required of the body to master practice. Expectations do not have to be true but they must be convincing (Beckert, 2013); learning is enabled when multiple senses and stimuli are activated in the present through, for example, graphic images, compelling narratives, and emotional imagining of what *can* happen in the future. Similarly, enduring body work, when threat is attenuated and distanced into the past, entails the ongoing work of aligning the body with situational contingencies that are as yet unrealised. Here the body learns to redirect its felt orientation to

habituated threats towards the present situation, breaking away from past contingencies. We suggest that this ability to redirect the body's temporal orientation to threat is particularly important in extreme contexts, where coping with the unexpectedness of situations is a key element in mastering a practice. Further, Hannah et al. (2009) note the importance of time as both an attenuator and intensifier of the extremity of threat. If a threat is perceived as immediate, it intensifies. In our case, we start to see how the experience of threat is also intensified or attenuated through body work. Threatening situations start to develop a performative history; a situation that has been experienced or performed before (Hannah et al., 2009) changes (i.e., attenuates) the felt experience of the threat.

Finally, we contribute to literature on extreme contexts by developing an embodied learning perspective that accounts for high-risk environments. Extreme context scholars show that threat experiences change with exogenous factors (time, duration, frequency of an extreme event; Hannah et al., 2009). This literature has also focused on how psychological beliefs (Weick, 1988) such as capacity, hope, and resilience attenuate threat. We add to this by highlighting the endogenous experience of threat, as linked to the bodily capacity to cope and participate through body work. This contributes to the emerging conversation within the extreme context literature on embodied sensemaking (de Rond et al., 2019), which encapsulates the notion that 'people make sense not only through cognitive information processing but also through feelings and bodily senses' (Meziani and Cabantous, 2020, p. 2). Importantly, bodily sensations, emotions, and capabilities play a role in intensifying and attenuating a risky situation. Our findings suggest that carefully selected stories and simulations of past realities can engage the body in learning in a narrative structure, which, per Bruner (1986), embeds plights, characters, and consciousness, and helps engagement with proposed solutions as preparatory training. Importantly, this sheds light on how body work interweaves emotions associated with past experiences with those that accompany imagined futures in seeking to understand the present. For example, future threat may be encapsulated in gruesome stories and narratives, with plights for the body to anticipate, or characters whose movements the body needs to emulate or surpass, which engages consciousness by stimulating emotions of shock or fright. In addition, overcoming bodily sensations that are overly oriented to the past and routinised into a monotonous replay of predictable habits can be vital in stimulating a refreshed orientation to possible future threats. In such situations, the body works to adeptly background its emotions – such as boredom – in order to reprioritise its focus on the wider situation and more proactively seek out emerging but unfelt threats. Here, we can note that although there has been a tendency to intellectualize future forms of learning (Hopwood and Paulson, 2012), the bodily responses observed indicate the need to attend to the body even while the mind seems mostly at play.

Future Research Directions

Our study suggests two avenues for future research. First, we have looked at physical threats that constrain the newcomer's ability to physically participate (e.g., fatigue and pain). Yet, within organizations, 'fitness' for participation can mean different things, and threats to participation may manifest differently due to gender, age, disabilities,

and cultural differences. For example, we know that being 'fit enough' is also a gendered issue (Johansson et al., 2017), and that actors of different genders may face different challenges for participation (for example, encountering sexual threats in a male-dominated industry; Sampson and Thomas, 2003). Future research might usefully focus on how these wider aspects of threats constrain (or enable) opportunities for embodied learning. We indicate that threats are apprehended through bodily knowing. Yet, how such knowing might be shaped by issues such as age, gender, and culture is a subject for future research. Exploring how different kinds of actors, facing varied threats, develop coping strategies that enable them to participate, might usefully provide insight into how to enable embodied learning through, for example, organizational processes, tools, and technologies.

Second, while we unpack some of the temporal nuances of body work in our paper, we nevertheless echo Lawrence et al. (2023) in suggesting that there is a need for more longitudinal work on body work over time. For example, Michel's (2011) work on investment bankers showed bodies breaking down after extended participation (over four years). Further exploration of how, over time, experienced practitioners handle changes to participation, and what this does to their bodily capacity to act, would be useful for scholars interested in the continuation of communities of practice. Notions of situated learning emphasize that participation is not a linear process; practitioners may move to different roles and even to different practice domains (for example, a war veteran moving to a civilian police force). This may mean that selective reactivation of certain body memory is performed, which may or may not be appropriate to a new context. Exploring how embodied learning translates across different practice domains over time, and the body work entailed in this, is an area for future research.

Boundary Conditions and Translation

Given our study's newcomer focus, as well as its extreme context setting, there are boundary conditions to our findings. We looked at the male-dominated setting of seafaring. Though we were interested in body work from a functional body perspective, the lack of gender diversity has influenced the development of our model. Moreover, we focused specifically on newcomer learning and participation. There is scope to explore how this translates for experienced practitioners. Finally, although extreme contexts have been noted to provide rich insights into often overlooked phenomena (Hällgren et al., 2018), we are aware that the acuteness of the threat experiences and the body work that we found in our setting may not be readily visible in other organizations. That said, we would argue that the central tenets of our model are translatable to more experienced learners and to other, less extreme, contexts. Think, for example, of the sudden stage fright that even the most seasoned academic practitioners can experience.

Our findings translate particularly well to other extreme contexts (for example, military and emergency settings) where newcomers have to develop the capacity to participate in physically arduous work and must learn to cope with fear and fatigue. Moreover, other less extreme settings offer scope for seeing the priming, battling, and enduring body work that we observed. For example, Michel's (2011) investment bankers were socialized

to work longer hours through controlling and subjugating their bodies. Similarly in non-emergency surgical training, participation includes bodily efforts (Beane, 2019; Sergeeva et al., 2020). Finally, in other settings, threats can take other forms and may also constrain newcomers' ability to participate (for example, making a mistake in a public facing role), which may require newcomers to engage in effortful work to reshape themselves in order to 'go on'.

CONCLUSION

Previous work on embodied learning has focused on task-related bodily doings that enable the accomplishment of practice. In this paper, we suggest that we need to look beyond the task-related know-how and consider how the body becomes capable of participating, especially in newcomer learning where bodies may be incapable of acting in a given situation. Our findings extend key dynamics of embodied learning. We show how body work is directed at overcoming the practitioner's instincts to the extent that they can become sufficiently fit to participate in practices, and then to do so skilfully. Additionally, we show how the body work and the endogenous experience of threat are mutually constituted in the embodied learning process. Furthermore, we highlight the temporal anchoring of the body work necessary for embodied learning. In sum, through our study of an extreme context, we show the effortful accomplishment of participation in practices through body work. In so doing, we extend the present understanding of embodied learning and point to interesting avenues for future work.

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NOTES

[1] Labels are pseudonyms to protect confidentiality.
[2] A dead-man alarm is a safety warning system (usually employed by Maritime Engineers) that is used if a person is working alone. The person working needs to reset the dead-man alarm at specific time intervals (e.g., every 20 minutes), with failure to do so resulting in alarms sounding to inform the other crew members of potential mishap.

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