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"The helm is lost!": Reframing psychological matters in non-routine technologically mediated interaction in a maritime context

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Abstract: The maritime industry is a dangerous and highly technologically saturated sector. Unfortunately, advancement in automation and technology have not minimised human error as intended. Interaction between humans and technology in the industry is also overtly pre-scripted. The main reason for this is to reduce human error by ensuring predictability in interaction. Ultimately, investigations of non-routine interaction are often based on a hindsight view of what went wrong in a given situation. This article analyses a collection of non-routine interactions that derive from a larger data corpus, using Discursive Psychology and Conversation Analysis. It argues that such a study can capture what is missing from some investigations, namely, what makes sense for crews in the context of a given non-routine situation. Despite the constraints and the challenges of technological complexity, this article argues that reframing psychological matters in non-routine technologically mediated interaction can be a new way of showing how such matters are dynamic, visible and manageable. This can inform the general debate of how to minimise human error, and more specifically, provide insight into the increasing inclusion of technology and as a consequence, the equally increasing amount of technologically mediated interaction that we will see in the future.

Keywords: humans, technology, maritime human factors, emotion displays, psychology, conversation analysis, mediated interaction

1 Introduction

The maritime industry is known to be a sector with a high rate of fatal injuries and a high level of task complexity. Paradoxically, advancement in automation and technology have greatly enhanced safety, but have also created new challenges for interaction between humans and technology. Some researchers (Cook and

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Woods 1994; Lutzhoft and Dekker 2002) even argue that technology and automation has created new human weaknesses and worsened the weaknesses that already existed. Interaction between humans and technology in the industry is also overtly pre-scripted. The main reason for this is to reduce human error by ensuring predictability in interaction and avoid negative influences that arise in the case of psychological impact of the non-routine situation. Psychological matters are generally deemed irrational and often seen as the cause of human error. They are not appropriate in routine situations and they are certainly not welcome in non-routine situations. Safety training programs also have a focus on the exclusion of psychological matters under the assumption that the task at hand cannot be attended to if such matters are present during shipboard operations. Ultimately, the investigations that take place in order to analyse what causes human error are often based on a hindsight view of what went on and what went wrong in a given situation (Hetherington et al., 2006).

Despite the constraints of pre-scripted interaction and the challenges of technological and task complexity, this article argues that reframing psychological matters in non-routine technologically mediated interaction can be a new way of showing how such matters are present, dynamic and yet manageable. This can inform the general debate on human error and how psychological matters can be viewed as a natural part of interaction between humans and technology, and more specifically, provide insight into the increasing inclusion of technology and the current debate regarding maritime autonomous surface ships (International Maritime Organisation (IMO) 2018). This technological advancement in the industry will only contribute to the level of technological saturation that humans will be interacting with, and the amount of technologically mediated interaction will naturally increase.

Human error has been a focus area within the maritime industry in order to improve safety critical operations, and with good reason. The International Maritime Organization (O'Neil 1994; International Maritime Organisation (IMO) 2002) attributed 75% of accidents of ships worldwide to human and organizational error. Studies of such errors in the maritime industry tend to draw on cognitive psychology. Furthermore, emotion displays are seen as precisely the errors that can cause the accidents (Pyne and Koester 2005). However, retrospective investigations do not always capture the reasons for emotional displays or human errors, which is why it is necessary to look to other ways of understanding what it is that takes place.

This article seeks to uncover how psychological matters are made relevant in non-routine technologically mediated interaction and tease out the sense making that takes place in situ as maritime professionals orient towards such matters in a technologically saturated context.

The literature review presents studies that have focused on technologically mediated interaction in safety critical settings and research on how psychological matters such as emotion displays have been studied. The review will then culminate in the aggregation of these two research perspectives and draw on a more micro-analytical analysis of technologically mediated interaction than is the usual case, in order to reframe psychological matters in a maritime setting.

2 Literature review

The increase in automation and technological complexity in the maritime industry has greatly enhanced safety but has created new challenges for crew interaction or what Dekker (2006: 111) coins as "loss of effective crew resource management". Research in Crew Resource Management (CRM) is substantial within the aviation sector, which has already identified that communication and language are key issues for high performance and overall success of flight crews, as well as a leading cause of error when communication breaks down (Cushing 1994). Bailey et al. (2006) have also found this to be the case in their study of crew interaction in ship operations.

CRM is a term that harnesses a focus on ways in which crew members onboard ships, or teams comprising ship and shore personnel can collaborate in eliminating human error by enhancing situational awareness, decision-making, communication and ways in which crew members can share workloads (Helmreich and Foushee 1993). Building on Roberts's (1964) idea of socially distributed cognition, Hutchins has studied how task coordination between crew members in both cockpit and navigational teams is coordinated, and how cognition can be re-hinged to interaction with the world by understanding it as distributed across a social group, involving the coordination between internal and external structures (Hollan et al. 2000; Hutchins 1995, Hutchins 1996). This enables us to understand cognition as situated in actions, and which is influenced by these actions. Crew performance can then be analyzed by focusing on the situated elements and the communication involved with these elements (Hutchins 1991: 284; Sampson and Zhao, 2003).

Crew members use communication to create a shared sense of understanding. It enables them to verify, clarify and coordinate all tasks (Hutchins et al., 1990; Froholdt 2015). Bøgh Andersen (2000) has examined what takes place in crew communication through analyzing human error. He describes how maritime communication is controlled by events that take place beyond the control of the crew due to the fact that they are pre-scripted. Hutchins (1995) analyzed pre-

scripted interaction on board a US navy ship and found that pre-scripted interaction is not followed or used in operations. It functions more as a starting point. Other researchers have found these pre-scripts to function more as a guide for crew members (The MARCOM project 1999; Pritchard and Kalogjera 2000; Woods and Hollnagel 2005; Froholdt 2010a, Froholdt 2012a, Froholdt 2015). However, although technologically mediated interaction includes pre-scripts as a guide as a feature, the interaction can include contextually relevant actions that are different from the intended principles of the pre-script (Froholdt 2010a, Froholdt 2015).

Returning to psychological matters such as emotion displays, studies have shown how emotion displays can be used interactionally as a way of doing social accountability (Hochschild 1975; Hochshild 1983; Goodwin and Goodwin 1987; Coulter 1986; Sanders 1985; Buttny 1993a, Buttny 1993b, Buttny 2007; Nikander 2007; Edwards 1997, Edwards 1999, Edwards 2007). Managing emotion displays is just one aspect of how accountability in safety critical operations and complex task-relevant information is sequentially accomplished (Whalen and Zimmerman 1987; Potter and Hepburn 2003; Hepburn 2004; Hutchins 1995, Hutchins 1996; Froholdt 2012a, Froholdt 2015, Froholdt 2017). This also happens despite apparent constraints in the technologically mediated interaction (Hutchins 1995, Hutchins 1996; Froholdt 2008, Froholdt 2012a, Froholdt 2015; Nevile 2004; Arminen 2005).

As I will show, studies that reframe the way that psychological matters have been traditionally understood, can provide an understanding in more interactional terms (Potter 1998, Potter 2005; Potter and Wetherell 1987; Edwards 2005). Cognitive processes can then be reframed and understood as distributed across the members of a group as they jointly accomplish shared understanding (Hutchins 1995; Hollan et al. 2000).

2.1 Emotion displays as a means of establishing accountability

Emotion displays in interaction have been investigated in many fields, although predominantly in psychology (Perakyla and Sorjonen 2012). An increasing amount of research is being conducted in healthcare and aviation settings with a focus on how emotion is displayed and responded to in communication and how emotion displays shape the outcome of interactions (Froholdt 2012, Froholdt 2013). Emotion as an interactional resource has been taken up in Hochschild's (1983) classic study of flight attendants and how their emotion displays must be presented in a manner that aligns with a moral social order for displaying emotion. However, studies of emotion displays (Firth and Kitzinger

1998) in emergency calls (Whalen and Zimmerman 1987) and helpline calls (Potter and Hepburn 2003; Hepburn 2004) have further argued that emotion displays can be a participants' resource for accomplishing accountability.

Emotion displays are certainly rich in detail and are highly useful in interaction when managing accountability (Edwards 1999). Buttny (2007) has examined how emotion display is used in interaction and argues that it is an important part of social accountability. These studies challenge the view that an emotion display is an inner state that can contaminate rational decision making and a mere *'inner mental state'* that directs interaction or directly reflects an inner experience (Wittgenstein 1958/1953: 244–6, 448–9).

3 Methods

Language and social interaction is an umbrella term for a multiple of disciplines, such as Anthropology, Semiotics, Linguistics, Sociology and Social Psychology. These disciplines include a wide range of approaches that often draw on micro-analytical methods, such as Sociolinguistics, Pragmatics, Conversation Analysis, Ethnomethodology, and Discourse Analysis (Froholdt 2012a). The present study focuses on psychological matters such as emotion displays that maritime professionals orient to in different non-routine situations. It makes use of a micro-analytical methodology comprising Discursive Psychology (DP) and Conversation Analysis (CA) in order to tease out how context and actions mutually constitute each other and how emotion displays are interpretations of meaning in context.

The article also draws on Wittgenstein's (1958) later philosophy where he argues that psychological topics are visible in interaction and can be understood as reactions to actions. This means that actions can be context shaped and context shaping. As Wittgenstein (1958: 132) inferred, it is important to *"give prominence to distinctions which our ordinary forms of language easily made us overlook"*. Wittgenstein advocates here for a more practical view of everyday life by studying the ordinary and to look for knowledge that is implicit and available in human interaction.

As Dekker points out in relation to investigating interaction in safety critical situations, it is imperative that the investigation focuses on "why peoples' assessments and following actions made sense at the time, given the circumstances that surrounded them" (Dekker 2002: 65). Dekker argues for the importance of bringing data back to its context and to *"reconstruct the unfolding mind set of the people under investigation"* (Dekker 2001: 39). Although such a study is relatively new in maritime research, such studies are more common in other

fields such as aviation and medicine (Goodwin and Goodwin 1992; Heath and Luff 1992, Heath and Luff 1996, Heath and Luff 2000; Roberts and Sarangi 1999; Nevile 2004; Nevile and Walker 2005; Froholdt 2012a).

The data analyzed in this article amounts to five excerpts in all and are transcripts of audio recordings that have been voluntarily given to the researcher by shipping companies that wish to remain anonymous. The first two excerpts derive from a six minutes long mobile telephone call between the captain of a ship and the technical superintendent of the ship's shipping company. The remaining excerpts derive from recordings of interaction that was technologically mediated on a Very High Frequency radio.[1]

The excerpts are all part of a larger data corpus, consisting of 124 recordings of naturally occurring conversations in English and ethnographic observations of routine and non-routine situations in the Danish Maritime Industry that took place between 2008–2009. The excerpts analyzed here are a collection of non-routine situations and emotion displays.

4 Analysis

4.1 The Helm is lost

The following two excerpts derive from the same context and concern the emotion displays that surface. The excerpts involve two participants, Cap, who is the Captain, and Shore, who is the company's technical superintendent who manages the ship's maintenance and speaks from the company's land-based office. The Captain placed the call and is speaking from the bridge of a ship in distress that has lost all steering. The shipping company viewed Cap's absent and vague response to Shore's technical assessment (Excerpt 2, line 60) as problematic, and the levels of high volume used by Cap, that are evident in excerpts 1 and 2, were evaluated by the company to be extremely inappropriate in a non-routine situation and conducive to a context for human error (Nevile 2004). Based on these evaluations, the Cap was requested to undergo a psychological evaluation.

1 The technology of a VHF radio is a semi-duplex channel system that does not permit two speakers to talk at the same time, such as conventional landline systems. The speaker must press a "push-to-talk-button" in order to speak and remember to release the button again when the turn at talk is completed.

This analysis teases out other possible explanations for Cap's actions. It can be said that the situation ended well – the ship was towed to a shipyard and repaired, and the crew was not harmed in any way. The transcription conventions can be found in the Appendix.

(1)

43	*Shore:	yeah (0.5) when you told me the story from
44		earlier (0.5) you told me that errr (.) that (.) that
45		when you put the (.) err rudder **harder port** after ten
46		minutes it went to straight.
47	*Cap:	.h ↑SIR yeah this is err before but now (.) ↓but
48		↓now (.) I am try (.) pull it to starboard but also
49		<u>not answer</u>
50	*Shore:	okay it's not answer
51	*Cap:	!NO ANSWER NO ERR (.) NO RESULT NO RESULT
52		IT'S CERTLY no result
53	*Shore:	o:ka:y (.) and err even if you put err the the
54		the: you could err (its) you put it to port you have
55		no result
56		(1.0)
57	*Cap:	.hhh (h) hno
58	*Shore:	o:kay .hh I I (.) err that is meaning that err that
59		the pumps err are not running nothing ↑is going on?
60	*Cap:	.hhh the !PUMPS IS RUNNING (.) BUT ITS HELM
61		(.)↓ it is ↑NOT ↓running (.)↑ I THINK ↓my opinion
62		(.) the se ↑THE HELM IS LOST
63	*Shore:	o:kay you think the helm is lost okay .hh[h]
64	*Cap:	[!YES SIR]
65	*Shore:	but why do you think it's going across all the
66		time then
67		(1.5)
68	*Cap:	°I dont know°

Lines 43 to 48 show several perturbations, and the intonation varies in the flow of the turn as Cap seeks to draw in elements of earlier events and arriving at the point that the situation has changed (Hutchins 1995; Hollan et al. 2000). This turn shows the uniqueness of distributed cognition and how Cap in line 49 and Shore in line 50 show their shared understanding which is part of this concept. Cap then begins his turn "NO ANSWER" (line 48) which is uttered with a high volume, although, again, portraying his shared understanding of the task at hand (Hutchins 1995). Why does Cap make it relevant to insert a high volume

utterance that stands in contrast to Shore's turn in line 50? It is the state of the ship at the time of the call, which is different from before. Shore's assessment of the situation, "when you told me from earlier" (lines 43–44), is not aligned with the current situation, "this is before but now" (line 47). Cap's emotion display is then relevant to insert as an amplified response to clearly signal to Shore that there is a change in the ship's manoeuvrability, making the display "relevant to some contextual antecedent" (Sanders 1985: 214), and that the situation is possibly more urgent.

After this turn there is trouble in the flow of the turn showed by perturbations (err) and repetitions (the the the, lines 53–54), and Shore asks: "you put it to port you have no result" (lines 54–55). Again, the assessment of the ship's manoeuvrability to port side is relevant for Shore. This could be relevant for Shore to ask, especially if he did not hear Cap's "also" in line 48, thereby assuming that the "no answer" and the "no result" referred only to the starboard manoeuvre.

This is followed by a 1.0 second pause and Cap then takes the floor and inserts some levels of high volume, stating that the pumps are working but that it is the "helm" that is not functioning. He refers here to the helm that is "not running" (line 60) and finally reformulates that the helm "is lost" (line 62). Cap is now clearly asserting to Shore that the helm is lost. This is an extreme case formulation (Pommerantz 1986; Edwards 2007) of the functioning of the helm, as the helm is not lost as in the physical disappearance of the helm as an object from the ship; however, it is the actual functioning of the helm, which has been lost. Cap may have inserted this formulation to defend against Shore countering (Pommerantz 1986). Also notable is the change in footing (Goffman 1981), from Cap presenting the state of the ship, to now modalizing, that the state of the ship is what he thinks it is, and that it is his opinion, both as markers of modalization (Fairclough 2003). The response given by Shore does not imply that the higher levels of volume in Cap's turns are displays of anger. They could be frustration, or distress, or eagerness to assist in solving the situation.

Shore repeats Cap's opinion of the situation and ends his turn, to which Cap emphatically responds with a "yes sir". Shore replies swiftly with a new question. After a pause of 1.5 seconds, Cap answers in a significantly low voice (line 68) in contrast to his previous emphatic responses (lines 47, 51–52, 60–62, 64), that he cannot explain the ship's manoeuvrability. Cap does not offer an alternative technical explanation, nor does he retract his claim that the rudder is not functioning.

The next excerpt attends to emotion displays and emotion categories and discusses how Cap's emotion displays as a sudden reaction to Shore's repetitive questioning, are defused by Shore's management of Cap's emotion displays.

(2)

89	*Shore:	Have you tried to err **go harder port** all the time
90	*Cap:	.hhh !SIR I EXPLAIN YOU AGAIN (.) (LEAVE ALSO)
91		(.) NOT ANSWER THE HELM (.) NO ANSWER THE HELM
92	*Shore:	no [no
93	*Cap:	[!EVERYTIME I TRY (.) PULL IT STARBOARD
94		(.) PULL IT AT PORT (.) IN THE MIDDLE POSITION
95		(.) BUT IS ALSO (.) NOT LISTEN
96		(1.0)
97	*Shore:	(hallo hallo) you just just err let's let us
98		caume calm down captain cause err I simply
99		need to cause I'm in contact with .hh I'm in contact
100		with the tugboat and we have not a dangerous situation
101		here s:o I completely [agree]
102	*Cap:	[˚yes ˚ (.) sir]
103	*Shore:	.hh let's just take it easy for two minutes and we find a
104		discussion and then we we agree what to do
105	*Cap:	yes sir

This excerpt begins again with another question about the ship's manoeuvrability to port. In line 90, Cap utters the word "SIR", orienting to Shore's role, and the whole utterance after "SIR" is in high volume. This aspect together with the high volume in his *emotion display* conveys a high level of genuineness (Edwards 1997, Edwards 1999; Hepburn 2004).

There is also high volume in his response, "I EXPLAIN YOU AGAIN" (line 90) and Cap inserts the account that this information already has been provided before. Cap's turn is responded to as an anger display by Shore, when he, after a notable pause, begins his response in line 97 to Cap with "(hallo hallo) you just just". Buttny (1993a) notes that displays of anger can be used to mark a critical stance of another's actions, and the display of affect frames the context as problematic, implicating that Shore can be responsible for provoking the display (Buttny 2007: 346). The trajectory implies trouble with Cap's turn and signals that Shore does not find Cap's response as appropriate within the institutional constraints of the talk.

Shore's response shows that the footing in the turn changes (Goffman 1981) and Shore turns his orientation from managing the technical problem of the ship to managing the emotional display that Cap inserts. Shore uses *emotion categories* together with plural pronouns such as "let us caume calm down" (line 97–98), "let's just take it easy"(line 103), "we find a discussion" (lines 103–104), "then we agree what to do" (line 104) and depicts, in doing so, precisely what a context for

rational sense making is. Shore defuses Cap's emotional display by using the emotion categories and overtly contributes to an alignment (Mandelbaum 2003) with the utterances "(let us) calm down" and "(we find) a discussion". Shore shows in this manner that he sees the necessity of accomplishing the current task as a shared task (Hutchins 1995).

These actions are recognized by Cap as a contribution to the tasks of the team and the social organisation of the team and Cap's recognition work is seen in line 102, where the intonation is no longer in high volume. This is also what Bailey et al. (2006) found in their study of bridge teamwork, that recognition of the contribution of another member of a team was a crucial feature of effective teamwork. Therefore, the emotion displays in lines 93–95 make Shore's emotion categories relevant (lines 97–101), which, in turn, projects an alternative trajectory in the interaction (lines 101–105), namely a rational and collaborative sharing of the task at hand and Cap's behaviour changes (lines 102, 105).

Shore shows attempts to re-construct the social organisation of the team by the utterances "we have not a dangerous situation here" (line 100) and "let's just take it easy for two minutes" (line 103) and by involving the tugboat (line 100). With these utterances, Shore displays his knowledge of how to promote team work which is in line with the reality constraints of the situation. This is recognized in Cap's receipt in line 105, orienting to Shore's role with, "° °yes sir", which is uttered in a notably lower voice.

The shipping company had concluded that Cap was dispositionally uncalmed due to actions during the non-routine situation. However, Cap's emotion displays do not inform that he is an individual with an angry or uncalmed disposition (Edwards 1997). Firstly, Cap's display of emotion that could have been understood as anger is a response to Shore's questioning, and it is not a display we see throughout the whole call. Secondly, the so-called anger display is sequentially organised. Thirdly, Cap's display changes trajectory after Shore contributes with emotion categories (lines 97–101) and Cap responds to this by beginning to manage his own recognition work (lines 102, 105). What can be said is that Cap's emotion displays are therefore periodic, flexible and serve to portray his accountability in the situation (Buttny 2007; Whalen and Zimmerman 1998; Potter and Hepburn 2003).

It is widely recognised in the maritime industry that emotion is irrational and should be avoided in non-routine situations, as it could result in human error, although emotion displays can also be exactly what defines a non-routine situation. The above two extracts show that emotion displays are present in a maritime non-routine conversation and they are flexible, interactionally consequential (Buttny 1993a) reactions to actions, used and defused

in the co- and re-construction of the social organization and coordination of the team and the tasks at hand (Hutchins 1995).

4.2 What do you intend to do?

The following three excepts involve a ship, Sea Empress, a Vessel Traffic Service (VTS) person and another ship called Sea Serpent. The context is a VTS area that is monitored by a VTS person. We enter the communication where the VTS person has placed a call to Sea Empress. In this excerpt we see how the VTS person displays his institutional task to monitor vessel movement in the VTS area in that the VTS person has monitored Sea Empress's movements and can see that the ship will go aground if it continues its current course in 2,5 nautical miles (28.76 miles or 46.28 kms).

(3)

3	*VTS:	err Sea Empress err Land Based traffic (.) err just
4		for your information if you continue that course
5		there is shallow water ahead of you (.)
6		errr in about two and a half mile .h so you have
7		to go more close to the buoy
8	Emp:	will do

In line 4, VTS inserts a preface, "just for your information", thereby projecting precisely what comes next – information concerning weather and sailing conditions. The design of the preface "just for your information" could seem inappropriate to the sensitivity of a situation where a ship is sailing towards shallow waters (line 5). But it allows VTS to display that he is in fact producing a VTS operator activity, which includes monitoring a ship's choice of course in the VTS area and providing navigational information. (This rule has changed since this data was recorded.) By inferring that a VTS person is only passing on information it enables VTS to disclaim responsibility for whether the ship acts on the advice given.

The only visible and hearable change in the talk is an inbreath in line 5 and a perturbation in lines 6–7, and there are no emotion displays remotely similar to those from the previous two excerpts. The utterance "if you continue that course" allocates rights of sailing to the ship and choosing its course to the officer to the Sea Empress, and in doing so, VTS displays his right to not take responsibility. The Sea Empress responds to VTS with a "will do" as to answer that the ship officer would steer closer to the buoy in question. However, despite

this reply, VTS had to place a second call to the ship, as Sea Empress did not act on the information given by VTS.

(4)

106	*VTS:	Sea Empress er Vessel traffic Centre (.) errr
107		(.) just for your information
108		I would like you to come more to port and
109		steer at least er three two zero degrees (.)
110		three two zero degrees
111	*Cre:	okay will do that (.) °three two zero°

In this excerpt there is a preliminary, "just for your information", which is similar to the preliminary that was used in excerpt 3. There are inbreaths and perturbations that suggest trouble in the talk. However, now the account from VTS has changed in footing (Goffman 1981) from "if you continue that course" in the previous excerpt to a request that is designed as "I would like" the ship to steer "at least three two zero degrees". This design of the turn shows that the VTS operator is making a clear request to change to a specific course, which is not in line with the constraints of the interaction; however, the request is softened by "I would like". VTS has previously allocated rights of sailing to the ship and choosing its course to the Sea Empress in the previous excerpt. He has also provided navigational information relevant for the course that the ship has chosen to take – that is, if the ship chooses to continue the course, the ship will sail aground. VTS has now more clearly warned Sea Empress, although there are no clear emotion displays in this non-routine situation.

A little after this call ended, Sea Empress was called up on the VHF radio by another ship, Sea Serpent. As it turned out, Sea Empress had begun to change her course after the second call (excerpt 4) from VTS, but the ship had been manoeuvred so dramatically and with such speed that she was suddenly on a collision course with another ship, Sea Serpent.

In the excerpt below, Sea Serpent displays trouble with the choice of course that Sea Empress has chosen. But there is a distinct difference in the way Sea Serpent designs her complaint in comparison to the VTS person in the two previous excerpts. Sea Serpent is much more direct.

(5)

1	*Serp:	#err Sea Empress (.) call sign is (Sea Serpent) #
2	*Emp:	#yes (1.0) go ahead ( ) please #
3	*Serp:	#er what do you (.) intend to ↑do be ↓cause we

4	are ↑closer: a:nd ↑closer: and you should
5	(.) slow ↓down to .h err not to ( )#
6 Emp:	#yeah just err make errr a little err (1.0)
7	I'll try to avoid this shallow water on my
8	starboard side later I will go to: (.) to
9	alter my course to starboard (.) just a few
10	minutes more then (.) just avoid this err (.)
11	shallow water on er (.) near to twenty three
12	over#
13 Serp:	↑yeah ↑yeah ↑I know I see you but you
14	should slow down and not to force me
15	to (.) to go you know now the right
16	side of the traffic lane ( ) (.) is
17	↑condition ↓warning now (.) on my ↑arpar #

In this excerpt, Sea Serpent directly asks Sea Empress how she intends to sail her course (line 3); there is no preface. This is quite unalike excerpts 3 and 4 involving Sea Empress and VTS, where VTS only informs that if Sea Empress continued her course she would go aground.

Sea Empress is getting closer and closer, says Sea Serpent (line 4) with emphasis and rising intonation on the utterance "closer and closer". This implies that the situation is sensitive, and that the ships are not just getting closer, they are getting *too* close. In lines 4–5, Sea Serpent claims that Sea Empress is sailing too fast and Sea Serpent's automatic radar plotting aid (ARPA) is currently ringing an alarm-sound with a condition warning that means that the ships are on a potential collision course. Sea Serpent comments more directly on Sea Empress's choice of course, with the utterances "er what do you (.) intend to ↑do" (line 3) and "you should (.) slow ↓down". The analysis has already shown that a VTS person does not assert the right to take responsibility of choosing a course to sail, which implies that Sea Serpent has more at stake than a VTS person. The call ends in Sea Serpent's decision to sail in the opposite traffic-lane (lines 6–12) in order to give way to Sea Empress to avoid a collision with higher volume levels and a display of anger.

This then shows the difference in the constraints and the distribution of rights for actors in the vessel traffic system. After two calls Sea Empress began to change her course but did so with a speed and choice of manoeuvre that created a new problem in the VTS area and a problem for Sea Serpent, forcing her to sail in the opposite traffic-lane. A VTS person has the right to provide factual navigational information that is packaged with a specific design that portrays his/her rights to *not* take responsibility for the ship's choice of course and not to display emotion

about the ship's choice to ignore the information provided. The choice of course is entirely up to the officer on watch and the analysis shows how this right is negotiated between the ships, Sea Empress and Sea Serpent, without the presence of a VTS person. These excerpts are representative of the data corpus and show the constraints pertaining to institutional interaction in the VST.

5 Discussion and conclusion

This article has investigated emotion displays in a collection of non-routine situations, paying specific attention to how the participants interactionally managed what was contextually relevant for them. Managing such interactional matters involved drawing on re-framed psychological resources such as emotion displays and emotion categories, which were used in various ways in order to promote the social organization of the team (Hutchins 1995). What is apparent in the data is that actions are designed in ways that participants find relevant to previous actions and in reference to the 'here and now'. In other words, actions are bound to the context in which they take place and are relevant to the task at hand. The excerpts show how the participants are constrained in some instances and not constrained in others, which is in line with other studies (Drew and Heritage 1992; Nevile 2004; Arminen 2005).

In excerpts 1 and 2, Shore succeeded in re-constructing the social organization of the team when Cap displayed high levels of volume, by diffusing the emotion displays with emotion categories and talk that promoted team organization, such as "we" and "us". This shows how emotion displays are interactionally consequential (Buttny 1993a). In comparison, excerpt 5 showed how Sea Serpent displayed anger about the way another ship chose to manoeuvre in a dangerous manner creating a context for collision. Emotion displays did not contaminate the outcome of the interaction in these excerpts, and this shows how such displays can be flexible and manageable, even when the emotion display frames the context as problematic (Buttny 2007: 346; Edwards 1999). Emotion displays can possibly be regarded by participants as a natural part of sense making processes in a non-routine situation.

Excerpts 3 and 4 differ from excerpts 1, 2, and 5 as the participants involved are constrained with regard to how they displayed their emotions. As explained previously, the VTS person must not assert any responsibility or take over the choice of course for the ship in any way. The participants complied with these emotional constraints, and although the responses are minimal and subtle, they are visible. Although excerpts 1, 2 and 5 portray the intonation as a prosodic

resource for displaying emotion, it is visible in excerpts 3 and 4 that participants choose a neutral or subtle footing, which strongly portrays their epistemic positions in the context (Goffman 1981).

In conclusion, this article contributes to showing how emotion displays, whether they are explicit or subtle, constrained or not constrained, can be a visible part of non-routine communication. The micro-analytical approach that was used focused precisely on understanding the context-dependent aspects of interaction, appreciating thereby the social forces that influence individuals and how they make sense of behaviour. Put into a maritime context, mitigating human error is not just about installing more technology, reading a manual or following a pre-script. Mitigating error is also about understanding the social organization of a crew, the task at hand and the sense making processes that take place sequentially. This is bound up by their communication with each other and the intricate context-dependent sense making (Froholdt 2010, Froholdt 2012a, Froholdt 2015, Froholdt 2017). This knowledge is necessary to include in the training of crew members. As the industry increasingly incorporates more and more technology, technologically mediated interaction will be more predominant in the future coordination of tasks, e.g. task coordination on autonomous ships. More studies are needed in the future in order to understand how cognition is digitally distributed across very small groups of crew members who will monitor maritime autonomous surface ship operations (IMO 2018)

Micro-analytical studies do not focus on empirical generalizations, but on the rich detail and diversity of the phenomenon under investigation (Psathas 1990: 17). It is exactly this type of study that can tease out some of the implicit and valuable knowledge that is embedded in the communication that takes place in shipboard operations. This knowledge can be incorporated into crew resource management programs and safety and performance training as "interactional awareness training" in order to ensure that maritime professionals and crew members are trained to meet the challenges that are involved in non-routine situations. This knowledge can contribute to existing efforts in understanding the local rationality of actions in shipboard non-routine operations by reframing psychological matters. Such matters are dynamic, visible and manageable and can be relevant in non-routine technologically mediated interaction.

Notes

There are different approaches to the way in which accounts and accountability are understood. For a more extensive review of the accounts literature see Buttny (1993a).

Appendix

Transcription key

(0.5)	The number in brackets indicates a pause in seconds.
(.)	A fullstop in brackets indicates a pause that is shorter than 2/10th of a second.
.hh	A fullstop before an h indicates a speaker's audible "*in-breath*". The more h's, the longer the "*in-breath*".
hh	An h indicates a speaker's audible "*out-breath*". The more h's, the longer the "*out-breath*".
:	A colon indicates that a speaker prolongs a sound or word.
!	An exclamation mark indicates animated or emphatic tone.
(guess)	The word in brackets indicates the author's guess of an unclear or fragmented sound or utterance.
.	A fullstop indicates an ending-like tone and not necessarily the ending of a sentence.
↑↓	An arrow up or down indicates a strong shift in tone, either rising or falling.
LARGE	Words written in CAPITAL mark the utterance as spoken noticeably higher in volume than the surrounding utterances.
° °	Degrees indicates that the utterance between the signs is noticeably lower in volume than the surrounding utterances.
> <	"Larger than" and "Lesser than" signs enclose fragments or words that are uttered noticeably higher in volume than the utterances surrounding the signs.
[ ]	Square brackets indicate a speaker overlapping another speaker's talk

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Bionote

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