



Transport Research Arena (TRA) Conference

# Potential safety outcomes of communication difficulties in mixed nationality crews: A study of Greek and Norwegian vessels

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## Abstract

The study examines potential safety outcomes of communication difficulties in mixed nationality crews on Greek and Norwegian cargo and passenger vessels. The aims are to examine the prevalence of unsafe situations due to language misunderstandings on vessels with different degrees of mixed nationality crews, and the factors influencing this. The study is based on quantitative survey data (n=367) and qualitative interviews (n=15) with seafarers on different types of Greek and Norwegian vessels with different degrees of mixed nationality crews. The survey indicates that respondents on board mixed-nationality vessels experience more unsafe situations because of language misunderstandings between different nationalities on board. Work pressure are also among the influencing factors. The qualitative data provide illustrations of such situations, including cultural differences on board.

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Peer-review under responsibility of the scientific committee of the Transport Research Arena (TRA) Conference

*Keywords:* maritime safety, mixed nationality crews, unsafe situations, communication difficulties

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## 1. Introduction

Alderton & Winchester (2002) suggest that the maritime industry is not only central to world trade, it is also the only example of a fully globalized industry. In 2005 it was reported that 50 % of the total crew of 35,000 on board Norwegian-registered vessels were foreign citizens, mostly from the Philippines, India, Poland or Russia (Håvold,

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2005). While nationally flagged vessels are required to follow national wage and working condition rules, and are thus generally manned by domestic seafarers, vessels flying flags of convenience (FOC) generally offer lower wages and are manned with more international crews. As ship owners increasingly have flagged out their vessels in several countries in the last decades, vessel crews are becoming increasingly multinational. International research asserts that approximately two-thirds of the world's merchant fleets, are manned by a mixed crew, which may include two to three different nationalities (Atratinei 2016). Progoulaki et al (2013) cite Gerstenberger's (2002) assertion that "seafarers are work immigrants, but in opposition to people working in foreign countries, seafarers do not emigrate to another nation-state but to the world market". This raises important challenges related to language and culture. Communication is an essential part of human interaction, and on-board ships with mixed nationalities, misunderstandings related to differences in language and culture may lead to serious maritime incidents threatening the safety of the crew and cargo, as well as the protection of the environment (Atratinei 2016). It is therefore important to assess safety implications of diverse culture, varying abilities to communicate in the common ship language and working conditions on board ships with mixed nationalities.

Flag states require that each ship must have a working language that each employee must speak to a certain standard (Hetherington, Flin, & Mearns, 2006). Although English generally may be chosen, research shows that far from all seafarers speak English fluently, and that this may have repercussions for maritime safety (Kahveci & Sampson 2001). These issues have been examined in previous studies. Progoulaki et al (2013) refers to the MARCOM project (1999), which examined the impact of multicultural and multilingual crew on maritime communication, proposing that the factors which turned out to be crucial in the performance of multicultural crew were their cultural background and linguistic skills. The final MARCOM (1999) report provides an overview and discussion of examples of accidents involving multilingual communication difficulties and cultural diversity. Sampson and Zhao (2003) examined the job-related communication problems among multilingual crew and found that miscommunication caused problems ranging from mere irritations to potential hazards.

Presenting results of their comprehensive ethnographic study aboard fourteen ships, Kahveci & Sampson (2001) mainly focus on the issue of communication and the difficulties arising aboard the ships because of communication problems. Their research shows that on half of the fourteen ships that they studied, the stated working language (English) was a second language for everyone on board. They also give several examples of crew members speaking only in their own language, although this language was incomprehensible to other crew members. They also give examples of crew members with very poor English. According to the seafarers that they interviewed, the main drawback of mixed nationality crews was communication difficulties. These difficulties affect several aspects of life aboard the ships. Kahveci & Sampson (2001) stress for instance the importance of good communication skills in order to avoid unintended offence, engaging in humour, avoiding social isolation and so forth. They showed that problems generated aboard among culturally diverse crews are related mainly to linguistic skills, power relations in the context of the ship, discrimination and racism. Moreover, they also found that miscommunication may have serious consequences for safety, and give examples to illustrate this, stressing that fluency in a common language underpins almost all social interaction on board multinational vessels, and increases the likelihood of the vessels operating as successful units.

Nævestad (2018) examine the potential influences of communication and language difficulties for maritime safety, based on literature review, qualitative interviews with sector experts and small-scale survey (N=222) among seafarers working on ships operating from Norway, registered in the main Norwegian registry (NOR) and Flags of convenience (FOC). The latter includes a higher mix of nationalities on board. Results indicate that respondents working on board FOC vessels experience more unsafe situations due to language misunderstandings, than respondents on NOR vessels. Multivariate analyses indicate that register is the most important factor influencing experiences with unsafe situations due to language misunderstandings. Other important variables are e.g. organisational safety culture, indicating that good organisational safety culture seem to reduce respondents experience of unsafe situations because of language misunderstandings. Other significant variables are respondents' age, vessels' manning level and the share of colleagues with different nationalities.

The Norwegian Coastal Administration conducted a survey of maritime user needs related to e-navigation in October and November 2009. A total of 575 respondents participated in the survey, and 486 of these were seafarers and 72 were ashore operators. Results from the survey indicate that in communications between ships, 81 % of respondents rated language skills as a problem to a high or moderate degree. In ship-shore communications, language

skills were rated by 44 % of respondents as a problem to a high or moderate degree. Thus, the Norwegian Coastal Administration conclude that respondents consider language skills to constitute an important challenge in maritime communications.

Effective communication in multicultural environments is hindered by cultural and linguistic differences (Progoulaki et al 2013). In emergency situations with high cognitive demands it will be difficult to communicate effectively and coherently in a second language (Hetherington, Flin, & Mearns, 2006). Thus we may question the extent to which ratings, officers and harbour personnel in such crews can develop the common shared understanding required to meet the IMO's demand for an effective safety culture on board in which all seafarers “do the right thing at the right time in response to normal and emergency situations”.

The mentioned studies indicate the importance of language misunderstandings as a cause of unsafe situations in the maritime industry, but it seems that there are few studies providing systematic statistical analyses of prevalence and influencing factors. The latter knowledge is important to develop preventive measures. The aims of the study are therefore to examine the prevalence of unsafe situations due to language misunderstandings on vessels with different degrees of mixed nationality crews, and the factors influencing this.

## 2. Method

The data in this project have been collected as part of the Safe Culture project, which is funded by the Norwegian Research Council, and undertaken by the Institute of Transport Economics - TØI (Norway), NTNU Social Research and the National Technical University of Athens - NTUA (Greece). The project is exploring safety culture in land and sea based, professional and private transport in Norway and Greece. Please confer Nævestad et al (2019), for a more general discussion based on the data, examining Safety culture in maritime transport in Norway and Greece, focusing on the role of national, sectorial and organizational influences on unsafe behaviours and work accidents.

### 2.1. Quantitative data

**Recruitment.** The study is based on quantitative survey data (n=367) with seafarers on different types of Greek and Norwegian vessels with different degrees of mixed nationality crews. While 169 of the respondents work on Norwegian vessels, 198 of the respondents work on Greek vessels. The Norwegian respondents were recruited through the Norwegian researchers' contact with Norwegian shipping companies. Web links to the questionnaires were distributed by the shipping companies to all employees working on board vessels, along with an introductory text explaining the purpose of the survey and stressing that the surveys were confidential. The Greek respondents were recruited through a marketing research company in Greece, under scientific supervision of researchers from NTUA.

**Survey questions.** The survey includes 15 background questions, e.g. gender, nationality, age group, seafarer experience, position/area of work, employment status, vessel type, vessel size, manning on board, ship register etc.

The survey also includes questions about safety behaviors (e.g. risk acceptance) and working conditions, e.g. how often “You are interrupted when you are off duty” “Sometimes I feel pressured to continue working, even if it is not perfectly safe”, and organisational safety culture (11 questions) based on the GAIN-scale on organisational safety culture, e.g. “Ship management often praises crew members who work safely”, “My colleagues on board usually report all safety problems and unsafe situations that they experience in their work”, “My colleagues on board do all they can to prevent accidents and unwanted incidents”, National safety culture, e.g. I expect the following behaviours from other seafarers from my country:” “That they sometimes avoid telling colleagues taking risks to work safely”, Sector safety focus, e.g. “Safety is more important than price to our customers”.

We measure the mix of national groups on the vessels through the following question: “Approximately how many of your colleagues have a nationality that is different to yours?” (Answer alternatives: 1) 0-24%, 2) 25-49, 3) 50-74%, 4) 75-100% have a nationality that is different from mine, We define respondents on mix-nationality crews as crews where respondents state that at least 25% of the crew has a different nationality than themselves.

We measure the potential safety outcomes of mixed nationality crews through the following question: “How often do you think the following events tend to occur for every 100 working days/nights on board: You experience unsafe situations because of language misunderstandings between different nationalities on board (answer alternatives: 1) Never, 2) 1-2 times, 3) 3-5 times, 4) 6-10 times, 5) 11-15 times, 6) 16-20 times 7) More than 20 times”

**Analysis.** We have conducted a regression analysis, examining the factors predicting respondents' experiences of unsafe situations because of language misunderstandings between different nationalities on board. We use linear regression analysis. Of course, we cannot conclude about causality, as this is a cross-sectional and correlational study. We nevertheless use the term predict when we describe the regression analyses.

## 2.2. Qualitative data

We have also conducted 15 qualitative interviews with seafarers on different types of Greek and Norwegian cargo and passenger vessels with different degrees of mixed nationality crews. The general purpose of these interviews was to get information about working conditions, national safety culture, sector safety culture, organisational safety culture, safety behaviours on board. In this study, we use information from these interviews to illustrate linguistic and cultural diversity on board and how this might lead to unsafe situations.

## 3. Results

### 3.1. Description of the sample

In this study, we include respondents who are either Norwegian (N=169) or Greek (N=198), who mainly work on nationally flagged vessels. There are 11 women in the Norwegian sample and one in the Greek sample.

Table 1: Distribution of respondents per nationality, sector (cargo vs. passenger) and age

Nationality	<26	26-35	36-45	46-55	56+	Total
Norwegian cargo	17 %	27 %	20 %	28 %	8 %	93
Greek cargo	3 %	17 %	27 %	31 %	21 %	99
Norwegian passenger	7 %	21 %	22 %	34%	16 %	76
Greek passenger	2 %	21 %	37 %	33 %	6 %	99
Total	7 %	22 %	27 %	32 %	13 %	367
Norwegian	12 %	24 %	21 %	31 %	11 %	169
Greek	3 %	19 %	32 %	32 %	14 %	198

Table 1 indicates that 59 % of respondents in the survey were aged between 36 and 55 years old. However, the share of young seafarers was larger in the Norwegian sample. This especially applies to the Norwegian Cargo sample. We asked respondents about the number of nationalities working on board their vessels: 72% answered one or two nationalities, 17% answered three to five nationalities, while 11% answered more than five nationalities on board. Thus, we see that 28% state that three or more nationalities are working on their vessel. We also asked respondents: "Approximately what proportion of your colleagues have a different nationality than yourself?" A share of 16% of the respondents answer that 25% or more of their colleagues have a nationality that is different from their own (6% said that 25-4% have a different nationality, while 10% said that over 50% have a different nationality).

### 3.2. Language misunderstandings and unsafe situations

We asked respondents how often they experience unsafe situations because of language misunderstandings between different nationalities on board (for every 100 working days/nights on board). A share of 13% of the respondents report that they experience unsafe situations because of language misunderstandings between different nationalities on board.

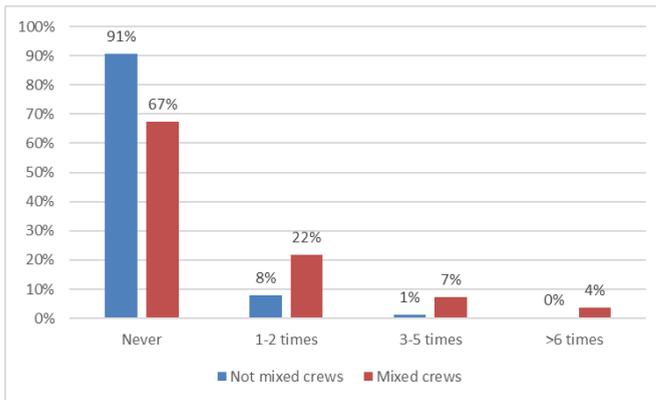


Figure 1: Respondents' experiences with unsafe situations because of language misunderstandings between different nationalities on board (for every 100 working days/nights on board). Respondents from Not mixed crews (N=306) versus Mixed crews (N=55).

Comparing respondents on vessels with mixed nationality crews with those who were not, 33% of the respondents in mixed nationality crews reported that they at least once or twice per 100 working days experience unsafe situations because of language misunderstandings between different nationalities on board, while the share was 9% in non-mixed crews (p=0.001). Results also indicate that the experiences with such unsafe situations are significantly related to seafarers' generally rating of the safety level on board their vessels on a scale from 1-10 (Pearson's R: -.146, p=0.006), and their assessment of the organisational safety culture on board (Pearson's R: -.171, p=0.001).

### 3.3. Multivariate analysis of factors influencing unsafe situations because of language misunderstandings

In Table 2, we examine factors influencing respondents' experiences of unsafe situations because of language misunderstandings between different nationalities on board through multiple regression analysis. The standardized beta coefficients in Table 2 indicate isolated effects of each independent variable, controlled for the other variables.

Table 2: Linear regression. Dependent variable: "How often do you experience unsafe situations because of language misunderstandings between different nationalities on board?" Standardized beta coefficients

Variable	Standardized beta coefficient
Nationality (Norwegian =1, Greek =2)	-.115*
Safety compromising work pressure	.193***
Vessel type (Other=1, General cargo =2)	.112**
Vessel registry (National flag=1, FOC=2)	.018
Organisational safety culture	-.034
Nationalities on board (1-2=1, 3-5=2)	-.032
Mixed crew (Not mixed =1, Mixed=2)	.234***
Position (Other=1, Leading officer=2)	.075
Experience	.106**
Adjusted R2	.146

\* p < 0,1 \*\* p < 0,05 \*\*\* p < 0,01

First, the most important independent variable influencing respondents' experiences with unsafe situations because of language misunderstandings between different nationalities on board is whether the crew on board is mixed or not, i.e. crews where respondents state that at least 25% of the crew has a different nationality than themselves. We see that this variable contributes significantly, indicating that respondents who work on mixed crew vessels report of significantly more unsafe situations because of language misunderstandings.

Second, safety compromising work pressure contributes significantly and positively, indicating that respondents who agree that they "sometimes feel pressured to continue working, even though safety may be threatened" are more likely to report of significantly fewer unsafe situations because of language misunderstandings.

Third, vessel type contributes significantly and positively, indicating that seafarers working on general cargo vessels report of more unsafe situations because of language misunderstandings. This applies also when controlling for the number of nationalities and whether the crew is mixed or not.

Fourth, seafarers' nationality contributes significantly and negatively, indicating that Greek respondents report of significantly fewer unsafe situations because of language misunderstandings between different nationalities on board. Additionally, seafarers' experience contributes significantly and positively, indicating that the more experience you have as a seafarer, the more unsafe situations because of language misunderstandings you report. This variable is comprised of five values (Min: "0-5 years", max: "over 20 years"). Finally, the Adjusted R<sup>2</sup> value indicates that the model explains 15% of the variation in the dependent variable.

### *3.4. Qualitative data*

Interviewees said that vessels with a higher mix of nationalities (e.g. FOC vessels) are typically manned with leading officers from the country of the shipping company, while the crew might be comprised of several different nationalities (e.g. from Eastern Europe, the Phillipines). Leading officers in Norway provided examples of challenges related to being "the only Norwegian on board", on Norwegian flagged vessels. The situation was similar in the Greek vessels, where leading officers are Greek while the crew is comprised of e.g. Filipino, Ukrainian or Romanian seafarers. Interviewees from both Greek and Norwegian vessels talked about challenges related to linguistic and cultural diversity. Among recurring themes were e.g. stereotypes of national culture among seafarers, and how this might influence maritime safety. Some mentioned that they never put certain groups of nationalities together in the same crew, as they have experienced that conflicts might arise. It was also mentioned that some national groups generally "do what they are told", while other groups show a higher level of safety autonomy. Additionally, it was also mentioned that it could be a safety problem that some nationalities generally refrain from speaking up, although it clearly would benefit maritime safety. Language challenges were also discussed in the interviews. To illustrate this, one of the interviewees said that:

"The chief mate understands English very well, but he ... is not grammatically correct. Sometimes we start laughing. If he asks whether I need him more up on the bridge, he says the exact opposite of what it should be. "No, I do not need you" he says. Huh, huh. The language is a little broken, but we try to correct him and control him a little when he says things like that. Then he laughs a little. I understand well what he means, you know, because we have been together for a long time. You understand pretty much no matter what he means. So, it's going well.

Discussing challenges related to national culture and safety behaviour, one of the interviewees said with a smile that: "There is only one culture on board the boat, so that's fine", and that is the culture of the captain and the shipping company. Crew members failing to adhere to this are put ashore.

## **4. Discussion**

### *4.1. Prevalence and influencing factors*

The present study indicates the importance of unsafe situations because of language misunderstandings between different nationalities on board on mixed crew vessels. This general result is in line with previous studies (MARCOM 1999; Kahveci & Sampson 2001; Sampson and Zhao 2003). The unique contribution of the present study is that it

provides a quantification of dangerous situations (anchored in an absolute reference point: per 100 days on-board) caused by language misunderstandings in mixed nationality crews versus non-mixed crews. To our knowledge, such estimations are lacking in previous research. Other previous studies which quantifies the prevalence of such situations, e.g. Nævestad (2018) use relative answer alternatives (e.g. happens often, sometimes), which makes it hard to make comparisons over time and across organisational contexts and sectors.

Another unique contribution of our study is that we conduct a quantitative multivariate analysis of the contextual factors influencing this, controlling for e.g. seafarers' nationality and experience, vessel type, seafarers' position, vessel registry and organisational safety culture on board. These analyses indicate that the most important variable significantly influencing respondents' experiences with unsafe situations because of language misunderstandings is that the crew has a mixed nationality. Interestingly, results do not indicate that the number of nationalities on board contributes as strongly to experiencing unsafe situations because of language misunderstandings as the share of colleagues with a different nationality than yourself. Thus, it could be that an experienced position as an "outsider" versus other national groups on board, several larger groups of different nationalities, or generally a high mix of nationalities is related to experiencing unsafe situations due to language difficulties. These issues indicate important questions for future research.

Interestingly, we also find that work related factors like safety compromising work pressure also influences respondents' reporting of unsafe situations because of language misunderstandings. Although work-related stress is studied or mentioned in the MARCOM (1999) report, the importance of stress as an aggravating factor for communication, increasing the probability of hazardous misunderstandings, has not been studied before like we do in the present study. As indicated by an example of a shipping accident in the MARCOM report (1999) a stressing work environment may increase the possibility of misunderstandings. On the other hand, our qualitative interview data indicates that crew members get to know each other over time, and although the language might be broken, crew members learn how to interpret each other. This suggests that misunderstandings perhaps are more likely to happen when people who are new to each other communicate. This is an interesting issue for future research. The importance of work stress is also in line with Nævestad (2018), who finds that higher manning levels are related with lower levels of dangerous situations due to language misunderstandings. The present study also finds that vessel type influences unsafe situations because of language misunderstandings. This could be due to the composition of nationalities, type of work, manning level etc. Identifying the importance of these different factors is an important issue for future research. We also find that the more experienced seafarers are, the more unsafe situations because of language misunderstandings they report. This is hard to explain.

The studied outcome variable "Unsafe situations because of language misunderstandings" is a safety outcome in itself, as it refers to "unsafe situations". Respondents' definitions of "unsafe" may however vary, and it is therefore interesting to examine the relationship between this variable and other safety outcomes. Nævestad (2018) finds a significant relationship between respondents' reporting of unsafe situations because of language misunderstandings and shipping accidents. The latter is measured as: "Has the vessel been involved in a shipping accident (e.g. grounding, collision, contact injury, fire) in the two last years?" We have not found such a relationship in the present study, but our results indicate that experiences with unsafe situations due to language misunderstandings are significantly related to seafarers' generally rating of the safety level on board their vessels, and the organisational safety culture on board.

#### *4.2. Methodological limitations and issues for future research*

Our results are contingent on the limited distribution of national groups in our sample (i.e. Norwegian and Greek), and our sample of vessel registry types. Our sample mainly includes nationally flagged vessels with a limited share of respondents in mixed crews (16% of the respondents). Thus, if we also had included other types of vessels, e.g. FOC vessels with a higher share of mixed crews, our results would perhaps have been different, as in Nævestad (2018). Finally, it is also important to remember that the respondents in the national samples also are different when it comes to age groups: there are four times more young respondents (<26 years) in the Norwegian sample compare to the Greek (12% vs 3%).

An important issue for future research, is to relate unsafe situations because of language misunderstandings to different types of operations and situations. Based on their analysis of accidents related to multilingual and multicultural challenges, the MARCOM researchers discern between the following activities where misunderstandings

based on multilingual and multicultural context are particularly threatening to maritime safety: 1) On board manoeuvring of the vessel under pilotage, 2) External communication ship to shore and ship to ship, 3) Inability to read instructions, 4) The cultural dimension, 5) In emergency situations. Future research could use this classification as a point of departure. The study of the Norwegian Coastal Administration also separates between two types of communication contexts.

### 4.3. Policy implications

Acknowledging the decisive role of language and culture for maritime safety, several studies suggest different approaches to language training and training in intercultural communicative competence. Sampson and Zhao (2003) concludes by suggesting a bottom-up approach to such learning, instead of the traditional top-down perspective on this. Progoulaki et al (2013) discusses the role of training needs analysis (TNA). Our study contributes to this research, by study also indicating the role of the organisational context of the seafarers who communicate: safety compromising work stress might increase the prevalence of unsafe situations due to language misunderstandings. Additionally, Nævestad (2018) found that a good organisational safety culture might reduce the prevalence of unsafe situations due to language misunderstandings. Thus, a unique contribution of our study is that we argue that reducing stress and improving safety culture also might reduce the prevalence of unsafe situations due to language misunderstandings.

## 5. Conclusion

Results indicate that respondents working on board mixed nationality vessels experience far more unsafe situations because of language misunderstandings between different nationalities on board. This was also significantly related to poorer evaluation of the safety level on board and poorer evaluations of the safety culture on board. Thus, these issues indicate an important issue which needs to be addressed to increase maritime safety in the future. Finally, it is important to note that communication difficulties among mixed nationality crews also may be due to “cultural differences. This was indicated in the qualitative data, and also indicates another important issue for future research.

## Acknowledgements

This research is part of the SafeCulture project, funded by the Norwegian Research Council’s Transport 2025 program.

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