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Information sharing during cross-border collaboration from a dialect continua perspective

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Abstract

Emergencies sometimes cross the borders of nations making information sharing over national borders essential in emergency management. This type of information sharing is often mediated by some kind of technology. However, appropriate and efficient cross-border communication is more than providing technology to mediate information exchange. This study note focuses on emergency services experience of terrestrial trunked radio (TETRA)-mediated cross-border communication across the Norwegian–Swedish border. We applied the theory of dialect continua to analyse how people from different dialect areas understood each other. The study was based upon data gathered from semi-structured interviews. The findings show that indeed the technological solutions had opened up new opportunities for cross-border communication but that during stressful conditions, the language differences between Norwegian and Swedish could lead to misunderstandings.

KEYWORDS
cross-border collaboration, dialect continua, information sharing

1 | INTRODUCTION

Emergencies can occur across both geographical and functional boundaries, possibly making differences in preparedness, legal systems and languages a challenge. In peripheral areas of Sweden and Norway, emergency services agencies (ESA), such as police, fire, and emergency medical, have large areas to cover with limited resources. In addition, the terrain can make access difficult in places, and long distances can make cross-border collaboration necessary. This situation often requires multi-agency collaboration and cross-border cooperation characterized by elaborate structures. Blondin and Boin (2020) argues the need for international collaboration since transboundary crisis seems to be on the rise. Martin et al. (2016) state that collaboration involves more cross-sectorial interaction than just cooperation and coordination. Through cross-sectorial collaboration, both resources and competencies can be combined to solve complex and large-scale situations (Murphy et al., 2015). Information sharing (Kapucu & Özerdem, 2013), communication (Comfort & Haase, 2006), and cooperation within and between agencies and countries are also key elements in cross-border crisis management (Kapucu & Özerdem, 2013). These concepts are important for activities such as resource allocation and prioritisation of casualties (Yates & Paquette, 2011). Interoperability issues (Schmitt et al., 2007) can cause information-sharing issues to lead to operational inefficiencies (Bharosa et al., 2010). Thus, providing resources that facilitate the sharing of information between agencies is a necessity. Andreassen et al. (2020) argues that information sharing and situation awareness are related to communication capacities and that information sharing limitations affects both short- and long-term coordination cycles. A recent innovation in information sharing is the inter system interface

(ISI) that makes cross-border terrestrial trunked radio (TETRA)-based communication possible.

In Sweden, the TETRA-based system RAKEL is the national digital communication system used for verbal communication by emergency service agencies (ESAs) and other actors in the field of civil protection and public safety. Norway similarly uses a TETRA-based system. Collaboration between Sweden and Norway with the aim of making the two TETRA systems interoperable started in 2012, and in 2016 the Swedish and Norwegian TETRA systems were the first in the world to be connected.

The role of information and communication technology (ICT) and risk and crisis communication is increasing (e.g., Chu & Yang, 2020; Gray et al., 2016; Stephens et al., 2020). ICT play an important role in communication and information sharing during crisis management. In addition to technology, communication involves the use and meaning of words, idioms, values, and verbal contextuality. All languages have dialects, which traditionally have been divided by areas and subareas (Davis & Houck, 1992; Heeringa & Nerbonne, 2001) though of course there is a continuum of change. In this article, we study the effects of the dialect continuum between the counties of Trøndelag in mid-Norway and Jämtland in mid-Sweden on cross border collaboration.

In this article, the focus is on TETRA-mediated radio communication on the border between Sweden and Norway. The three mainland Scandinavian languages (Danish, Norwegian, and Swedish) constitute a Scandinavian dialect continuum, which makes them understandable between the inhabitants of these countries. The inhabitants talk to each other in their native tongue in what is known in linguistics as semi-communication (Haugen, 1966). Research on communication and information sharing has been published, but literature on cross-border communication (hereafter, abbreviated as CBC) is rare. We investigate ESA communication in Norwegian–Swedish emergency management collaboration in the cross-border region of Jämtland county in Sweden and Trøndelag county in Norway (see Figure 1).

The following research questions are addressed in this article:

- How has CBC developed over time in the case cross-border region?
- Does the language continuum affect the ESAs' CBC in the region and, if so, how?
- What advantages, if any, do ESAs identify in the use of TETRA-mediated CBC?
- How can organisational differences be understood in CBC?

2 | BACKGROUND: DIALECT CONTINUA AND GEOGRAPHICAL SETTINGS

The Nordic languages all belong to the Germanic language family and have their origin in Old Norse. Individuals who speak one of the mainland Nordic languages—Danish, Norwegian, or Swedish—normally have what is referred to as a primary Nordic language

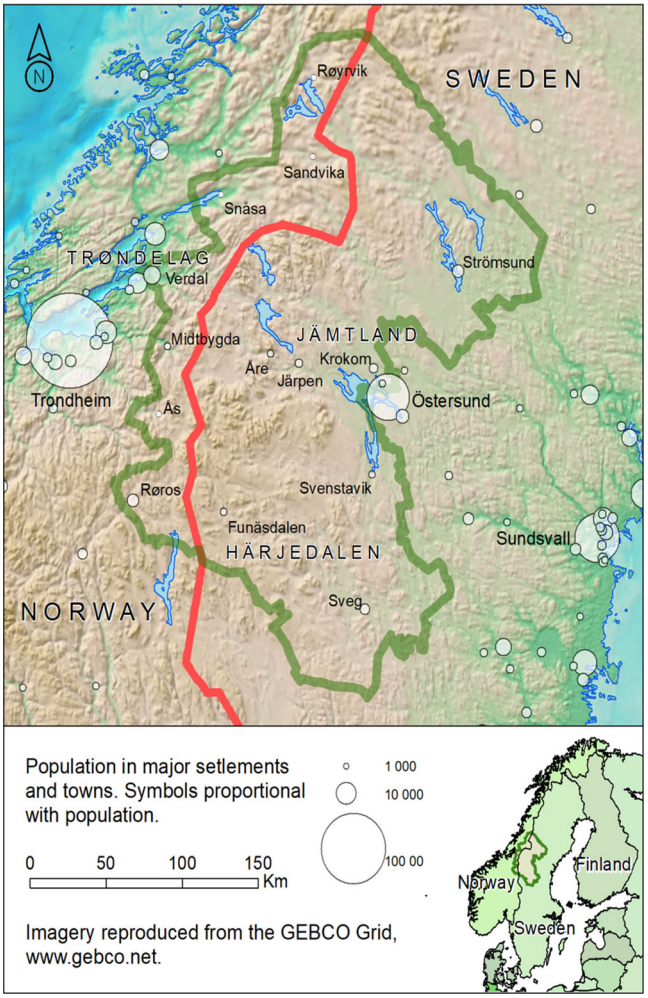

FIGURE 1 Map of border municipalities in the counties Trøndelag and Jämtland

understanding. This means that speakers of one of the three mainland Nordic languages can, without further training, understand each other, both in speech and writing. The mutual understanding depends less on political borders, such as the border between Norway and Sweden, than on the geographical distances between different dialects in the same country. An individual born and raised in the west of Jämtland might more easily understand a person from eastern Trøndelag than a person from Skåne (in southern Sweden). As Torp (2004) pointed out, it is a political task to decide whether a dialect in the border region between Trøndelag in Norway and Jämtland in Sweden should be recognized as a Norwegian or Swedish dialect. The transition between dialects is gradual. From a linguistic point of view, these Nordic languages represent a language dialect continuum. In this continuum, neighbouring dialects have easier access to or understanding of their respective language dialects than dialects that are spoken further away. The language continuum was first described by Chambers and Trudgill (1998), who noticed the gradual linguistic differences from village to village, when travelling in any direction from a specific location. The concept builds on the idea that linguistic differences accumulate and become larger the farther away from the

starting point one moves. Inhabitants in two neighbouring villages often understand each other, but inhabitants on the outer edges of a 20-village continuum may not (Chambers & Trudgill, 1998; Heeringa & Nerbonne, 2001). According to this reasoning, a person from far away should have difficulties understanding any local dialect. However, the application of 'national dialects'—the languages Bokmål, Nynorsk (the two official languages of Norway), and standard Swedish—has resulted in a levelling of the dialects. According to Røyneland (2005), this type of levelling takes place along two axes, whereby the differences between local dialects in a wider region gradually decreases over time, as does the variation within a dialect. Dialect levelling may also result in a harmonisation within the standard language and a levelling between countryside dialects and urban dialects (Røyneland, 2005).

The border between Norway and Sweden, which extends from 59°N to 69°N, is 1630 km in length and passes through sparsely populated and mountainous terrain, following the divide between the Baltic Sea and the Norwegian drainage basin. Trøndelag county in Norway and both Jämtland county and Härjedalen province in Sweden have the northernmost historical landscapes with substantial populations in proximity to each other. Throughout history Jämtland and Härjedalen were in an intermediate position between Norwegian and Swedish influence, commerce, culture, and language. The distance from Jämtland's core area, from Östersund to the Baltic Sea, is about the same as to the fjords of Trøndelag, but with respect to trade, Trøndelag has had the advantage of ice-free harbours. In the past, wars were fought between Denmark–Norway and Sweden over these areas, but contact and trade thrived in peaceful times. As a result of the extensive transboundary interaction, the dialects spoken in Jämtland, Härjedalen, and Trøndelag, respectively Jamska, Härjedalska, and Trøndersk, are relatively close and are distinct from the national languages (Oscarsson, 2007).

There are 12 border municipalities in Jämtland and Trøndelag: seven on the Norwegian side and five on the Swedish side. The land area is 11,755 km^2 in Norway and 41,165 km^2 in Sweden, and the populations are 27,856 and 55,334, respectively (Statistics Norway, 2019; Statistics Sweden, 2019). These 12 municipalities share a number of challenges. First, their combined area is large (Figure 1), but sparsely populated. At 52,920 km^2, the area is substantially larger than, for example, the area of Switzerland, but the population density is only 1.6 per km^2. Settlements are clustered in the valleys. Second, the population is decreasing. From 1998 to 2018, 7 out of 12 municipalities had a population decline of more than 10%, and in total the population dropped by 3.3% (Statistics Norway, 2019; Statistics Sweden, 2019). Third, the transportation network is sparse. Roads generally follow the valleys that cut through the mountains from west to east. Thus, transportation tends to be faster between municipalities across the border than across municipalities on either side of the border. For example, to drive along the national border from Røyrvik Municipality (Trøndelag) in the north to Funäsdalen village in Härjedalen Municipality (Jämtland) in the south takes approximately 7 h. Fourth, the region is popular with visitors. Close to the border, municipalities on both sides host mountain resorts and holiday homes. For example, during the winter season 2017–2018, the number of visitors to the ski resorts in Åre and Härjedalen totalled 2.7 million (Jämtland Härjedalen Turism, 2019). The numbers are lower in the other municipalities; nevertheless, the tourism industry makes a positive contribution to employment and activity all over the region. However, the high number of transient visitors is an extra burden on ESAs. Due to the declining numbers of inhabitants, the municipalities struggle to maintain public service levels and preparedness measures. This, in combination with the fact that the closest assistance may be from across the border, means there are strong incentives for cross-border collaboration in rescue operations.

3 | THEORETICAL ASSUMPTIONS: COMMUNICATION

COVID-19 has generated several studies on crisis communication effectiveness (Lee & Li, 2021) and strategies (Petridou & Zahariadis, 2021; Subert, 2020). Vardavas et al. (2021) states that communication from government and public health officials is essential to strengthen publics' resilience. Communication is used to build structures, coordinate work, exchange information, and facilitate relationships, and it leads to shared understandings (St. Pierre et al., 2016). Brindley and Reynolds (2011) state that 'Strong verbal communication skills are key whether for establishing a shared mental model, coordinating tasks, centralising the flow of information, or stabilising emotions'.

Communication often helps to find solutions to situations but research shows that such communication is not always easy. The semiotic triangle (Odgen & Richards, 1923, cited in Reuter et al., 2012) serves to illustrate the relation between symbols (words), thoughts (concepts), and referents (objects)—how a word can be used to represent a thought we have about a specific object. Reuter et al. (2012) argue that this relation may lead to misunderstandings in communication, as individuals may understand the same 'symbol' (word) differently. Different fields, such as a particular profession or area of research, have their own set of mental models of concepts that are important within that field, and have specific words to describe them. Thus, the words have a specific interpretation. This combination of concept and words is the terminology of the field. Mental models are important for how we interpret information we have received. If people's mental models differ, it may lead to misinterpretation of cues given during communication. With this in mind, it is important to use familiar abbreviations and exclusive terms to minimize the risk of misinterpretation (Prasanna et al. 2011). Sutcliffe et al. (2004) argue that effective communication is affected by individual factors such as stress or fatigue. Perception, attention, memory, decision-making, problem solving, and response execution are all known to be affected by stress (Bourne & Yaroush, 2003) and are important cognitive processes when communicating and sharing information. Mild stress facilitates cognitive functions, making our actions focused. However, a high level of stress seems to trigger more rigid strategies or habit memory rather than the use of flexible

cognitive operations (Sandi, 2013). Crises management is known to be an information-intensive context often performed under stressful conditions under which communication can be challenging. For example, speech patterns are a common contributor to incidents and crashes involving aeroplanes (Merritt, 2000). Vuori et al. (2014) found that high levels of work-related strain were related to the speed of memory retrieval. This in combination with semi-communication could provide a challenging situation.

Furthermore, within an organisation, systemic factors affect communication. Different types of communication behaviour are re-enacted and sometimes restrained in organisations through cultural patterns and norms. St. Pierre et al. (2016) argue that it is important to use terminology rather than colloquial language, since nonspecific language can contribute to misunderstandings in communication. They also claim that articulation and mispronunciation can be a risk factor for misunderstandings. According to St. Pierre et al. (2016, p. 141), 'Good communication in critical situations is aimed at creating a shared mental model'. This shared mental model is the basis of the teamwork needed to solve a critical situation. Kristiansen et al. (2017, p. 19) describe how, during emergencies, 'distinct messages and sufficient communication are needed to collaborate'. They also describe how personnel who are unfamiliar with radio communication were unable to share and collect relevant information. Researchers who have conducted studies of health-care argue that there is a need to improve teamwork communication (Bhasale et al., 1998; Williams et al., 1999) and that there is a need for standard terminology to achieve accurate communication. St. Pierre et al. (2016) argue that it is of importance to use official terms because colloquial language creates an 'insider language' that is difficult for outsiders to understand.

Taking the literature of the communication process as a point of departure and add the challenge of a dialect continuum we end up in another or an additional dilemma. Swedish and Norwegian with their common roots in old norse and today basically two languages that today are more or less inter-changeable (with some exceptions) result in a situation where the spoken language in the communication between different ESAs in two different languages must be precise and accurate. This study examines how this works out in practice.

4 | METHOD AND ANALYSIS

Data were gathered from semi-structured interviews with eight persons with various professional roles in the investigated domain. All interviews were based on a semi-structured interview guide. The informants were selected with the idea of purposive sampling, with a mix of professional roles with special competence, including the head of a rescue service organisation, the head of a fire department, a group manager in a rescue service organisation, police staff, and paramedics. Four informants were from Sweden and four informants were from Norway, all of whom had long experience in their professional role ranging from 10 to 30 years.

The interviews took place during Autumn 2019 at the informants respective workplaces and lasted between 60 and 90 min. All interviews were recorded and transcribed, but the interviewers also took handwritten notes during the interview sessions. All interviews were based on a common question scheme and focused on the following issues: the emergence of CBC, incidents of misunderstanding CBC, how the language continuum is dealt with, and issues related to the radio communication and the national organisations. The themes in the interview guide related to the four overall research questions (see the Section 1). The questions were open, leaving the informants free to share their experiences in the area of interest.

The approach used for data analysis was a thematic analysis whereby we aggregated data from the interviews into a common grouping of found patterns into themes. Individually generated codes were discussed and grouped collaboratively with the aim of grouping codes and themes into categories that would be relevant for addressing the four research questions. The analysis was inspired by the six-stage process described by Braun and Clarke (2012), who suggest that analysis can be carried out sequentially by: (1) familiarisation with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing potential themes, (5) defining and naming the themes, and (6) producing the report. Unlike quantitative analyses, in the aforementioned approach both writing and analysis are closely interwoven with the ongoing analysis, also in the sixth and final stage (Braun & Clarke, 2012).

To a large extent, the coding scheme based on the interviews followed the original research questions. The major themes in the interviews were:

1. previous experiences of rescue work in general;
2. previous experiences of rescue work in border regions;
3. geographical background, such as place of birth and origin (to capture the informant's language/dialectical background);
4. practical experiences from recent rescue work in general;
5. recent rescue work in the border region;
6. experiences of any language/dialectical misunderstandings in face-to-face communications;
7. experiences of any language/dialectical misunderstandings in in radio communication.

Each recorded interview was first transcribed and then analysed by the researcher who had conducted that interview. The transcriptions were reread to find the information that could help to answer the research questions, and selected parts of the audio recordings were replayed to enable us to gain a better understanding of nuances in the prosody. Thanks to the format of semi-structured interviews we were also able to scan for results related to the questions. After a final stage, in which each we each summarized the patterns and themes we had found, we collectively discussed their relevance in face-to-face and online meetings on Zoom.

4.1 | Ethical considerations

The work during this study followed the recommendations for good research practice from the Swedish Research Council (2017), with the

fundamental idea of protecting involved individuals from harm or wrongs. However, as stated under Swedish Research Council's guideline 1.4 Ethics Codes, 'it is not reasonable for a trivial amount of harm to hinder important research' Swedish Research Council (2017, p. 13; our translation). Furthermore, the informants were contacted in accordance with the principle of acquiring informed consent; they were initially provided with details about the study by e-mail and then contacted by telephone. All informants were informed about the purpose of the GSS3 project, and that they at any stage of the process immediately could decline to participate in the study. After the interviews, the informants were asked to read and approve the transcribed interviews. With respect for the informants' personal integrity, all data in the study were kept anonymous, and recorded interviews and transcriptions were stored without any possibility for public access.

5 | RESULTS

The presentation of the results is organized in relation to the four research questions (presented in the Section 1). In the following, each informant is referred to by a code comprising the symbol # followed by a number.

5.1 | Past and present CBC

Our perspective is that history affects the present, and this makes the emergence of an activity such as TETRA-mediated CBC interesting. Cross-border collaboration is well established and has long existed in the Trøndelag–Jämtland region. Informant #8 described how his older generations collaborated on paramedic issues in the 1960s. Growing up in the cross-border region provided him with opportunities to spend much time in both countries. The border was of subordinate importance; young people had friends on both sides of the border.

One informant described the communication technology used by emergency units in the past and present as follows:

> We had a pager, when it started to beep, we knew we had an alarm. Then we got a message in the car on Mobitex. And we had a phone. And then, when a big accident happened, we had to use the radio in the door. And then we had to try to find a connection. It was pretty hard because you don't get those big accidents that often. You never got to be familiar and feel secure with them [the technology]. […] The biggest difference today is that the RAKEL terminal is three features in one. You got the pager, the radio communication and the phone all in one. (Informant #6)

The fact that radio is a type of technology was used daily was highlighted as an advantage 'we use RAKEL terminals in our daily work, we communicate [using RAKEL] on all work cases' (Informant #6). The informants also emphasized the impact that the technological advances had had on both their personal safety as well as the safety of the patients they helped on a daily basis: 'It's 150 kilometres to the hospital we usually go to. On that trip we had to physically change the channel 4 times' (Informant #5). The same informant described it as important to know where, geographically, they were and to remember to change the channel. This affected their possibility to connect to the hospital, since in certain geographical areas it was not possible to make a connection.

Before being able to use CBC via the TETRA network, communication between agencies in the two counties was carried out by mobile phone, which Informant described as 'kind of hard'. Phone numbers occasionally had to be updated:

> Sometimes when you got a new phone and changed your phone number, you forgot to send the new number. This could be difficult. You had to call the dispatcher on the Swedish side, who called the dispatcher on the Norwegian side, and then they contacted the person you needed to get in contact with on the other side. It wasn't easy. Now we can solve it ourselves. We just press the button and then we have a connection. It is a huge difference. (Informant #6)

The possibility to establish a connection between the two counties made an important difference to resource planning: 'This is crucial for us, so that we can bring the right equipment and the right crew' (Informant #4). Another example of how resources and crew planning was sometimes affected was evident from Informant #5's description of the alarm calls:

> We got a priority-1 alarm. The patient was 10 kilometres from the border, on the Swedish side. We got the assignment to assist. When we started, we knew that the Swedes had a 55 kilometre-drive, and we had 15 kilometres [to drive], so we knew that we were going to be the first paramedics at the scene. When we arrived at the scene it turned out that the patient was Norwegian and wanted to go to a Norwegian hospital. We called our Swedish colleges on Nødnett/Rakel, telling them about the situation. We took care of the patient and they [our Swedish colleagues] could turn back, rather than driving another 30 kilometres at high speed with blue lights. Instead, they could return to cover their area of responsibility.

Last, the possibility to prepare mentally as well as practically, while on the way to the scene of an accident was highlighted by the informants as very important:

> Because we have communication on Nødnett/Rakel, it is also possible to prepare the task force along the

> way, [and] we know what we are going to do in the effort, and we get instructions on where we are going. The map functionality across the border is so-so. Nødnett/Rakel makes it possible to be mentally prepared if there are serious incidents. For example, we have been in Sweden to assist with a serious accident […], and then it is good to be prepared for what meets us. (Informant #4).

The above example highlights that communication across the border between turn-out and arrival on scene may prime emergency personnel psychologically on what they will meet when they arrive, in addition to the value of being able to clarify practical issues such as location and details about the emergency.

5.2 | Dialect issues and CBC

Our study focused on CBC in a geographical area with a long history of contact and trade. This extensive transboundary interaction is manifested in the dialects spoken in the region. We were interested to find out whether the language continuum had any impact on CBC. Our findings indicated that misunderstandings occurred and were related to the individuals' location on the Scandinavian dialect continuum. As an example, Informant #1, who was born and raised in the Swedish part of the border region, mentioned 'It is relatively easy for me to understand Norwegians on the other side of the border [Trøndelag], but [I experience] more problems with [Norwegians from] other regions in Norway'. For example, according to Informant #1, for someone from Jämtland, people in the Trondheim region were more difficult to understand, and this was especially the case for people in Helgeland, the most southerly district in Norway region. By contrast, Informant #6, who was similarly born and raised in Sweden close to the Norwegian border, said 'The Swedish we speak in this region is closely related to the Norwegian language, so I do not see any language difficulties'. Informant #4, who was raised in Norway near the border, said that it might be difficult to understand alarm messages read by immigrants and in-migrants to the region.

Informant #2, who was born and raised in Stockholm, 550 km south of the case region, claimed that 'People from Jämtland generally understand Norwegian, often but not always, better than I do […] I understand the Oslo dialect far better than the Norwegian that is spoken in Trøndelag'. According to the same informant, there should have been a strategy to ensure the use of 'normalized standard Swedish with clear pronunciation'. Other informants (#5 and #7) considered it important to ask when one did not understand a specific word. Dialect-related problems may be particular to some individuals, as some people have more difficulties understanding the language than others (Informant #5). According to Informants #1 and #2, stressful situations could increase and aggravate misunderstandings, and both of them offered the same solution, namely, to speak more slowly and clearly when under stress, as they had been trained to do in their basic formal education and in their professional development. However, sometimes nuances are lost and misunderstanding occur communication. One example is when the Swedish rescue service asked for a Norwegian scuba-diver in an emergency situation, but the Norwegian colleague did not understand how serious the situation was and did not send a diver (Informant #2).

Some words may be understood from the context, but they can be difficult to understand if the delivery is too fast paced. After many years, the words used can turn out to be a combination of the two languages, 'I use a combination, "svorsk", a self-made abbreviation combining Swedish and Norwegian)' (Informant #5). The informant had learned that certain dialectal words should not be used at all, since they might be completely misunderstood in the other language. There are also instances of particular words leading to misunderstandings. One example is the Norwegian word *legevakt*, the English equivalent is an emergency call centre or clinic. In Swedish, this Norwegian word may be interpreted as 'camp guard'. A few words are a slightly ambiguous, but most of the informants were well aware of them and of concepts that differ between the two languages. Our respondents suggested that a common parlance for the emergency facilities in the border region should be developed, but at the same time there has not been an expressed need for it.

Despite the misunderstandings that occur in the Scandinavian dialect continuum, switching to English is rare (Informants #1, #2, #5, and #7); Interview #2 said 'It would be weird to switch to English'. Rather, the relationship between the actors affects their willingness to use English. Furthermore, the language misunderstandings seem to be asymmetric, as highlighted by Informant #1: 'Norwegians understand Swedish better than the other way around, but they expect Swedes to understand Norwegian better'. This view was shared by Informants #5 and #7. Terminology dictionaries have been developed, but they were not used in the Swedish rescue service organisation in the case region (Informants #1 and #6) at the time when the informants were held.

5.3 | TETRA-mediated communication

The ability to speak with ESAs on the other side of the border via the TETRA terminal used in everyday work is a new intervention. New interventions provide new possibilities and sometimes restrictions. We were interested in finding out whether the ESAs in the case region identified any advantages in the use of this new communication channel. As mobile network coverage is poor in parts of the border region, the ability to use TETRA emergency radio makes communication more robust. Using Nødnett/Rakel makes it easy to cooperate with other agencies in general and across the border: 'You just push to talk' (Informant #6). However, communication via radio removes some nuances from communication until only the individual words remain. Informant #5 described also the practicalities of radio communication as more difficult compared with other kinds of communication:

> I think that all communication via radio is a bit harder […] it's a combination of the quality of the sound, the lack of body language and, yes, everything else. […] also, it depends on how experienced you are. Some

> push the button too quickly or talk before they've pushed the button. Then you'll lose some words. It's a lot about knowing how to operate the terminals. If the actors have insufficient knowledge of how to operate the terminals, they may miss important information. What mostly fails is the terminal operation. The right channel hasn't been chosen, or you don't call the right way. (Informant #6)

Most of the CBC by ESS personnel in the region is carried out by using RAKEL and Nødnett. However, RAKEL and Nødnett do not seem suitable for all kinds of communication: 'For me, radio communication is about short messages […] a radio is not a technology meant for discussions' (Informant #2). Informant #4 was of the same opinion and added that from a Norwegian point of view, Swedes lack radio discipline. According to Informant #2, if there was a need for longer conversations with more detailed discussions, the phone was more suitable than radio. If it is not possible to connect with 'the right people', personnel often have a private list of phone numbers to get in contact with the right persons across both organisational and national borders. Furthermore, the choice between radio or phone may depend upon who one will be working with during a shift:

> We have a lot of doctors that aren't that familiar with radio communication. If you know what doctor you will be working with, there are times I choose the phone because I know that using the radio will be difficult. (Informant #5)

Mental stress is always a part of ESS work and has to be taken into consideration when communicating: 'People who are stressed in other situations get stressed by the radio' (Informant #6). Individuals differ in their ability to manage stress:

> Sometimes you feel the adrenalin, depending who you are working with and what the assignment is. If kids are involved or you know that [help] is far away […] I try to speak calmly. It's not easy, but with many years of experience it is possible (Informant #5)

Thus, when communicating via RAKEL or Nødnett, it is important for ESS personnel to adapt their way of communicating. Adaptive communication includes reducing speaking speed and being more careful with the choice of wording when talking to someone who does not share the same native tongue.

5.4 | Organisational differences

ESA collaboration often involves multi-agency work, in which actors from different organisations work together. When working close to the border between Norway and Sweden, the work includes not only national organisations but also international organisations, each with their own set of norms, rules, and regulations. This leads us to our fourth research question: How can organisational differences be understood in CBC? All informants verified that organisational differences affected communication, especially when there were newly recruited staff in the team. Informants #5 and #6 described how there were many words that were different, and that in some cases the difference related to the different organisational procedures in the two countries. Several informants highlighted the various organisational differences, such as how the work at the scene of an emergency was organized in the two countries. In Norway, the work is mainly managed with a single chain of command, headed by the police. In Sweden, no single agency holds the incident commander position. Instead, each agency is in command of their own work, making coordination and collaboration a central aspect of the Swedish crisis management work.

The organisational structure in the case region is manifested in the actions performed. As a result, the wrong organisation may be approached with a different structure in mind. Furthermore, organisational differences between Norway and Sweden may be manifested in expressions that have different meanings in the two countries. An example given in the interviews was when a Norwegian asked the question 'So everything is OK at the scene?' and the Swede answered, 'Yes. Everything is OK.' When the question was asked, the Norwegian asked with the Norwegian structure in mind and wondered whether all aspects relating to the accident in question were OK, meaning from all agencies' point of view. The Swede interpreted the question and answered with the Swedish organizational structure in mind, meaning everything was OK regarding his own organisation's area of responsibility. He did not have any knowledge of the needs of the other agencies at the scene.

Another difference that may lead to some confusion is that Norway sends patients to different hospitals, depending on the type of injury, whereas in Sweden patients are sent to the closest hospital (Informants #5 and #6). This practice can lead to misunderstandings when Norwegian staff think that Swedes follow the same model. Yet another difference is that the Norwegian rescue service uses several emergency numbers, whereas in Sweden all rescue services are coordinated via one telephone number (Informant #1). In Norway, communication centres known as AMK (Akuttmedisinsk kommunikasjonssentral)[1] are much more active participants in emergency work and follows the work from start to finish (Informants #1, #5, and #6). Staff at AMKs connect the actors in the field to the doctors in the hospitals to make them well aware of the overall situation and what will be required during their work. By contrast, 'In Sweden SOS[2] prioritises and directs. After that, we are not involved' (Informant #1). This creates a situation where staffing at AMKs misunderstand how much information SOS has about an emergency. Informant #7 described how improved collaboration was a result of increased awareness of available resources across the border among personnel at the dispatch centre.

In some instances, differences in terminology may cause confusion about organisation. Interview #3 gave an example of terminology that created confusion due to the way it is converyed that the police had authority to do something differed slightly between

TABLE 1 An overview of expression and different meaning of words

English	Norwegian	Swedish
The police have authority	politiet har *myndighet*	polisen har *befogenhet*
Authority	myndighet	befogenhet
Government	myndigheterne	myndighet

Norwegian and Swedish, respectively 'politiet har myndighet' and 'polisen har befogenhet'. In Norwegian, the word *myndighet* is used to express that Norwegian police have authority but in Swedish *myndighet* means 'government'. Informant #2 state: 'to work with as little terminology as possible, we try to speak with everyday language because terminology can mess things up' (Table 1).

6 | DISCUSSION

In this article, we have focused on CBC via TETRA networks, a technology that with intersystem interoperability facilitates communication between Norwegian and Swedish emergency service personnel. Long distances and limited resources create special working conditions and technology, which in turn makes shared utilisation of resources easier essential. Both Norway and Sweden are obliged by law to maintain emergency preparedness within their geographical area of responsibility. This includes administering the material resources and always having personnel on standby in case of an emergency. Our interviewees, who represented the aforementioned group of personnel, emphasized the positive impact that improved CBC had had on emergency management and response in their areas of responsibility. During emergencies the required resources could easily be requested from across the border and it was possibility for personnel to prepare both mentally and practically for arrival at the scene of an emergency. Furthermore, when an operation was finished, it was simple to terminate activities. Interviewees in both countries argued that these were the main benefits of CBC via TETRA networks.

Innovations often bring about new ways of operating equipment and may necessitate new work routines and emergency procedures. This has also been the case with the introduction of Nødnett/Rakel communication. As TETRA radio communication has been used in the two countries for several years, the TETRA terminals have become an everyday tool for ESAs. Turoff et al. (2004) emphasize the importance of using equipment such as emergency communication devices routinely to be confident in using them during emergencies. The findings from our study indicate that most issues regarding CBC and the use of the new technology have been the result of personnel not being accustomed to the adjustments required to operate across more than one TETRA network. The procedures for cross-border interoperability are relatively new to the crews, which has resulted in occasional mistakes when using the terminals. Furthermore, our findings revealed differences in how radio communication is practiced in the two countries. Norwegian personnel seemed to maintain a stricter radio discipline in everyday work compared with their Swedish counterparts. Hence, the Norwegians sensed there was a lack of discipline when collaborating with Swedish ESS in CBC.

The historical context of the Trøndelag–Jämtland region is characterized by close dialects across the border, and our findings revealed that language issues in CBC within the region is less of a problem than could be expected. People born and raised close to the national border are usually familiar with both Swedish and Norwegian. To ask a person on either side of the border whether he or she understands a person from across the border is irrelevant, as they belong to the same dialect continuum with just minor differences in grammar and vocabulary. According to our interviewees, adaptive communication, such as adjusting talk speed and the choice of wording, was the norm. This supports the ideas of Maurud (1976) and Braunmüller (2002), who argue that the languages spoken in the case region could be considered dialects of a nonexistent language. The national border does not affect the dialect continuum.

The mobility patterns in modern societies normally result in a mix of dialect origin within each geographical region. In our study we found that *trøndere* (persons native to Trøndelag) and *jämtar* (persons native to Jämtland) understood each other when talking with respectively dialects. By contrast, if one or both were immigrants or inmigrants to either Trøndelag or Jämtland, cross-border conversation usually continued in the respective standard languages, albeit sometimes awkwardly. Those who were not native to the region experienced the most difficulties with the other Nordic language, with respect to both dialectical pronunciation and interpretation of specific dialect words, regardless of their nationality.

The result partly supports the theory of semi-communication (Haugen, 1966), in which the anticipation of being understood and the ability to understand exists, but sometimes meaning is created through guesswork. As confirmed by one of our interviewees, some words cannot be used because the meaning is completely different in Swedish and Norwegian. That is, the symbols (words), thoughts (concepts), and referents (objects) described as the semiotic triangle by Ogden and Richards (1923, cited in Reuter et al., 2012) are not identical between the languages. Our interviewees emphasized that in such situations the ability to use a standard language, pronounce distinctly, and talk loud and clearly was absolutely necessary to avoid misunderstanding and mistakes in critical situations.

Organisational differences seemed to be a more important issue in CBC in the case region than were language differences. This emphasize the importance of exercises since they are known to build trust and strengthen collaboration (Roud et al. 2021). Frequent interaction with other emergency response organisations enable personnel to develop a tacit knowledge about how they operate that is not always expressed in words, and sometimes enriches communication between personnel across organisations. An example is how the Norwegian system uses different hospitals for different injuries, such as sending patients with head injuries to one hospital and patients with broken bones to another). In such instances, tacit

knowledge makes it possible to communicate about where to send the ambulance just by stating the type of injury. The organisational structure when working at the scene of an accident or other type of incident creates different frames of references. In line with the discussion on the semiotic triangle (Odgen & Richards 1923, cited in Reuter et al., 2012), our findings show that questions that could be perceived as simple and straightforward were coded and interpreted in ways that could lead to misunderstandings.

In some instances, a word that is used does not represent the same concept in Norway and Sweden because the concept reflects the different organisations' divergent ways of structuring their workflows. Although Prasanna et al. (2011), Jennex (2004), and Manoj and Baker (2007) do not focus on multilanguage cross-border collaboration, they bring into focus that shared understanding between actors is created with words that are slightly differently interpreted and that could result in divergent comprehensions of emergency situations. Since shared understanding is the basis for coordination and resource allocation, this area needs more attention. Like Reuter et al. (2012), we find that conceptual confusion may lead to misunderstandings in CBC. In a stressful situation, communication should ideally flow effortlessly and not be a reason for hesitation due to difficulties with interpretation and understanding. Contrary to Prasanna et al. (2011) and Jennex (2004), who argue that a common terminology should be used in emergency situations, we found that in some instances our interviewees avoided using professional terminology and instead resorted to using everyday words to avoid misunderstandings. Manoj and Baker (2007) point out that in most cases there is a lack of a shared common vocabulary between agencies, which affects the coordination of a joint response. In our case regions the personnel were, with minor adaptations to the use of words, able to carry out communication within the dialect continuum that exists across the border. However, individuals not born and raised in the border region and thereby most likely not fully familiar with the regional dialects, were at a disadvantage and expressed difficulties in the CBC.

The main conclusions drawn from our study are:

- More easily managed resource allocation was emphasized as an advantage by ESA personnel.
- The dialect continuum was not an issue in CBC for people born and raised in the region.
- Norwegian and Swedish share some words that have different meanings in the two languages, which in stressful situations can be a source of misunderstanding.
- Organisational differences may create a tacit knowledge that is not conveyed in oral communication.
- Minor changes in communication tools impact their use in situ.
- Adaptive communication is important in CBC.

Several words on shared understanding. We observed a discrepancy between how ESAs considered the use of terminology with regard to previous research and therefore future research on the same topic should take the dialect continua into consideration to understand whether it is part of the reason why a discrepancy can be seen.

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DATA AVAILABILITY STATEMENT

Due to ethical concerns, supporting data cannot be made openly available.

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ENDNOTES

[1] An AMK is a Norwegian emergency medical service dispatch centre with the main task of answering the calls for emergency services.

[2] SOS Alarm is a Swedish medical emergency service dispatch centre that connects to all ESAs simultaneously.

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