ABSTRACT

Emergency call takers listen to callers describing mundane errands, but also to callers describing severe accidents, agony and deaths. The emergency setting is further complicated by having to perform triage quickly, but without the possibility of seeing the patient. The setting rests on an imperative of speedy management—there is little possibility of postponing or reconsidering a decision. At the same time, the mode of communication (telephone) may cause an overflow or lack of information, resulting in an uncertain and ambiguous decision-making setting. A focal point for the organization is therefore the individual capability of conducting triage. The organization thus seeks to help call takers by providing organizational routines, which are manifested in decision-support systems, to help them navigate this uncertain and ambiguous setting.

Considering the above, the emergency setting brings a problem to the fore—how do workers in this emotional setting, with features of vivid and interruptive experiences that possibly detour normative decisions, interact with routines that are supposed to provide the stability and support that recurrent decisions can be made under similar conditions? Drawing on the fields of decision making, organization theory and communication theory, the problem is investigated by a series of four studies.

The first study is a field study of the emotional landscape of emergency call taking. Emergency call takers rated callers’ emotional expressions, the level of intensity and need for help. The second study is an experiment, using a speech sample from authentic emergency calls to find out whether expressed emotion and intensity contribute to the perceived need for help.

The third study focuses on the management strategies of call takers. More specifically, how do emergency call takers manage a double-faced set of emotions—i.e. their own and the caller’s emotions—simultaneously? The fourth study focuses on how call takers make decisions, more specifically, how call takers use intuitive and emotional capabilities to complement or challenge rational aspects of the decision-support systems.

The studies reveal that certain emotions occur more often than others and that the level of intensity of expression contributes to the perceived help needed. Call takers have also developed specific emotional management strategies in order to cope with both callers’ and their own emotions. Finally, call takers were found to use rational and formal routines as well as non-formal, intuitive and emotionally based, individual routines in order to derive their decisions. These findings are put into an organizational context in terms of implications for emergency call taking. Limitations to the development of situation-specific expertise and obstacles for organizational learning are identified. Also, emergency call taking would benefit from drawing on knowledge found outside the medical domain. Moreover, the most important finding is that the interpretation of emotional expressions in callers’ voices can trigger modifications of the triage routine being used.
Routes, Routines and Emotions in Decision Making of Emergency Call Takers

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Doctoral Dissertation in Industrial Economics and Management

School of Management
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SWEDEN
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ACKNOWLEDGEMENTS

I remember a time lying in my hammock—wrapped in the shade of a magnolia tree. I was pondering about this project, thinking there were oceans of time to complete it. That was the late summer of 2006. Many things have happened since, but when summarizing the process of writing this dissertation an overarching theme emerges.

When making priorities most things are not either or (even though they appear to be), rather they are both.

The process of writing this dissertation has been negotiated with life in general. Many times it has been a matter of how big a circle that needs to be made—what to include and what to exclude. Dealing with this process has rubbed off on my character like printer’s ink. I have become a father—twice. Inevitably this has caused me to balance work with the obligations of being a father. Thus, in order to set my priorities straight I have been forced to find out what to embrace and what to let go of. I can only hope that I have become a bit more knowledgeable about myself and others in this process at same time as I am thankful for having had the opportunity to conduct my studies.

However, next to personal growth and the inner voyage of writing a dissertation are the people who enable the process. An exhaustive enumeration of these people would of course not be possible (that circle would be too big). Nevertheless, I believe the people contributing to this dissertation can roughly be divided into those who have provided professional advice and social support. Of course, there are individuals who span both categories (again it is both and not either or)! First, I would like
to say thank you to my supervisor Alf Westelius. Your way of letting me find my own path is admirable in all its aspects. Your ability to focus my seemingly disparate thoughts into patterns of recognition has been of great importance to finalizing this dissertation. Erik Lindström (the giraffe manager), you have provided laterality, not to mention the many laughter’s we have had. I would like to thank Lars Bengtsson for letting me be a part of the doctoral program in Industrial Economics and for the many pieces of advice I have got in a very short period of time. I would also like to thank Birger Rapp for a facilitating enrollment in the MIT research school.

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In terms of social support, I allow myself to be more categorical. Martina you have been a part of, not to say running, the logistics when visiting our house. I also owe thanks to my in-laws for letting me making their basement into an academic institution during our visits. Thanks for listening and being there Mathias. A special thanks to my parents for their uncompromising strive to be fair—I will try to retain and reproduce this virtue to the best of my knowledge.
Finally (but also first) Ammi, this dissertation would never have been written if you did not support me. It has been a bit of a struggle, but now we are finally there. Thanks for listening to (sometimes lengthy and uninteresting) discussions, your patience when I have been absentminded. You have also rooted me by directing focus towards what is really important in life—relationships. Then again, you are the mother of our children. I would do the journey again, but only if it were with you! For all its worth, I would be much less without you.

The 30th of April 2012, still in the hammock, but in another place, wrapped in the shade of a cherry tree.
Routes, Routines and Emotions in Decision Making of Emergency Call Takers

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1. Introduction

The emergency number (112) is the first access point in a longer health care chain which provides service to a broad, multicultural community with unique health care needs. The point of access is used by someone who signals distress by making a phone call. A lay perception of the meaning of SOS (in Morse above) states it to be an abbreviation of save our souls\(^1\), but the signal was originally created based on that the three letters were easy to remember and code into Morse, rather than connoting to pastoral work. However, this dissertation will show that the nature of emergency call taking, where call takers listen, prioritize and give advice to callers in need of help, is a multifaceted job that goes beyond protocol-based procedures and lends support to the pastoral definition as well.

Emergency call taking has become a medical and societal resource of increasing importance. Working at SOS Alarm has been described “as one of the most difficult jobs in Sweden” (SOS Alarm, 2011a, p. 7) and it is a setting compromised with communicative difficulties, where small misjudgments can cause severe consequences.

Emergency call taking resembles work conducted within call center, helpline and medical domains. The set-up for work mirrors customer-based call centers since it draws on rationalistic assumptions, aligned with the current Zeitgeist of being clean, fast, precise, nice-to-have and always

\(^1\) Oxford English Dictionary 2 ed
there for us (Dormann & Ziljstra, 2003). Other similarities are seen in reliance on structured work methods, where procedures are molded into information and communication structures (ICTs). However, the medically influenced decisions within this setting also make emergency call taking into a unique work setting. For instance, it is impossible for call takers to either predict content of calls—as can be seen at specific branches of customer-based call centers—or how they develop over time. In turn, this indicates low timing control, but also a high level of uncertainty and ambiguity as it can be difficult to obtain adequate information to make assessments. As opposed to work within the medical domain call takers have to make their assessments using a single sense rather than using multiple senses. Furthermore, call takers mainly make decisions, rather than provide advice as can be seen in helpline settings. The decisions are further characterized by an imperative of speedy management without being able to be postponed in an emotionally volatile setting. Call takers are solely responsible for decisions they make—and they make decisions that are the difference between life and death.

However, during the past 2-3 decades there has been a shift from merely providing for transport of patients to providing pre-hospital care and advice over the phone. Thus, emergency call taking constitutes a multifaceted occupation, where call takers receive, interpret signals, make complex decisions (prioritize) based on often incomplete information as well as save souls by conducting pastoral work when comforting and advising distressed callers. In order to manage such complexities, call takers need to draw on medical and technical know-how as well as on communicative skills in order to delineate symptoms from non-symptoms. Cru-
cial to the communication process is the call takers’ ability to have an empathic stance (SOS Alarm, 2011b) as well as avoid catching on unwanted emotions (cf. Hatfield, Cacioppo & Rapson, 1994; SOS Alarm, 2009c). This communicative skill is essential in order to identify when to verbally comfort or challenge callers in order to obtain adequate information, but it is also important in terms of not letting unwanted emotions detour decisions from prescribed ways of working. Thus, detection and expression of emotion as well as management of emotion constitute important aspects of work—as does following prescribed organizational routines.

In the past, routines have been linked to stagnation (Weber, 1947; Kaufman, 1977), regularity and continuity (Stinchombe, 1959) and inflexibility (Weiss & Ilgen, 1988), having somewhat preserved, but not necessarily contributed to organizational efficiency. Routines and policies are often implemented in order to aid decision making in uncertain situations (Weick, 1969). Routines contribute to facilitation of coordination and control through standardization, provide stability in order to be able to create expectations about others’ actions, facilitate “cognitive economy”\(^2\) as well as bind knowledge, causing individuals with partially overlapping knowledge to be able to share understanding (Becker, 2004).

Contemporary technology enables use and maintenance of routines. For instance, call takers use a communication platform, enabling them to co-operate and share knowledge, store and track knowledge in a highly structured manner. But foremost, routines are manifested in the

\(^2\) Cognitive economy refers to conducting a task with no more than the necessary cognitive effort. In other words, routines may aid in lessening the cognitive strain yet maintaining efficiency.
decision support system which is integrated in the platform. The decision support system functions as a normative backbone for how call takers ought to act by providing suggestions on what to ask when assessing symptoms. In other words, it is an artifact which aids decision making in an uncertain and equivocal situation, helps call takers to coordinate decisions, aids in forecasting behaviors of fellow call takers, lessens cognitive strain, but also constitutes a benchmark for organizational learning as there are performance evaluations associated with fulfillment of the routine.

While routines, from an organizational point of view, are formal and prescribed ways of acting, they must not be viewed as to be applied algorithmically. Instead, it is likely that they are partial depictions of a greater complexity. Thus, individuals do not algorithmically conform to routines, but act based on their current knowledge. There may also be informal agreements among workers—dependent on individual perceptions of best practice—that constitute patterns for understanding and acting in a specific setting. These patterns may or may not be aligned with an organizationally prescribed routine. Routines are causes, but not necessary causes that automatically cause events, rather they function as organizational dispositions energizing conditional patterns of behavior by sequential responding to cues within an organized group (Hodgson, 2008). Thus, alignment between individuals actions and the organizational prescription hinges on understanding (ostensive), in terms of cognition-based processes, and actions (performance) taken in conjunction to that a routine is carried out (Feldman & Pentland, 2003). However, deciding when and how to use routines is also dependent on ones’ emotional stance.
Emotion is intertwined with cognition (cf. Anger Elfenbein, 2007, p. 352), provides for action tendencies at the same time as it has distinct effects on thought (cf. Scherer, 2000, 2005; Lerner & Tiedens, 2006; Small & Lerner, 2008), but has so far been an under-emphasized aspect when trying to understand and act in concordance with routines (cf. Salvato, 2009; Hodgkinson & Healy, 2011). The individual understanding and enactment of routines regards interpreting and managing callers’ and one’s own emotions at the same time as emotions need to be negotiated with the prescribed routine. In the case of SOS Alarm this relationship becomes ever important since the organization provide for equal triage3 to callers by alignment to protocols at the same time as call takers are facing time-criticalness and emotionally volatile expressions from callers. Thus, where routines aim for stability, facilitate cognitive economy and bind knowledge (Becker, 2004) emotions tend to be interruptive, transient, redirect focus, influence cognitive capabilities and prime actions (cf. Scherer, 2005). In other words, there is a tension between organizationally provided routines and the individuals’ own routines, when emotion is introduced in the picture.

A central tenet regarding the tension between organizationally provided routines and individual routines is found in SOS Alarm’s mission of providing help to callers. High reliability organizations, such as SOS Alarm, must conform to a world of limited resources—therefore call takers conduct triage, prioritizing the most ill first (Castrén et al., 2008). However, a desire to provide help to callers expressing similar symptoms

3 Triage refers to categorization and prioritization of patients according to the severity of symptoms and the availability of aid.
also means that discrimination between callers must be done. Decisions must conform to economic resources—since there are only a certain number of ambulances at the call takers’ disposal. Therefore, assigning ambulances is associated with overall costs due to the precision of the decision making of the call takers.

Situations considered as severe, in terms of that they may cause consequences for both the organization and individual callers, are depicted as O’s in Table 1. Making the right decision regards making correct identification of symptoms as well as identifying the correct level of prioritization (HIT-HIT). When the level of prioritization is correct (HIT), but the identification of the symptom is wrong (MISS) the caller gets help. However, this condition may cause confusion since the call taker assessment mismatches the assessments of the operating staff responsible for initial treatment and transport of the patient. On the contrary, when the level of prioritization is failing (MISS) in conjunction to that the symptom is correctly identified (HIT) there may arise additional costs in the healthcare sector or society due to unnecessary waiting times, deaths or additional treatment of patients. Even more crucial is the condition when iden-

Table 1. Categorization of Misjudgments in Emergency Call Taking

<table>
<thead>
<tr>
<th>Identification of Symptom</th>
<th>HIT</th>
<th>MISS</th>
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<tr>
<td><strong>Level of Prioritization</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIT</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>MISS</td>
<td>O</td>
<td>O</td>
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tification of symptom and level of prioritization both fail—situations that are not supposed to happen, but unfortunately do so. All three situations depicted as O’s causes unnecessary economic strain on society. However, since the prevailing decision support system provides suggestions on priorities to make when symptoms are identified it is less likely that there is a mismatch between identified symptoms and prioritizations. Thus, the most common mistake would be when the call taker misidentifies the symptom causing a faulty priority (MISS-MISS). This contributes to depletion of economic resources to a larger extent than the two former mistakes, but is also a sign of how routines (molded into artifacts) may aid triage work.

The emergency response sequence (see Table 2) encloses several steps, where response times and intervals may be extracted to develop

<table>
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<th>Table 2. The Emergency Alarm Sequence (Castrén et al., 2008)</th>
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<td><strong>The response interval of the public:</strong></td>
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<tr>
<td>1) The incidence occurs</td>
</tr>
<tr>
<td>2) The emergency call is made</td>
</tr>
<tr>
<td><strong>The emergency response interval:</strong></td>
</tr>
<tr>
<td>3) The call is answered by the service</td>
</tr>
<tr>
<td>4) A need is identified</td>
</tr>
<tr>
<td>5) A priority is decided</td>
</tr>
<tr>
<td>6) A response is defined</td>
</tr>
<tr>
<td>7) The response/resource is dispatched</td>
</tr>
<tr>
<td>8) Assistance may be given online if indicated</td>
</tr>
<tr>
<td>9) The call is terminated</td>
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common standards (cf. Castrén et al., 2008). The steps of 1, 3, and 7 are steps where core data could be measured in terms of time. Interestingly, standards indicating qualitative aspects of emergency call taking, steps 4, 5 and 6 were not addressed. It is important to state that this is an aspect which is not completely missing in the organization. SOS Alarm is an ISO certified organization. Such certification regards quality assurance of educational and process management. Rather, it is a matter of which aspects that are given precedence in the organization. The current standards of how to derive, and frame decisions—or in other words how to extract information, select, account and enact in decision making—is somewhat black-boxed and signals rationalistic assumptions of how call takers actually manage this process. In turn, it also motivates the writing of this dissertation.

In summary, the capability to delineate symptoms from non-symptoms hinges on call takers’ communicative competence, but must also be seen in relation to organizationally provided routines on how to conduct triage. The communicative competence is bound to individuals in terms of delineating symptoms, via a channel (telephone) with reduced possibilities to obtain information. This process emphasizes on distinguishing what is said from how it is said. Call takers must also empathically guide distressed callers as well as being in control over ones’ own emotions, not letting them interfere with the decision-making procedure negatively. In all, the individual competence regards emotional management of both the caller and oneself—a matter that may be difficult to formalize into a routine. However, the organizationally suggested route to conduct work suggests a route which is highly formalized and standar-
dized. In other words, there is a tension between the individual’s own routines and the organizationally provided routine—a tension which motivates the purpose of this dissertation. Thus, the main purpose of this dissertation is to study emergency call takers:

_to develop understanding of the functions of emotions in routine-based triage._

1.1 Research Questions

Studying the functions of emotions in routines requires an understanding of the emergency setting as a context as well as the role of emotions. However, it is impossible to enumerate all types of studies conducted within the setting of telephone-based triage. Therefore, a sample of studies is introduced here in order to further contextualize the setting and motivate the research questions.

Work-related stress has been studied in terms of call takers’ changing cortisol⁴ levels during their work time (Weibel et al., 2003). The identity of the caller—as being the patient, a relative or being unrelated to the caller—has also been studied. The study found that in emergencies, as opposed to low priority cases, it was a peer or another caller (second or even third party) calling on behalf of the actual patient (Karlsten & Elowsson, 2004). The actual work setting has been characterized by uncertainty, communication difficulties and insufficient resources were individual skills, knowledge, experience, sensitivity, insight, empathy and intuition help aid in making decisions (Forslund, Kihlgren & Kihlgren, 2004). Leprohon and Patel (1995) investigated decision strategies used by

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⁴ Cortisol is a steroid hormone commonly secreted during stress.
triage nurses as a function of task urgency and complexity. One of their findings points to that heuristic rules based on symptoms applies in high-urgency situations—call takers were also observed to be accurate most of the time in these cases. As calls were perceived as more complex more causal explanations were found, but these assessments often turned out to be inaccurate.

Other studies have had a more explicit emotional focus in terms of communication (Tracy & Tracy, 1998) or that call takers conduct emotional labor (Shuler, 1997; Shuler & Sypher, 2000), but also on how the emotional expression of the caller affects the call takers’ possibilities to obtain adequate information. Clawson and Sinclair (2001) stated that emergency calls did not show the prevalence and importance of emotional expression (hysterical callers) that is commonly anticipated by the public. However, while there may be a mismatch between public anticipation and call taker perception of expressions in emergency calls it is also important to emphasize that emotional expressions go beyond hysterical callers.

In two other studies, using computerized automatic detection techniques, Vidrascu and DeVillers’ (2005) showed specific emotional cues (such as fundamental frequency and intensity\(^5\)) to enable discrimination between emotions in French emergency centers. However, emotions were overall best recognized by verbal rather than nonverbal cues (Vidrascu & DeVillers’, 2006). Despite the wide range of these studies, few have addressed emotional aspects of emergency call taking—even fewer have

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\(^5\) Fundamental frequency \((F_0)\) refers to the rate at which the vocal cords fold and close across the glottis and is defined as the lowest period cycle component of the acoustic wave form (cf. Scherer, 1982). Intensity refers to the measure of energy it takes to produce speech and is measured by logarithmic transformation of decibel (dB) (cf. Scherer, 1982)
focused on the interaction of emotion and routines in decision making within this setting. The research herein is set out to start to fill the gap. It does so by getting inside SOS Alarm, closely observing the practice of the emergency call takers.

In order to do research on the interaction of emotions and routines, prevalence of emotions must be determined. Since call takers’ triage work regards healthcare-related assessments, rather than making priorities in police- or rescue-related calls, it is healthcare-related calls that are focused in this dissertation. Furthermore, moving beyond single dimensions, as to which degree callers are hysterical or not (Clawson & Sinclair, 2001; Eisenberg et al., 1986), towards a more multifaceted description of emotional expressions in voices of callers there may be alternative and more nuanced ways to unveil functions of emotions in routines. Thus, a dual first research question regards the emotional landscape of emergency call taking:

**Research Question 1a:** Which emotions do call takers perceive callers to express in healthcare-related emergency calls?

**Research Question 1b:** Which relations are there among types of expressions, their intensity and perceived need of help?

However, establishing a baseline for emotional expression does not necessarily contribute to the understanding of call takers own emotions or how call takers maneuver callers in order to do their job. Thus, the second research question is:
Research Question 2: How do emergency call takers manage callers’ and their own emotions in the triage process?

As a consequence of the research questions, this dissertation demonstrates how call takers deal with the tension of organizational routines (manifested in ICT-artifacts) and individual routines, emphasizing on management of callers’ and call takers’ emotions when making emergency decisions.

1.2 Connecting the Dots of the Studies
Figure 1 shows the relation between the main purpose, the overarching research questions and the research questions in the studies. Furthermore, the type of study and examples of expected contributions are also summarized in the figure.

Certain themes are explored in each study. In turn, the themes are also carried across in a sequence. By viewing the research questions it becomes evident that questions preferably are addressed by means of different methods. As the first research question refers to a description of the emotional landscape and relations among selected variables, quantitative methods are used. In turn, the second research question refers to call takers and callers emotions in relation to specifics of the context (as in routines) and thus a more proximal and qualitative method is used.

The actual sequence progressed through three different stages. First, there was a qualitative stage where initial readings on emotions in ICT-settings together with readings of annual reports and initial meetings
<table>
<thead>
<tr>
<th>Study 1</th>
<th>Study 2</th>
<th>Study 3</th>
<th>Study 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field study</td>
<td>Experimental study</td>
<td>Field study</td>
<td>Field study</td>
</tr>
<tr>
<td>The callers: How do call takers perceive in the voice of emergency call takers?</td>
<td>Affect decisions? How do emotional expressions (of fear) influence call takers?</td>
<td>How do call takers cope with emotional expressions (fear)?</td>
<td>How do call takers make decisions?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Purpose</th>
<th>A Frame of Routine-Based Decision Making Within Organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>To develop understanding of functions of emotions in routine-based triage</td>
<td></td>
</tr>
</tbody>
</table>
with SOS Alarm representatives constituted a conceptual stage helping to craft research questions. Second, there was a quantitative stage. Since it is an inherent facet of human nature to be exposed to as well as experience emotions it would be highly likely that there are expressions from the caller affecting the call taker or that emotion is used as a social signal in decisions. Furthermore, due to the nature of the work setting it is likely that emotions are vivid and volatile. However, in order to create a baseline for a discussion about emotional impact on work life there needs to be a distribution clarifying prevalence of emotions in relation to intensity and perceived help need, hence Study 1.

Since Study 1 had a correlation character and a wider focus, enclosing an emotional palette, a narrower and focused experimental design was chosen in Study 2. This study focused on whether the level of intensity in expressions showed a relationship with perceived help need, as it did in Study 1. The study regarded fear expressions since this was the most common expression in Study 1.

These two studies constituted stage two of the research process. In turn, since Study 2 was conducted on non-call-takers, but with an ecological sample (stimulus set of authentic calls) at the same time as the emotional prevalence was stated in Study 1, a more thorough investigation of how the takers manage callers and their own emotions was motivated. Therefore, Study 3 focused on emotional management strategies of call takers. Finally, Study 4 focused on how call takers balanced verbal and non-verbal information in emergency calls in order to align themselves to organizational routines. Together, the latter two studies constituted the third stage of the research process.
1.3 Demarcations
To further state that it is an informed choice to research SOS Alarm in order to find answers to my research questions I will account for demarcations. I will make these demarcations explicit by addressing SOS Alarm as research setting, units on analysis and sources of data.

1.3.1 SOS alarm: An Arena for Research
Emergency settings hold a number of parameters which are essential if one wants to study functions of emotions in routine-based triage. First, emotions are likely to occur more frequently at SOS Alarm than in other call center settings since the nature of the calls are associated with dramatic changes of callers’ life. SOS Alarm is a high-reliability organization that is accessible 24 hours a day all year round, but also works within a different time-span compared to other call center settings. Decisions are made on the spot with few possibilities to postpone decisions as can be done in for instance helpline settings or customer-based call center settings. The time span for interaction gives possibilities for emotions to have impact on decisions without considerable confounds that may arise in situations where emotions have had the chance to wear off or migrate into other affective states. Second, the setting emphasizes routine-based work. The importance of routines for SOS Alarm is manifested in their vision, mission and core values in terms of reliance on ICT-structures (as means of structuring work and communication). In 2008 a new digital platform (Zenit) was implemented. The platform, which is a telecommunications switchboard, supports computer- and radio-based traffic as well as provides digital maps and decision support structures. The decision support structure is grounded in a Swedish medicine index, which consti-
tutes the backbone for the prioritization routine. The investment of implementing the platform was expected to exceed 250 million SEK ($37 million U.S, SOS Alarm, 2009d). Annually, additional technological investments are made for 20-50 million SEK ($3-7.5 million U.S) while 20-25 million SEK ($3-3.7 million U.S) are invested in maintenance of technology (SOS Alarm, 2011a, p. 8). Third, the setting emphasizes a situation where one party acts with a decision as a response to communication. While this may be found in other settings, it is evident that there are few or none calls that are managed and finalized without a recorded decision in the SOS Alarm setting.

1.3.2 Units of Analysis
Concepts like institutions, norms and conventions would all be applicable if researching collective aspects of the decision making process within the emergency call taking domain. Even though call takers make priorities in co-operation with other call takers, here it is the individual who is in focus. A reason for this is that when call takers co-operate, they receive calls individually, but are also solely responsible for making the priorities. The concept of routines helps bridge different levels of analysis. Routines refer to a collective level of analysis, however, it also connects the micro-level to the collective level of analysis (Becker, 2008). Individuals’ habits or reflected understanding grow into patterns constituting an organizational disposition for action. Thus, while the prescribed routine refers to a collective level, enactment of the routine is on an individual level. In turn, the classification of units of analysis is dependent on the micro, meso and macro level. The micro-level refers to a perception of expressions or acoustic cues in relation to judgments of individuals, but these expres-
sions are also compared across perceivers. The meso-level refers to perceptions of expressions across calls, cases or call takers in relation to prevailing routines at the emergency center. The macro-level refers to a policy level of how emergencies would be managed on a national or international level. The different studies can also be classified in relation to the degree of proximity to the emergency call-taking setting that the studies are researching (see Figure 2).

Figure 2. Levels of Analysis and Degree of Proximity to the Research Setting

Study 1 was a field study focusing on selected variables. Perceptions of emotional expressions, during the opening-phase of the call, were analyzed for patterns across a range of calls. It dealt with expressions across calls at the same time as it was conducted within the emergency setting. Therefore it was closer to the micro than the meso-level of analy-
sis. However, it also had a delimited focus on how emotions relate to routines since it addressed the setting in a reductionist way—by means of selected variables. Thus, it is classified as showing a moderate proximity to the researched setting even though it is conducted as a field study.

Study 2 was an experiment focusing on few selected variables and their relation to specific voice cues in the voice of the caller. Besides the authentic voice sample, the sample was purposely deprived of context. Thus, the study was classified as a micro-level study showing less proximity to the context. Study 3 and 4 were classified as drawing on both a micro and meso-level of analysis as individual and organizational routines are compared and contrasted towards the emotional life of call takers in their setting. Consequently, these two studies show a high degree of proximity to the research setting. Finally, the macro-level depicted in Figure 2, is excluded as a level of analysis since none of the studies addressed how emergencies should be dealt with on a national or international level.

1.3.3 Sources of Data

The purpose and research question of the dissertation reveals that multiple rather than single sources of data are preferable. In order to be able to spot interactions between organizationally provided routines and individual routines there needs to be at least two different sources of data. However, use of several different sources, emphasizing different levels, passive and active participation, perceptions of events as well as recording of events in real time, would help reveal a credible and valid description of the triage process. Thus, choosing which data sources to include for analysis was an expansive rather than restricted activity.
1.4 Summary of Chapter 1

In all, emergency call taking is a complicated occupation where the margin for error is small. Mistakes may cause severe consequences—in worst case scenarios casualties, but mistakes may also cause economic strain on the organization and society at large. The occupational role is therefore different from regular customer-based call center work even though the set-up for work is similar. Emergency call taking has also expanded its work domain from being an organization that provides for transport of patients to an organization that provides for transport, advice and pre-hospital care of patients. All this happens in a telephone-based, uncertain, ambiguous and emotionally volatile setting with a primacy for fast and accurate decision making.

The conditions for work causes reliance on routine-based methods—framed in IT-structures—in order to guarantee public safety. Thus, emergency call takers need to possess multiple competencies in terms of medical, technical, and emotional skills. Conditions for work, such as reliance on ICT-structures, time-criticalness and communicative difficulties are also argued to constitute fertile soil for tensions between organizationally provided routines and individual routines. In other words, even though routines provide a decision aid, the routines are unlikely to be applied algorithmically. Routines hinge on understanding and action (Feldman & Pentland, 2003), but also on emotional aspects of individuals. While there are studies focusing on the difficulties of being a call taker, call takers conducting emotional labor (Tracy & Tracy, 1998), and call takers’ interpretation of hysterical callers (Eisenberg, 1986; Clawson & Sinclair, 2001), there are few studies that address the intersection
of emotional expression, experience of these expressions and one’s own emotions in decision making of call takers.

Furthermore, rationalization of work primes focus on measureable units. A focus on times and intervals somewhat overlooks more qualitative aspects of emergency call taking such as extracting, selecting, accounting for symptoms and enacting decisions (cf. Castrén et al., 2008). Taken together, this point to an empirical gap of emotional influence in decision making in mediated environments and of how call takers manage their own and the callers’ emotions in the triage process. These matters are researched in four studies.

Study 1 focuses on call takers’ perception of emotional expressions and their relation to intensity and help need in authentic emergency calls. Study 1 is a correlation study, preventing causal inferences, Study 2 has an experimental design and focuses on the relationship between fear expressions and perceived intensity and help need in a non-call-taker sample. Study 3 returns to the call-taker context, by focusing on how call takers manage their own and the callers’ emotional expressions. Study 4 focuses on how call takers complement the decision process with non-verbal information in order to be able to conform to organizational routines and use of ICT. In all, the dissertation is expected to have implications for decision quality, development and sustainment of functional routines, learning and education of call takers, but also have a wider implication for communication and decision making in mediated settings.
2. The Research Setting: Description of SOS Alarm

SOS Alarm is appointed by the Swedish government to be in charge of the public emergency number 112. Callers may be helped by ambulance, police, fire brigade, air and sea rescue, mountain patrol and clergy on call by calling this number. SOS Alarm AB was founded in 1973 and is owned by the Swedish Government (50%) and Swedish Association of Local Authorities and Regions (SKL; 50%). There are 18 emergency centers that function within 3 major geographical production areas (North, Middle and South).

The mission of SOS Alarm is regulated by “Alameringsavtalet”, which states that municipalities, county councils and governmental rescue services should be offered to establish a contract with SOS Alarm regarding emergency services. According to the contract, SOS Alarm should provide an efficient service. The fulfillment of the contract is monitored by the Swedish Civil Contingencies Service. The municipalities and county councils are not bound to accept contractual agreements provided by SOS Alarm; however a majority of Swedish county councils have done so.

The organization deals with a range of different kinds of calls. Police matters are typically transferred to regional police operation centers unless there is an evident danger for the callers’ life. In such cases, the call taker handles the call. Rescue matters regard alerting and directing

---

6 Some county councils have contracts with call centers managing health care related calls. All emergency calls are still channeled to SOS Alarm, but health care related matters are transferred to an external call centre which then manages prioritization and ambulance direction. Examples of this are found in Uppsala, Södermanland, Västmanlands county councils as well as Gotland municipality.
fire brigade resources to fires and large scale traffic accidents. Finally, SOS Alarm manages health care matters by setting priorities, alerting and directing ambulances.

SOS Alarm had on average 873 employees over 2010, with an average age of 43 and 62% of the workforce were women\textsuperscript{7}. Between 2007 and 2009 the average turnover rate for metropolitan areas reached 15.2\%\textsuperscript{8}. Call takers are accessible 24 hours a day, 365 days a year, coordinating emergency services. On yearly basis, call takers answer, make judgments and prioritize approximately 3.5 million calls which fall under cat-

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{sos_alarm_call_takers.png}
\caption{SOS Alarm Call Takers at Work}
\end{figure}

\textbf{Reprinted with permission by SOS Alarm.}

\textsuperscript{7} According to the annual report of 2009.
\textsuperscript{8} This is considered to be a relative high turnover rate. In particular since turnover in regular call centers show similar numbers and are also in general considered to have high turnover. For instance, the average internationally in general call centers reaches approximately 20% , but in Sweden the average is 7%-15%. Such numbers are based on statistics from internal call centers, showing a turnover rate of 8-14%, as well as external ones, showing a turnover rate of 19-20% (Callcenter branschen, 2008/2009)
egories of need of health care, police, fire rescue or clergy on call (see Table 3). There is also a large additional post that regards transferred calls to for instance a helpline regarding poison information.

Table 3. *Calls to SOS Alarm Between 2006-2011*

<table>
<thead>
<tr>
<th></th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Assigned ambulance</strong></td>
<td>623 268</td>
<td>527 889</td>
<td>613 464</td>
<td>658 414</td>
<td>654 944</td>
<td>712 652</td>
</tr>
<tr>
<td><strong>Assigned fire</strong></td>
<td>103 060</td>
<td>81 979</td>
<td>91 029</td>
<td>92 820</td>
<td>93 863</td>
<td>91 132</td>
</tr>
<tr>
<td><strong>Police</strong></td>
<td>627 301</td>
<td>715 191</td>
<td>613 970</td>
<td>618 670</td>
<td>616 913</td>
<td>610 213</td>
</tr>
<tr>
<td><strong>Priest on call</strong></td>
<td>70 589</td>
<td>67 223</td>
<td>68 109</td>
<td>80 821</td>
<td>88 965</td>
<td>95 298</td>
</tr>
<tr>
<td><strong>Additional-</strong></td>
<td>164 909</td>
<td>94 048</td>
<td>90 669</td>
<td>76 444</td>
<td>64 410</td>
<td>53 892</td>
</tr>
<tr>
<td><strong>ly transferred</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>calls</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>A-numberless calls</strong></td>
<td>NA</td>
<td>NA</td>
<td>426 142</td>
<td>464 030</td>
<td>562 488</td>
<td>528 627</td>
</tr>
<tr>
<td><strong>Silent calls</strong></td>
<td>1 011 507</td>
<td>865 126</td>
<td>746 329</td>
<td>698 271</td>
<td>658 367</td>
<td>640 820</td>
</tr>
<tr>
<td><strong>Unaware calling 112</strong></td>
<td>654 451</td>
<td>350 810</td>
<td>191 051</td>
<td>147 193</td>
<td>122 244</td>
<td>120 416</td>
</tr>
<tr>
<td><strong>Nuisance calls</strong></td>
<td>225 347</td>
<td>206 883</td>
<td>114 530</td>
<td>98 105</td>
<td>88 556</td>
<td>84 826</td>
</tr>
<tr>
<td><strong>Practice/test</strong></td>
<td>NA</td>
<td>37 861</td>
<td>14 816</td>
<td>11 183</td>
<td>14 369</td>
<td>7 845</td>
</tr>
<tr>
<td><strong>Calls by mistake</strong></td>
<td>296 071</td>
<td>443 608</td>
<td>406 948</td>
<td>444 428</td>
<td>437 810</td>
<td>421 409</td>
</tr>
<tr>
<td><strong>Reprimanded, the police</strong></td>
<td>NA</td>
<td>195 382</td>
<td>177 177</td>
<td>148 935</td>
<td>138 151</td>
<td>125 133</td>
</tr>
<tr>
<td><strong>Total calls</strong></td>
<td>3 776 503</td>
<td>3 586 000</td>
<td>3 554 234</td>
<td>3 539 314</td>
<td>3 541 080</td>
<td>3 492 263</td>
</tr>
<tr>
<td><strong>Emergency calls</strong></td>
<td>1 589 127</td>
<td>1 486 330</td>
<td>1 477 241</td>
<td>1 527 169</td>
<td>1 519 095</td>
<td>1 503 187</td>
</tr>
<tr>
<td><strong>Non-Emergency calls</strong></td>
<td>2 187 376</td>
<td>2 099 670</td>
<td>2 076 993</td>
<td>2 012 145</td>
<td>2 021 985</td>
<td>1 929 076</td>
</tr>
</tbody>
</table>

However, a vast body of these calls (approximately 60% of the 3.5 million) is deemed to be unnecessary calls such as A-numberless calls\(^9\), si-

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\(^9\) These calls do not have a number identity or an identity that may be automatically identified by computerized systems at SOS Alarm. These calls are typically silent calls and types of calls that are expected to increase. Car manufacturers have reported that
lent calls, callers unaware of calling 112, nuisance calls, practice calls (made during education of new call takers) as well as calls where callers are reprimanded to call the police due to non-urgencies (see white rows in Table 3). The number of calls has remained rather constant between the years 2006 and 2010.

During 2009, the emergency center in this study renewed its contract to prioritize health care related issues and routing ambulances in the region. The assignment included medical management of emergency cases and urgent medical advice while waiting for an ambulance. The contract caused organizational changes in terms of that the emergency center should have nurses who made the medical assessments in all health care calls and that the organization should have access 24 hours a day to nurses who possess higher medical expertise.

The local emergency center had four different shifts that call takers could schedule themselves on. Each of the shifts was 8 hours, enclosing half an hour lunch and short breaks. During dayshifts, a voluntary debriefing session, lasting half an hour, was offered the employees. The call takers worked independently in an office landscape, but were also jointed and cooperated through a network-based platform called Zenit. The platform enabled transfer of cases from call taker to call taker as well as between call takers and different public authorities. The platform also provide interview and decision support in terms of the Swedish emergency medicinal index. The medical assessment is carried out dependent on the specific contractual agreement that is established with the region they intend to install numberless phones in new cars that will send out an alarm in case of an emergency.
emergency center is located in. The most regular forms of assessment are carried out as follows:

- The call taker sets the priority and makes the alarm to ambulance services.
- The call taker is aided by the medicinal index in order to make the priority. A few emergency centers have, according to contractual agreements, nurses hired by SOS Alarm. The call is transferred to the nurse if the emergency call regards a medical assessment.
- Some emergency centers have nurses employed by the respective county council. These nurses have a part-time employment at the emergency center and are responsible for making the medical assessments.
- All of the emergency centers have a higher medical competence in terms of doctors and nurses who can be consulted over the phone if symptoms are ambiguous or if the call taker/nurse is uncertain.

The call takers use an electronic emergency medicine index providing decision support when making priorities. The index provides decisional support by providing an overview of categorized symptoms (ranging from allergies to assault) with attached suggestions of priorities errand case should have on an ascending scale ranging from 4 to 1 (where 4 is the least severe and 1 is most severe). Juxtaposed to the index is also an interview guide with sample questions on what to ask for each symptom. Priority 1 (coded as red) regards vital functions, such as lowered awareness, respiration and circulation, making the need for help highly evident. Priority 2 (coded as yellow) emphasizes on criteria that are critical and that without hesitation should be examined by healthcare staff. Priority 3
and 4 (coded as green) are considered less critical. Priority 3 regards aspects where patients are needed to be examined by healthcare staff but within a reasonable wait. Priority 4 involves patients who do not need medical treatment for the trip to the hospital, which may result in other means of transportation.

The initial interview questions are:

- What has happened?
- Where did it happen?
- What phone number are you calling from?

During 2010, the emergency center implemented an improvement of the decision support system in terms of adding questions regarding vital parameters at the initial stage of the interview (see Table 4). SOS Alarm emphasizes that call takers ought to have knowledge of their spe-

Table 4. Sample Questions Associated With the Prioritizing Routine.

<table>
<thead>
<tr>
<th>Health Care Start Card</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cessation of Breathing?</td>
<td>Yes</td>
</tr>
<tr>
<td>Unconsciousness?</td>
<td>Yes</td>
</tr>
<tr>
<td>Affected Breathing?</td>
<td>Yes</td>
</tr>
<tr>
<td>Affected consciousness?</td>
<td>Yes</td>
</tr>
<tr>
<td>Affected circulation?</td>
<td>Yes</td>
</tr>
<tr>
<td>(Pale/Coldsweaty/Bleeding/Fainting)</td>
<td></td>
</tr>
<tr>
<td>Affected by pain or feelings of discomfort?</td>
<td>Yes</td>
</tr>
<tr>
<td>Violence/Trauma/Assault</td>
<td>Yes</td>
</tr>
<tr>
<td>Suspicion of poisoning/overdose</td>
<td>Yes</td>
</tr>
<tr>
<td>Suspicion about suicide or severe psychiatric problems</td>
<td>Yes</td>
</tr>
</tbody>
</table>
cific region and local markets in order to provide for fast help. Potential call takers are recruited by means of interviews, tested in problem solving, simultaneous capacity and stress management with the aim to provide for unique SOS Alarm competence. More specifically, SOS Alarm states desired traits as being a good listener, be able to see patterns, have an ability of perspective taking, constantly be accessible, provide for unique needs and conditions of the callers, make decisions and prioritize in complex situations, communicate measures for help in a situation which is characterized by time pressure. Furthermore call takers should show empathy when analyzing and managing the calls. Vivid emotions are commonplace and therefore call takers also need to be emotionally competent.

Call taker work involves aspects of managing emotions of both caller and oneself. This is achieved through alignment of institutional feeling rules such as the one expressed in the educational material of emergency call takers:

“…Being a professional means keeping a cool head and warm heart. We must allow our feelings to be included, to get to know them. At the same time we must suppress their expressions when we act quickly”. (Internal educational material)

The call takers complete continuous internal education, but accumulated experience derived from continuous call taking is also important. Prior to becoming a call taker, an education process progresses in three sequential stages. The whole process takes about a year and costs approximately 450 000 SEK ($ 70 000 U.S). Call takers are certified on a yearly basis and get approximately 45 hours of competence development annual-
ly, mainly accomplished through an electronic learning management system.
3. Conceptual Framework

There are a number of literatures that may be used to contextualize the research setting. Thus, there is reason to be selective among literatures. To further explicate my reason for choosing literatures I will use Figure 4

![Figure 4. Elements of the Setting with Corresponding Choice of Literature](image-url)

- **(1) The Setting for Communication:**
  - Brunswik’s Lens Model
  - Media Choice Theory

- **(2) Contextual Conditions for Call Takers:**
  - Emergency Call Taking
  - Foundations for Organizational Learning
  - Routines
  - Routes for Establishing Routines
  - The Organizational Form and Precedence of Knowledge
  - The Use of Feedback

- **(3) Individual Capabilities:**
  - Decision Theory and Medical Decision Making
  - Affective Influences on Decisions
  - Dualistic Assumptions of Information Processing
  - Decoding of Emotional Expression
  - Emotions in Organizations
  - Transferring Emotion
  - Emotions, Judgment and Decision Making in an Organizational Setting
as a point of departure. My choice aims to integrate three elements of the emergency setting, (1) the mode for communication, (2) contextual restrictions and enablers as well as (3) decision making capabilities of individual call takers. In turn, this draws on writings spanning decision making, organization theory and communication theory. These streams of literature are connected in terms of that the concept of emotion is carried across the literature.

Firstly, in order to set priorities, communication between caller and call taker need to occur. The communication can roughly be divided into verbal, nonverbal (Argyle, 1994) and silence. Since understanding of the emergency call is dependent on expression of the caller as well as apprehension from the call taker end a communication theory need to account for both expression and apprehension. Brunswik’s lens model (1952, 1956) is believed to do so. Since communication is vocal, I briefly review constraints and possibilities of using telephone as a medium for communication by turning to media choice theories—this review is further extended when elaborating on individual capabilities to decode vocal emotion.

Secondly, I turn to review the emergency call taking setting. The decision making process in this setting does not occur in a vacuum, but rather hinges on interaction between individual capabilities and organizational structures in terms of how call takers may compensate for single modal communication. In parallel to the constraints of the medium, I account for contextual conditions in terms of prescribed organizational action (routine-based work), but also the process of learning such work. The latter is further contextualized by elaborating on how different kinds of
organizations draw on different kinds of knowledge as well as which role feedback has in order to develop expertise.

Finally, the decisions that are made are healthcare related, which in turn rests on assumptions of medical decision making. Medical decision making originates from rational assumptions, but has also been influenced by studies on expertise and intuition. This is the reason why I review two different modes of information processing. In turn, the dual system emphasizes processing of affect as well as deliberate processing, which is why I elaborate on emotions and their influence on decisions. Within the section where emotions are addressed, I also account for possibilities to decode and transfer emotion in an organizational setting.

3.1 The Setting for Communication

3.1.1 A Lens Model of Emotional Communication

Throughout the dissertation, communication is aligned with Brunswik’s lens model (1952; 1956). The use of Brunswikian theory spans studies in decision making (cf. Cooksey, 1996) to communication of emotion in music (cf. Juslin, 1998). Therefore it is a useful candidate when addressing matters of decision making in settings that are vocally primed. The model also coincides with the view that individuals act on imperfect information rather than exhaustive information. Individuals construct their perceptions. The model is also applicable for analysis on different levels, but in this dissertation the unit of analysis is individual to individual, rather than group to group, with a specific focus on the perceiver end.

Originally, the lens model was developed to depict perception as a matter of focusing and rearranging cues in a world of scattered and inter-
changeable cues. Brunswik’s model concerns uncertainties associated with the perceiver’s world and accompanying adaptive interrelation to environment and people (Cooksey, 1996; Hammond, 1966). In other words, efficient communication or achievement of a distal variable (what is to be perceived) occurs through use of proximal cues (sources of information). The proximal cues, however, overlap only probabilistically with the distal variable which complicates communication. The perceiver end is therefore argued to rely on vicarious functioning; as in acting as an “intuitive statistician”, combining, judging and shifting attention from unavailable to available cues. In other words, the perceiver aims at “smallness of error at the expense of highest frequency of precision” (Brunswik, 1956, p. 146). The correlation between a distal variable and a certain cue is argued to describe ecological validity. In other words, ecological validity refers to how well the cue represents the environment in an accurate manner. The correlation between the cue itself and the perceiver’s judgment is called cue utilization and refers to what extent the cue is used by the receiver as means for representing the environment (see Figure 5). At a first glance the lens model may seem simplistic and similar to other communication models. A perceiver tries to make sense of an imperfect depiction of the environment through attending to and rearranging of cues. However, the model also differs from other models. Shannon and Weaver (1948, 1949) emphasized the left side of the model; through the sender and channel the receiver passively gets the message, hence the term receiver. Brunswik’s model (1952; 1956) is weighted towards the right; perceivers (not receivers) actively construct perception of an array of cues by rearranging and appropriating the cues.
Such a claim corresponds better to the call taker who tries to make sense of calls in order to make decisions.

**Figure 5. A Modified Version of Brunswik’s Lens Model (1952; 1956)**

In turn, the Brunswikian model connects with both organizational routines prescribing what to do and individual capabilities of detecting vocal emotion in terms of what facilitates and what may cloud decisions. Juxtaposed to addressing emotional communication, I will review media choice theories since they explicate that some media are more permeable than others, but also that in-depth knowledge about a situation may compensate for insufficient communication.

### 3.1.2 ICT Related Communication Theories

In media richness theory (MRT) media is categorized as to its possibility of feedback, possibility to express cues, maintenance of personalization
and how it houses linguistic differentiation. In MRT, media are ranked from richest to leanest in descending order: face-to-face, telephone, written addressed documents, unaddressed documents and numerical documents (Daft & Lengel, 1984; Daft, Lengel & Trevino, 1987). Daft and Lengel (1984) claimed that different kinds of media are—or should be—chosen depending on the purpose of the communication. To provide for efficient communication, the choice could enhance or reduce richness in communication in order to reduce either uncertainty or ambiguity (equivocality). In situations calling for uncertainty reduction and collection of relevant data, a leaner medium would be preferable and in situations were equivocality resolution is important, as in discussions or negotiations, rich media would be better suited.

When generalizing, however, media trait theory establishes a causal link between actors, who rationally and purposely choose media, to communicate and characteristics of technologies and specific tasks (Daft & Lengel, 1984). Similarly, reduction in co-location, synchronous communication, facial cues, body language and spoken words impede naturalness of communication (Kock, 2004). In turn, low naturalness leads to compensating techniques with increased cognitive effort on behalf of the perceiver. However, individuals engaging in compensatory encoding may experience encumbered communication (Kock, 2007) by establishing “good enough communication”, since learning occurs through interaction (DeLuca, Gasson & Kock, 2006) and this is despite the fact that they are using a medium with low “naturalness”. Richness/naturalness of media is not only associated with the characteristics of the medium, but also with user perception of the same characteristics. The physical characteristics
are central, but even more important are the users’ perceptions of them. These are argued to depend on experience from previous interactions with users at the same time as the perception develops over time (Carlson & Zmud, 1999). It seems natural that individuals try to compensate for channel constraints by adaption. The latter is similar to adaptive structuration theory, proposed by DeSanctis and Poole (1994), which views physical characteristics of the medium as being appropriated and used dependent on how physical characteristics are understood. However, understanding is appropriated and modified according to existing social structures rather than being individual capabilities. Thus, it is not only the actual medium that contributes to communication, but also contextual understanding.

Somewhat contrary to stringent forms of media trait theory, social influence theories do not view media as holding characteristics of objective physical properties of technology (Fulk, Schmitz & Steinfeld, 1990). Rather, communication is a matter of social and institutional context (Yoo & Alavi, 2001) and observation and adjustment to emotional reactions of co-workers’ behaviour when choosing media (Fulk, Schmitz & Steinfeld, 1993). In other words, individuals socially construct perceptions of richness in media since they have knowledge about their context that may compensate for loss of specific media characteristics (Lee, 1994).

In all, telephone-based communication is a relatively rich medium, but at the same time it lacks visual cues which in turn may complicate communication. Thus, call takers are bound to commit to the use of (vocal) cues at the same time as contextual parameters such as prevailing routines constitute boundary conditions for communication.
3.2 Contextual Conditions for Call Takers

3.2.1 Emergency Call Taking

Emergency call taking is a context where different types of research have been conducted. Early work in the field regarded the interactional structure of calls made to emergency centers (Whalen, Zimmerman & Whalen, 1988; Whalen, Whalen & Zimmerman, 1990; Zimmerman, 1984, 1992a, 1992b). Studies have come to emphasize accuracy of medical assessment, concerns related to the communication process such as emotional expressions of callers to call takers, development of emotional management strategies among call takers and decision making in this volatile environment.

Primarily, the setting has been researched using a medical perspective—here the research is vast—but the setting has also been researched using other vantage points. The research within the emergency call-taking domain is therefore somewhat fragmented and difficult to review in a uniform and representative manner. Even though work is regulated and routine-based per se, there are differences in routines and standards between countries as well as between single emergency centers within countries, preventing direct comparisons. In fact, the Emergency Data Project (2003)\(^\text{10}\) concluded that there are common denominators among European countries in terms of how work is conducted, but also that there was a lack of standards. The emergency systems are commonly

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\(^{10}\) The Emergency data project is a network which was initiated in 1996 and consists of European experts from various disciplines within the healthcare domain. They work in order to develop best practice and standards in order to be able to compare emergency service systems within and between countries.
delivered by several different providers as well as have different funding mechanisms. There has also been a lack of clinical governance which has resulted in lack of feedback as well as there has been a lack of standardization of the education and training that underpins titles in the emergency setting.

Furthermore, there has been a lack of standardized terminology within the field—a matter which Castrén et al. (2008) addressed with the purpose of initiating steps towards standards that facilitate regional, national and international comparisons when conducting and reporting research. However, these standards mainly describe a process-based approach where collection of core data comprises time of incident, the time the call is answered by the service and when resources are assigned. “Soft” issues such as how the need of the caller is identified, how the priority is decided as well as how the response is defined were mentioned as important stages of the chain of decision making. However, attention was not directed at how to develop standards or collect core data regarding these issues. Thus, important aspects of emergency call taking seem to have been somewhat black-boxed.

A Swedish study conducted by Forslund, Kihlgren and Kihlgren (2004) described the setting of emergency call taking as an uncertain setting, filled with communication difficulties and insufficient resources. Individual skills, knowledge, experience, sensitivity, insight, empathy and intuition helped bridge difficulties of work. A Canadian study focused on occupational stress of emergency call takers and found aspects of work to induce stress in terms of: decoding and dispatching on deadline, functioning as conduits of information, call-center-like working conditions, orga-
nizational and management issues, including inadequate supervisor support (Gurevich et al. 2006).

In the vein of emergency call taking as a stressful environment Weibel et al. (2003) measured stress by gathering diurnal salivary cortisol levels of 8 emergency call takers (matched with a control group of 8 subjects). The salivary samples were obtained during workings hours (9 AM to 7 PM) and the results showed significantly increased levels of cortisol in the working emergency call takers, as opposed to the control group, regardless of time of day. The results further indicated that the emergency call taking setting is a stressful environment since the cortisol levels were positively correlated with measures of emotional stress.

Besides stress, the call taker setting seems to be an uncertain context. Uncertainties in the setting may reside in difficulties of obtaining adequate information. It may be that communication is tainted by information which is not directly related to the medical condition or that callers are not patients themselves—being a second or third party caller. Karlsten and Elowsson (2004) stated that in low priority cases, as opposed to high priority cases, it was the patient themselves who made the phone call. Thus, according to Karlsten and Elowsson (2004), in high priority cases, it is more common that someone else makes the phone call—a peer, relative or even someone who is being unrelated to the caller. These uncertainties were concluded to pose difficulties for effectively and accurately assessing patients’ conditions.

In terms of decision making, Leprophon and Patel (1995) suggested an interesting differentiation of decision-making strategies regarding telephone-based triage. In highly urgent calls, call takers were accu-
rate and fast in making decisions—suggesting use of heuristic rules as the primary decision mode. In other words, highly urgent situations seemed to be distinguished with relative ease as opposed to moderate and low priorities. Decisions in situations of moderate urgency coincided with increasing case complexity and more causal explanations due to increased backward and forward reasoning. This pattern held the highest percentage of inaccurate decisions (mostly false positives). The third pattern, low urgency, regarded deliberated problem solving where nurses made fewer errors in situations of moderate urgency, but more errors than in immediate response situations. The latter pattern involved backward-directed reasoning in terms of making assessments of the whole situation, identifying basic needs of the patient, before referring them to the correct institution for care.

The accuracy of the medical assessments call takers make is difficult to assess since feedback loops between the emergency center and operative field personnel is rare. A Swedish study by Lindström et al. (2010), focused on the feasibility of a computer-assisted feedback system between two ambulances and one emergency center. In total 240 feedback codes contained a 92% agreement between the call taker and ambulance personnel regarding their assessment. The most common feedback code that was sent was “agree with the dispatchers’ assessment”. Thus, the conclusion was that the feasibility of the system was acceptable due to its high level of agreement.

Other studies have had an emotional focus in terms of that emergency call takers conduct emotional labor (Shuler, 1997), a work role where they may align themselves to organizational display rules, but may
feel in a different way than what the display rule prescribes. However, Shuler and Sypher (2000) emphasized that emergency call takers also view this kind of work in terms of a comic relief, as a fix and as an altruistic act. On a similar theme, Tracy and Tracy (1998) investigated emotion rules, and the communicative devices call takers use to manage emotion, suggesting modifications of the emotional labor literature. They proposed more careful investigation of the effects of how call takers internalize organizational display rules, and the way self-talk and talk among call takers may render reappraisal of severe situations. Furthermore, Tracy and Tracy (ibid) suggested that double-faced management (managing one’s own feelings and the callers’ emotion) and how neutrality may be accomplished were important aspects of the setting.

In an early American study of emotional influence on decision making in the emergency context, emotional content of calls regarding cardiac arrest (N = 516) were compared with calls (N=146) which reported non-arrest situations (Eisenberg et al., 1986). Using 1-5 ratings (1 equal to normal conversation speech) and 5 (so emotionally distraught that information could be obtained only with great difficulty), revealed a mean emotional content of non-arrest calls of 1.4 while the cardiac-arrest calls was slightly higher, showing a mean of 2.1. Similarly, Clawson and Sinclair (2001) stated that emergency calls did not show the prevalence and importance of emotional expression (hysterical callers) that is commonly anticipated by the public. The mean (using the same scale as in Eisenberg et al., 1986) was 1.05 for British Columbia and 1.21 for New York State. While there may be a mismatch between public anticipation and call taker perception of expressions in emergency calls, it is also im-
important to emphasize that emotional expression goes beyond hysterical callers. There is a range of emotions that may influence perception of the situation and how information in the situation is processed by both caller and call taker.

In yet two other studies, using automatic detection techniques, Vidrascu and DeVillers’ (2005) showed that specific emotional cues (such as fundamental frequency and intensity\textsuperscript{11}) enable discrimination between emotions in French emergency centres. However, emotions were overall best recognized by verbal rather than nonverbal cues (Vidrascu & DeVillers’, 2006).

In summary, research within the emergency call taking setting provides concurrent perspectives ranging from clinical medicine-based to management-based studies of the setting. Despite differences within and between countries, work is also believed to share characteristics of being routine-based, involve stress, uncertainties and communication difficulties. In turn, these conditions make decision making complicated and difficult to evaluate in terms of accuracy ratios due to small samples. Related to studies of communication and decision making in emergency call taking there are studies of the emotional expression of callers. However, these studies have typically focused on hysterical callers or been assessed with automatic and computerized techniques rather than letting call takers focus on callers multifaceted expressions.

\textsuperscript{11} Fundamental frequency (F\textsubscript{0}) refers to the rate at which the vocal cords fold and close across the glottis and is defined as the lowest period cycle component of the acoustic wave form (cf. Scherer, 1982). Intensity refers to the measure of energy it takes to produce speech and is measured by logarithmic transformation of decibel (dB) (cf. Scherer, 1982)
3.3 Prescribed Organizational Action

3.3.1 Routines

Concepts that capture recurrent patterns of thoughts and actions with the purpose to prime problem solving have been viewed from different perspectives and on different levels for a long time. On an individual level of analysis, habits (cf. Hull, 1943) and scripts (cf. Abelsohn, 1981) have been studied. The concept of habits unfolds into behaviors that establish a link between an evoking stimulus and an action. If the behavior link is efficient it is traced into being automatic, unaware and unintentional (Bargh, 1994). Additionally, scripts focus on action sequences within mental schemas. However, as opposed to habits, they are not just response programs, but knowledge structures which give access to symbolic representation as well as to direct experience (Abelsohn, 1981). Thus, the concept of scripts implies that deliberate thought may affect a pre-determined action sequence, rather than being automatic and out of awareness.

On an organizational level of analysis, concepts such as policies (Beach, 1990), production rules (Payne, Bettman & Johnson, 1993), but more importantly routines (March & Simon, 1958; Cyert & March, 1963; Thompson, 1967; Nelson & Winter, 1982) have been studied. Routines constitute an interesting concept since it is considered as a behavioural regularity, a pattern of interaction on both the individual and the collective level and a cognitive regularity in terms of rules and standard operating procedures (Becker, 2004).

In turn, routines are claimed to facilitate coordination and control through standardization. Routines provide for behaviour stability since expectations of others can be formed and routines facilitate cognitive
economy in terms of that individuals do not have to be completely attentive when following them. Finally, routines bind knowledge by functioning as behavioural capabilities for organizations and individuals (Becker, ibid). However, the routine literature rests on different, but overlapping fields of research.

Reasoning about capabilities conforms to a discussion found in organizational economics. Routines are entities, “black boxes” which aid in coordinating, creating and changing firm performance. Within the capability perspective, individuals are assumed to act in concordance with a prescribed routine in a bounded rational manner (cf. Parmigiani & Howard-Grenville, 2011).

Another perspective, deriving from organizational theory, puts practice to the fore by emphasizing internal dynamics of routines. Here it is not the firm that is in focus, but rather how individuals and artifacts influence routine performance. Individuals are believed to have motives, intentions and understandings constituting the base for maintenance and change of routines, rather than always acting according to what the routine specifies.

Despite the different views put forth here, there is also overlap between the perspectives. Parmigiani and Howard-Grenville (2011) identified four themes where the capability and practice perspectives overlap. First, despite the previous preference for viewing routines as an organizational matter, individuals are likely to play a crucial role. Individuals function as either a carrier of routines from firm to firm or that their actions cause reproduction or change of a routine. Second, tacitness matters, either because degree of complexity and ambiguity of routines prevent
transference from firm to firm and therefore contributes to a business advantage or because of how individual knowledge plays out in performance. Third, while the capability perspective is concerned with stability, routines may be micro-foundations that cause firms to be both efficient and flexible (Adler, Goldaftas & Levine 1999). Thus, a functional routine may allow firms to operate efficiently at the same time as the firm is superior in adopting different operations. In other words, firms may be ambidextrous and able to explore and exploit simultaneously and thus provide for both stability and change as a consequence of their routines.

The practice-based perspective, on the other hand, emphasizes routines to be driven by variation. There may be variation among individuals in terms of how they understand and enact routines. However, individuals may also show stable patterns of understanding and enactment of routines, but the understanding and performance is at variance with the intention of the routine. In other words, the same process contributes to both stability and change. Finally, both perspectives argue importance of contextual conditions. For instance, the capability perspective has focused on firm specificity, such as which production factors and industry attributes that are considered important. The practice perspective has also done so, but from a vantage point of situated action—specific people do specific things at specific times—somewhat neglecting organizational level attributes.

While there are similarities between the perspectives, there is a reason to focus specifically on how change of routines may be accomplished by drawing on research from the practice perspective. Feldman and Pentland (2003) separated a routine into an ostensive and a perfor-
mance aspect. The ostensive aspect refers to an abstraction: an ideal or schematic form of the routine; in other words, it describes the routine in principle. The performance aspect refers to temporal matters in terms of when specific people do specific actions at specific times. The ostensive aspect influences the performance aspect by serving as a prospective guide for what actions that should be taken. Routines may also account for actions already taken as well as serve as a reference directing attention in a world of overwhelming choice of possible activities. In turn, the performance aspect creates the ostensive aspect through initially scattered actions being repeated and recognized as patterns. Maintenance of certain actions legitimizes and upholds the ostensive aspect. Finally, execution can also render variation—altering the repertoire of creation and recreation of the routine (Feldman & Pentland, 2003). Thus, the ostensive aspect seems to be closely related to cognitive processes while the performance aspect evidently is related to actions.

Both the ostensive and performance aspect of a routine may be viewed in relation to the artifacts used in an organizational setting. Some artifacts, such as rules, standard operating procedures, checklists or different kinds of documentation may refer to the ostensive aspect of a routine, while monitoring of outcomes refers to a performance aspect of a routine (Pentland & Feldman, 2005). For instance, in the case of emergency call takers the decision support system may be seen as an artifact that carries both the ostensive and performance aspect of the routine. Selection of questions refers to the ostensive aspect whereas the set priorities tell about the performance in a specific case. However, it is also important not to confuse the actual artifact with the routine. In particular
since understanding as well as actions related to the routine may diverge from the intention of the routine or the artifact. Thus, the routine may exist even without the existence of the artifact; for example; when technical mistakes cause the platform to malfunction, call takers may still be able to conduct triage work. The ostensive and performance aspect implies differences in terms of how routine-based work could be researched. Routines could be analyzed, not only in terms of “black boxes”, but also in terms of understanding of the routine as well as how it is carried out and what artifacts that are tied to it.

A routine is a broad concept which ties an individual level with an organizational level of analysis. Since the routine concept focuses on the interaction between understanding and action, it also separates itself from the concepts of habits and scripts which typically are weighted towards action, rather than understanding. Furthermore, as opposed to habits, routines do not have to be, but can be, automatically chosen (cf. Aarts & Djiksterhus, 2000). Moreover, routines can be learned without reinforcement, much like scripts and rules may be learnt by mere observation (cf. Abelsohn, 1981) or via instruction (cf. Ballstaedt, 1997). Thus, a routine is a representation of a possible route for action which may or may not be enacted, sustained or developed dependent on individuals’ understanding and action in relation to the routine.

Finally, and importantly, while a focal point has been interaction between cognition and action, the concept of emotion is somewhat overlooked (cf. Parmigiani & Howard-Grenville, 2011, Salvato & Rerup, 2011, Svensson, 2010). Even though routines aim to streamline behavior, minimize variation within and between individuals’ understanding and
action it is important to remember that emotion may frame both cognition and action (cf. Svensson, 2010; Anger Elfenbein, 2007; Frijda, 1986). Thus, emotions seem to have a natural place within routine research—a matter which I will return to when discussing implications of this dissertation.

### 3.3.2 Routes for Establishing Routines

Besides providing help in uncertain and ambiguous decision situations, routines are also intimately related to organizational learning. Ideally emotions, thoughts and actions have been interpreted and negotiated across a range of levels in the organization—prior to having been summarized into a routine. Such a procedure would allow local and tacit knowledge to be at least partially captured and represented on a collective level. But of course, this view of routines is many times a desire rather than an empirically affirmed matter. It is equally likely that routines are imposed on individuals from the higher managerial levels and downwards.

However, using the individual as a point of departure, I will depict learning, moving from the individual level towards the organizational level. Within this section, I will also address the relationship between different kinds of knowledge and the organizational form as factors influencing learning and establishment of routines. Additionally, I will tie the ostensive and performance aspect to establishment of routines.

Previous distinctions have been made between different types of knowledge as well as how this knowledge is acquired. Examples have included formal and non-formal knowledge (Eraut, 2000) and tacit and explicit knowledge (Polanyi, 1962). Formal knowledge coincides with explicit knowledge; it is formulated, has abstract characteristics and can
be transferred across time and space without being bound to individuals—in other words formal knowledge is encodable. Typically, it takes deliberation to acquire this kind of knowledge. On the contrary, non-formal and tacit knowledge coincide, bringing practical skills, know-how and action to the fore. This type of knowledge is individually bound and not easy to communicate or transfer among individuals.

By drawing on an evolutionary paradigm of variation-selection-retention (cf. Zollo & Winter, 2002), routines are argued to evolve from a series of connected phases (see Figure 6). However, it is important to emphasize on that this view of establishing routines is also compatible with a practice-based perspective. For instance, the ostensive-performance distinction mentioned earlier may contribute to that variation is introduced into the process—either by differences in understanding, differences in enactment or by that stable patterns of individuals are at variance with the routine itself.

While working individuals scan their environment they may discover deviations from current prescriptions, which may affect the perception of how work should be conducted. These deviations may, at first, be difficult to verbalize and therefore surface as intuitions among the individuals in the organization (cf. Crossan, Lane & White, 2000). In turn, the patterns can either be neglected or attempted to be communicated. Interpretation and evaluation refers to verbalization and negotiating between organizational members on what to do regarding these discrepancies. Conversation creates “spillover” effects to the group level since shared understanding is accomplished by negotiation, mutual adjustment and coordination. In turn, mutual adjustment causes an internal selection me-
chanism legitimizing certain procedures. Thus, in order to learn, the organization must also change its language. The replication phase regards problem solving, how to solve and implement agreed solutions into already existing frameworks. The phase regards communicating agreed solutions to other branches of the organization. Finally, as time progresses, the previous informal negotiating, mutual adjustment and coordination becomes increasingly formalized and institutionalized in terms of routines, rules and procedures. The agreed patterns are enacted and routinized until formalization once again is interrupted by variation, inducing mismatch between the environment and the organization.

Figure 6. A Route for Organizational Learning and Routine Development (Zollo & Winter, 2002)

While routines may evolve according to the described procedure, the different phases hinge on the organizational view of knowledge, as in which
knowledge the organization gives precedence. The view of knowledge may create barriers, but also cause tension between prescribed and actual use of knowledge. In turn, it may be difficult to learn since feedback is given on what is prescribed rather than what is enacted.

3.3.3 The Organizational Form and Precedence of Knowledge

Lam (2000) explicated that there are interactive relationships between forms of organizations and the prevailing view of knowledge in the organization. Lam (ibid) stated four types of knowledge (embrained, embodied, encoded and embedded) that were manifested within four different types of organizations. I will address the four types of knowledge that underpin the four types of organizations (professional bureaucracy, machine bureaucracy, operating adhocracy and J-form organization). However, I will elaborate specifically on two of the organizational dispositions since these show the overall best fit with the emergency call-taking setting.

Embrained knowledge refers to formal, abstract and theoretical knowledge which is dependent on individuals’ conceptual skills and cognitions. It is categorized as being favored within a scientific community. As a contrast, embodied knowledge shows a primacy for tacit knowledge, turning away from abstract and theoretical knowledge, favoring practical experience (Polanyi, 1962). It is also less occupied with deliberate and conscious decision making. While these two types of knowledge refer to individuals, encoded and embedded knowledge refer to collective processes similar to memory or the collective mind of the organization (Walsh & Ungson, 1991).
Encoded knowledge is primarily semiotic in terms of that information is coded into procedures or routines, making knowledge standardized, transferable and controllable at the expense of individualization. Finally, embedded knowledge is collective and tacit by nature, and shared by groups through norms and routines (cf. Brown & Duguid, 1991). It is a relation-specific, contextual, organic and dynamic form of knowledge that rests on shared beliefs among individuals. This mutual understanding fills in gaps in communication among individuals in a setting—even though routines may not typically be encoded in writing. In turn, these four types of knowledge are typically represented within four different types of organizations. The knowledge-base for the operating adhocracy is individualistic, but also collaborative as individual “experts” typically work in market-based projects solving problems through experimentation and interactive problem solving (Lam, 2000). Thus, there is an idiosyncratic and embodied view of knowledge. The trial and error character together with the primacy for tacit knowledge is the reason for why it is an organization type which does not match well with how emergency call taking is assumed to function. Somewhat similarly, less standardized knowledge may be represented in J-form organizations. This type of organization glues stable and efficient features of “bureaucracy” together with flexibility and teamwork through a strong corporate culture. Thus, the view of knowledge is embedded. Despite that the emergency setting may prove to have a strong corporate culture, this type of organizations shows primacy for less standardized knowledge—a matter which stands in conflict with making standardized decisions. The two organizational dispositions that
were mentioned earlier are the professional bureaucracy and machine bureaucracy.

The professional bureaucracy draws on knowledge from the em-brained knowledge pool. Jobs are standardized and formalized in this setting and individuals function as experts (Mintzberg, 1979). However, standardization and regulation of work does not primarily come from within the organization; rather, it is governed by principles of formalized education found outside the actual organization. Problem solving regards reducing uncertainty in terms of perceptually filtering problems through assumptions deriving from formal, explicit, abstract and theoretical knowledge (cf. Starbuck, 1992). Thus, the scope for learning is to some extent already predetermined and regulated according to formal structures. Specialization also contributes to lack of dispersion among individuals who in turn intervene with non-structured tacit knowledge. Tacit knowledge is not eradicated; rather it is bound to specific individuals.

The machine bureaucracy is heavily influenced by specialization, standardization and control. Procedures draw on encoded and formalized knowledge with the purpose to reduce uncertainties (Mintzberg, 1979). Thus, the structure is best suited to solve well-known problems. Codification of knowledge also supports and enables use of information systems since these facilitate standardization and control. The organization learns by performance monitoring and correction. Due to focus on codification of knowledge, operating procedures become incomplete and atomistic descriptions, not reaching beyond a specific task or situation which in turn makes the knowledge base fragmented. Moreover, the strong emphasis on codification contributes to marginalization of tacit knowledge.
In all, emergency call taking rests on assumptions of a professional bureaucracy as it draws on the medical skills of qualified nurses, but also on a machine bureaucracy since it is heavily routine-based in terms of using the decision support system. Furthermore, the organizational forms and bases of knowledge are intimately connected in terms of that certain knowledge in each of the organizations is given precedence. Thus, the relationship between the type of organization and accompanying view of knowledge helps explain the functionality as well as how the organizations learn. However, the relationship between organizational form and knowledge type also causes tension between prescribed and actual use of knowledge. For instance, organizations that rely on encoding may still have staff that make use of tacit knowledge and vice versa.

3.3.4 The Use of Feedback
Discrepancies between stated use of knowledge and actual use of knowledge have been addressed by Argyris and Schön (1974) who distinguished between espoused theories and theories in use. An essential problem for professionals is that they assign great value to espoused theories, which describe the world in an idealized manner. Espoused theories are typically developed in educational contexts and represent the ideal images of how professionals would like to be perceived by the public (Eraut, 1994). For instance, a professional bureaucracy such as the medical profession may have a large set of methods, obtained through formal education, yet using tacit knowledge to derive decisions. Similarly, a machine bureaucracy such as call center work may have a strictly regulated work setting, yet use tacit knowledge compensating for gaps in routines.
In other words, organizations may come across as a professional or mechanical bureaucracy drawing on idealized assumptions of formal knowledge, while there is in fact a widespread use of tacit skills among workers. As a consequence, management may not be calibrated, since there is a lack of understanding of perceived effects of one’s own and others’ actions. In turn, this may cause single loop feedback, perceiving or being told stories that are aligned with expected outcomes of a situation, rather than getting feedback on actual outcomes of a situation. Argyris and Schön (1974) claim that the only way to come to terms with these matters is to step outside the setting searching for genuine feedback. The call takers engage in voluntary debriefing sessions. However, these sessions emphasize call takers´ perceptions of events, typically not including feedback on outcomes of events unless the incident raised specific attention. Also, there are no routines for systematically obtaining feedback from ambulance and subsequent healthcare actors. Thus, genuine and adequate feedback is difficult to obtain in the emergency call taker setting.

One crucial factor when making use of feedback is the particularities or the validity of the environment. A high-validity environment refers to that variables may be observed and that there are functional relationships among the variables that are not due to random or confounded patterns. For instance, Hogarth (2001) stated that there may be “wicked environments” where feedback is misleading due to confounding factors. Thus, validity in this case refers to causal and statistically identifiable options. A hypothetical example would be a coffee machine that randomly portions coffee. There is an assumed functional relationship between
pressing the button for coffee and getting the coffee. When pressing the button for coffee you get coffee on the first two occasions and draw the conclusion that there is a functional relationship between pressing the button and the coffee. However, having pressed the button a third time, getting chocolate instead would have revealed a “wicked environment” since the functional relationship is a premature conclusion based on too few trials. Medicine and firefighting have been brought up as two environments with high validity, but it is also important to clarify that validity and uncertainty are not mutually exclusive (cf. Kahneman & Klein, 2009). In other words, there exist environments that are both highly valid and uncertain, such as for instance poker and warfare, where making “best moves” increases chances of winning rather than guarantees it. Thus, while there may be functional relationships among symptoms and medical conditions in emergency call taking it is also a setting which is fraught with communication difficulties. Callers and call takers do not see each other which make it difficult to describe symptoms as well as the surrounding environment which in turn complicate making assessments and obtaining feedback about them.

3.4 Individual Capabilities
The setting is complicated by its mode of communication, which affects the possibility to obtain information. Call takers also need to stay aligned with organizationally prescribed routines—a matter which often conforms to rationalistic assumptions of decision making. Therefore and first, I will elaborate on what a decision is as well as how it meets standards of rationality in relation to medical decision making. Second, I will turn to individual decision making by drawing on how individuals are likely to
process information in a dualistic manner. I will also delineate emotions from other affective phenomenon, and address specifics of vocal emotion in terms of how it may be decoded. Third, I will address emotion in organizational settings, how it may be transferred or used as social information in order to inform judgments and decisions.

3.4.1 Rational and Irrational Decision Making

When addressing the nature of decisions they are often referred to as an event or action that takes place at a specific point in time. However, the scope of decision making goes beyond such a definition enclosing multiple processes that in turn makes it difficult to claim an actual frame for a decision. Thus, in this dissertation summary evaluations, the gist or essence of an event are argued to function as building blocks for decision making—a matter which I will return to when discussing perception of emotional events.

Rational decision making has been depicted to run along a temporal and consequential line where choice among alternatives and anticipation of consequences aim to reduce unknowns or uncertainties (cf. March, 1991). Such a procedural character involves phases where one needs to define a problem, generate possible criteria to solve the problem, rank the different criteria as regards importance to the problem and assess alternative solutions before one finally chooses the optimal solution (cf. Bazerman, 1998; Simon, 1968). While such notions of decision making seem appealing from a performance point of view, individuals are typically flooded or suffer from incomplete information causing rationality to be bounded by contextual conditions (cf. Simon, 1968). As a consequence,
rational decisions may be rational, but on different levels, dependent on what kind of contextual conditions it fulfills.

According to Pham (2007) logical rationality refers to matters of logic inference (transitivity). An individual preferring A to B and B to C should also prefer A to C. Material rationality refers to consistency between one’s objectives, decision and actions. Ecological rationality complements the concept of rationality claiming some behaviors to be inconsistent as regards both transitivity and self-interest, yet they are considered as rational if meeting higher moral standards reflecting individuals’ relation to social and cultural values. The different views of rationality stated here also relate to emergency call taking in different ways. First, rationality is context dependent. For instance, ecological rationality may be fulfilled if call takers adhere to social and cultural norms of altruistic acts in terms of helping callers that are not entitled to help according to current routines (such as giving extra help to children or elderly). Such rationality may violate the mission of providing equal help to callers. Second, individuals may have goals, desires and make decisions that are both manifested and not manifested in actions, making material rationality a difficult matter to conform to. In other words, there may be dissonance between what we feel, think and do as we perform routines so they appear consistent with their intentions. Finally, and most interesting for this study, the process of prioritizing seems to rest upon principles of logic rationality. Call takers ought to identify and order symptoms, such as if the individual is awake, breathing or shocked, trying to uphold principles of transitivity. In other words, if a lack of awareness is identified, assessment should be made according to awareness rather than shock. Such a
procedure is believed to grant quality and efficiency since call takers ought to decipher symptoms from the said and the unsaid as well as from contextual cues.

3.4.2 Medical Decision Making

Medical decision making is rooted in a modus operandi of logic rationality, deriving from studies in statistics and probabilities. It is taught in formal education, giving primacy to algorithmic-like working procedures. However, the skill of medical decision making is also passed on in a guild-like manner, where experienced practitioners guide novices throughout their residence period (Groopman, 2007).

Within medical decision making causality has been a crucial concern. However, most theories on medical reasoning also recognize a more cyclical process, where explanations, testing and evaluation occur iteratively (Patel, Arocha & Zhang, 2005). Causality has also been a matter of debate since it may help to explain differences between experts and novices. Medical decision making is highly influenced by the knowledge-base the individual possesses. For instance, Patel and Groen (1986) studied expert cardiologists solving complex clinical problems. The results showed that those who solved the task accurately used a data-driven strategy (letting patient data lead to a hypothesis) whereas those who misdiagnosed or partially diagnosed the patient typically showed a hypothesis-driven strategy (letting hypotheses govern the process).

Using a forward directed reasoning strategy (moving from data towards concepts) becomes complicated to commit to when complexity is introduced. Increasing complexity means increasing number of variables to account for. Thus a data-driven strategy would be more error-prone.
since the number of inferences increases. Data-driven processes are argued to be most successful under constrained conditions and when the domain knowledge is adequate. On the contrary, a hypothesis-driven strategy places high cognitive demands as goals and premises need to be checked for alignment. Therefore, hypothesis-driven strategies are used when domain knowledge is inadequate and the problem is considered complex and of an uncertain nature (Patel, Arocha & Zhang, ibid). However, complexity may be represented differently between experts and novices, also suggesting that their mode of reasoning may differ. For instance, Patel and Groen (1991) and Patel and Kaufman (1994) found that experts indeed used more data-driven processing due to their highly organized knowledge base. In turn, their highly ordered knowledge allowed them to skip steps in their inference process. On the contrary, novices used more hypothesis-driven strategies, due to a narrow knowledge base, which was insufficient in terms of discriminating between useful and non-useful cues. In turn, this lead to relatively more complex patterns of reasoning for novices. Similar patterns for reasoning have been found within the emergency call taking domain (cf. Leprohon & Patel, 1995 in the section regarding emergency call taking).

3.5 Affective Influences on Decisions

3.5.1 Dual Modes for Processing Information

Theories of judgment and decision making point to dual processes when processing information. These process patterns have been labeled as “hot” and “cold” processes (Metcalfe & Mischel, 1999). For instance, Metcalfe and Mischel (ibid) proposed a dual system framework, where a cold cog-
nitive “know” and hot emotional “go” system process information differently. The “cold” system is the seat of cognitive, neutral, contemplative, flexible, integrated, coherent, spatiotemporal, slow, episodic, and strategic processing. The “hot” system is emotional, impulsive, reflexive fundamental for emotional (classical) conditioning and undermines efforts of self-control (Metcalf & Mischel, 1999).

Similarly, system 1 (Kahneman, 2003) or the experiential system (Epstein, 1994) has been argued to be pre-conscious, rapid, automatic, holistic, typically nonverbal and majorly driven by affect. System 2, or the rational system, has been considered to emphasize cognitive characteristics which are slow, serial, effortful, rule-governed, flexible and neutral.

The two systems seem to function independently, but also interactively. Affective information may migrate and undergo deliberate processing according to the characteristics associated with the second system. Thus, the two systems are architecturally and evolutionary different, but while some theorists advocate parallel and competing processes involving implicit and explicit systems of knowledge, others promote influence of pre-conscious and deliberate processing (Evans, 2008). For instance, intuition may describe a phenomenon that is framed within the first system since the process typically is believed to be very rapid, based on little external information, automatic, holistic and nonverbal. However, intuition may also be viewed as an inferential process in terms of recognition of memory patterns that routinely have been traced into automaticity via repeated experiences (cf. Simon, 1987).
Despite fuzzy boundaries between the systems, the assumption of
dualistic processing earns acknowledgement within the research commu-
nity. It has been widely acknowledged in a range of research programs
(cf. Paivio, 1986; Evans, 1989, 2006; Sloman, 1996; Hammond, 1996;
Lieberman et al., 2002). As a consequence, I will use this separation as a
vehicle for discussion. I now turn to the affective processing aspects of
the first system.

3.5.2 Delineation of Affective Phenomena
I will not explicate an absolute definition of affect since the question what
affect is has many answers. The answers to such a question are dependent
on epistemological assumptions, which in turn would cause a too lengthy
enumeration of definitions to be made in this dissertation. However, I will
try to explicate the view of affect, or more specifically emotion, used in
this dissertation without claims of being exhaustive in nature.

Affect is an umbrella term for a range of different processes. To
further nuance affect I follow Scherer’s (2000) sevenfold differentiation
of affective phenomena. Three typical characteristics of affect are intensi-
ty, duration and synchronization. Differences between the different di-
mensions and accompanying affective phenomena are shown in Table 5.
A small dot implies absent to low activation, a medium dot implies low to
medium activation whereas a large dot refers to medium to high activa-
tion.

Emotions arise as interruptions to ongoing events (Frijda, 1986),
showing a rather limited temporal process. Emotions initiate synchroniza-
tion of a range of different processes in order to cope with a situation
(Scherer, 2000).
Table 5. Differences in Affective Episodes (Modified from Scherer, 2000; 2005).

<table>
<thead>
<tr>
<th></th>
<th>Intensity</th>
<th>Duration</th>
<th>Synchronization</th>
<th>Event focus</th>
<th>Appraisal</th>
<th>Rapidity of change</th>
<th>Behavior impact</th>
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<td><strong>Emotions</strong></td>
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<td><strong>Moods</strong></td>
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<td>(cheerful, gloomy and irritable)</td>
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<td><strong>Affect Dispositions</strong></td>
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<td><strong>Stress</strong></td>
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<td>(tense, stressed and strained)</td>
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</table>

In other words, emotions change rapidly, wear off or transform into other affective phenomena such as moods. The synchronization component refers to the degree to which different processes are synchronized in order to deal with a new situation (for instance cognitive processes and motor expressions). Communication has been argued to be dependent on emotional cues (cf. Lee and Wagner, 2002). Therefore it seems justified choosing a high key phenomenon (anger, fear and sadness) rather than a low key (irritable, tense and gloomy) in order to facilitate detection. Second, the marked behavior impact accompanying emotions together with the interruptive character make emotions traceable in organizational life to a larger degree than free floating moods. Third, emotions’ vividness and relation to events make them easier to remember in comparison to general moods, affective states or stress.
3.5.3 Decoding of Emotion in Speech

Emotions are mirrored in the autonomic and somatic nervous system (cf. Cacioppo, et al., 2004). Such physiological change can be traced down to change in the vocal apparatus which in turn correlates with voice patterns of different emotions. Researchers tend to converge on that discrimination of vocal emotion, at better than chance level, is possible (cf. Banse & Scherer, 1996; Murray & Arnott, 1993; Pittam & Scherer, 1993; Scherer, 1986; Scherer, Banse, Wallbott & Goldbeck, 1991; Van Bezooijen, 1984; Wallbott & Scherer, 1986). Anger and sadness are generally better communicated than fear and happiness, but also better communicated than tenderness (Juslin & Laukka, 2003).

Researchers (cf. Scherer, 1986; 2003; Juslin & Laukka, 2001; 2003) have argued that the same emotion may be expressed in different ways with different configurations of voice cues. For instance, Banse and Scherer (1996) showed that many of 14 different emotion labels in a standard content paradigm were grouped into families—being categorically similar, but differing in intensity. More recently, Spackman, Brown and Otto (2009) found differences across untrained and trained speakers’ expression of the same emotions. However, no accompanying relationship was found in accuracy of detection of the expressions—suggesting that there may be many ways of expressing emotion.

Few researchers have investigated perceptions of vocal emotional expressions in calls to emergency centers. Exceptions may be found in

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12 Studies of vocal emotional expression are often conducted according to a standard content paradigm which means that the same verbal material is used across settings. Effects of listeners’ judgments are typically attributed to expression of certain emotional cues.
Vidrascu and DeVillers’ (2005) study of which emotional cues, in positive and negative speech, that were responsible for emotion perception. They also conducted a study of primacy for lexical versus paralinguistic features (2006). The first study (2005) indicated $F_0$ and intensity features to be most relevant for discrimination between emotions. The second study (2006) revealed that fear was best (and sadness least) recognized by lexical features. Overall, the study indicated higher lexical accuracy over paralinguistic accuracy. However, these studies used automatic detection techniques rather than human judges.

In summary, individuals are argued to rely on two different modes of processing. The separation is not absolute since information in the first system may migrate and undergo more deliberate processing in the second system. Affect typically belongs to processing of the first system. It is also an umbrella term for a range of phenomena. Emotions are believed to be high-key phenomena, have a marked behavioural impact as well as be vivid. In all, this makes it into phenomena which are traceable in organizational life. Furthermore, emotion may be modal-specific in terms of expression. Detection of vocal expression has been argued to be possible better than chance level. Research on emotional detection within the emergency domain has been sparse, but when conducted, it has shown that recognition is more accurate by lexical rather than by paralinguistic features.

3.6 Emotions in Organizational Settings

The view that emotion equals irrationality as well as the view that organizations try to eradicate emotion from their actions has gone out of fashion—at least among emotion researchers (cf. Fineman, 2003, p. 98-
Instead, it seems as if organizations are emotionalized zones (Fine-
man, 2003, p. 37-38) and research has become directed towards how or if
emotions are managed in organizations (Rafaeli & Worline, 2001) or how
emotions facilitate or impair organizational learning (Fineman, 1997;
Scherer & Tran, 2001). Scherer and Tran (ibid) proposed the importance
of emotional climate as experience of specific emotion has specific effects
on organizational learning. For instance, deterrence emotions (such as
fear, anxiety, distress and pessimism) may serve as signals for danger or
negative consequences and be based on generalizations of previous expe-
riences. These emotions may hamper learning by hindering exploration.
Antagonistic emotions (anger, hate, irritation and aggressiveness) may
damage relations and therefore hinder learning. Withdrawal emotions
(sadness, resignation, shame and guilt) may on the other hand facilitate
learning by that individuals strive for adaption due to a loss. In turn, the
striving invokes repair motives which may coincide with acquiring know-
ledge about a specific person, place or setting (Scherer & Tran, 2001).

Numerous publications, in and out of the laboratory, refer to emo-
tional labor and emotional regulation of workplace behavior (cf. Hoch-
schild, 1983; Ashforth & Humphrey, 1993; Sutton & Rafaeli, 1988; Ra-
faeli & Sutton, 1991; Gross, 1998; Morris & Feldman, 1996; Rafaeli &
Worline, 2001; Grandey, 2000). However, matters of emotional manage-
ment are not going to be addressed in depth here since it is brought up in
more detail in Study 3. Neither are further aspects of organizational learn-
ing considered at this point, since in order to study how emotions affect
learning one need to know which emotions are common in a specific set-
ting. Instead I will address emotions as they occur by focusing on how emotions may travel in organizational settings.

3.6.1 Transferring Emotions in Organizational Settings

Emotional contagion refers to catching and experiencing emotions expressed by others. It is also a process where individuals or groups may influence emotions or behaviors of other individuals or groups by implicit and explicit routes (Barsade, 2002). Hatfield, Cacioppo and Rapson (1994) stated that individuals mimic each other in interpersonal communication using visual, vocal and postural cues. The emotional experience seems to be affected by such mimicry in terms of that afferent\textsuperscript{13} feedback of the mimicry is interpreted as an actual emotion. In turn, this causes the perceiver to catch on and experience senders’ feelings. Such a process may occur in the emergency setting since vocal cues are expressed and received in real-time, enabling a fast mimicry processes, making it likely that call takers catch emotions over the phone. However, it is also likely that emotional contagion is mediated by a number of variables. Emotional contagion may be mediated by roles and norms associated with the occupational role of being an emergency call taker. However, the type of expressions and intensity are also matters that need to be taken into account when addressing emotional contagion.

While primitive emotional contagion happens on an unconscious level, a parallel research vein suggests emotional contagion to occur as a

\textsuperscript{13} The term afferent feedback refers to "information" sent from the peripheral nerves of the body to the brain or spinal cord.
social comparison process (Bartel & Saavedra, 2000). Individuals search their organizational setting for emotions since they have social value (Salcik & Pfeffer, 1978), in particular in ambiguous situations (Gump & Kulik, 1997). Thus, individuals compare their affect with others’ expressions and align themselves to the counterpart when it seems appropriate to do so (Barsade, 2002)—with the hope to resolve or reduce ambiguity.

It seems as if it is not only direct communication between individuals that causes contagion, but also that emotions arise due to interpretations of events. In 1996, Weiss and Cropanzano stated the affective events theory (AET), a model that proposes interpretation of events to cause affective episodes which in turn influence attitudes and behavior. The interpretation of the event is pre-disposed by the individual’s mood and personality—causing events to be interpreted differently dependent on the personality and mood the individual has. Interpretations of single or minor affective events are also likely to accumulate over time causing individuals to summarize series of events into an emotional theme. In other words, AET proposes incidences as daily hassles, job demands and emotional labor to accumulate and affect overall job performance as well as evaluations of how satisfied people are with their job. For instance, in a study by Wegge et al. (2006) 85 call centers (N =2091) where surveyed regarding central predictions of AET. The results indicated that work features and job satisfaction where mediated by emotions. The results remained even when characteristics such as age, gender, type of call center (inbound and outbound) and organizational size were controlled for.

Returning to the discussion regarding emotional events (that was initiated when discussing rational and irrational decisions) and the state-
ment that type and intensity of expressions matters (mentioned at the begin-
ning of this section) it seems as if not only emotional expression is vital information. Events are typically summarized into an overall emotional theme. In turn, and as an extension to what AET suggests, interpretations of events are likely to be affected by the intensity of the affective event itself. In other words, a peak-and-end rule applies where the intensity peak and how the intensity was when the event ended determines the overall evaluation of the event (cf. Fredrickson, 2000).

3.6.2 Emotion, Judgments and Decision Making in an Organizational Setting

Emotions have been argued to detour behavior from initial intentions. However, the influence of emotions on judgments and decision making is not uniform. Emotions may be contagious causing, individuals to catch on and experience emotions of others. Experiencing an emotion may also be different from viewing others’ emotion—yet others’ emotions may inform individuals on how to behave. Therefore, I will review both experience of emotion and the use of displays of emotion as a source of social information.

In general, positive affect seems to work in a top-down fashion, but also provide for flexibility and assimilation and make use of preexist-
ing ideas and associations making processing less effortful and deep (Clore et al., 1994). Furthermore, Isen (1987, 2001) and Isen and Baron (1991) claimed that positive affect primes lateral thinking, making con-
nections between ideas more accessible, broadening and focusing prob-
lem solving. The disposition of positive affect may therefore appear as organizationally desirable, but not necessarily logically desirable.
Somewhat contrary, negative affect seems to promote systematic and detailed bottom-up processing, narrow attention, increase external focus towards changing one’s situation (Clore et al., 1994; Loewenstein & Lerner, 2003). In other words, putting negative emotions in relation to transitivity, negative emotions appear rationally and logically desirable considering that an employee then identifies and evaluates alternatives before acting to a larger extent than when being under influence of positive emotions. However, a separation of positive and negative affect is over-simplified and inadequate.

The impact of specific experienced negative emotions on behavior is even more nuanced. Lerner and Keltner (2001) claimed that certain negative emotions (anger and fear) bring different action tendencies. For instance, anger increases focus on blame whereas fear increases focus on risk (cf. Small et al., 2006). Tiedens and Linton (2001) found that emotions of high certainty (anger and contentment) lead to heuristic processing in the form of stereotyping, reliance on expertise of information source and less attention to quality of arguments. Emotions low in certainty (anxiousness and surprise) led to the opposite. Sad individuals have been claimed to be biased towards risk-seeking and high reward alternatives (Raghunathan & Pham, 1999).

In further addition and related to emotional influence in policy-oriented situations, Small and Lerner (2008) experimentally tested carry-over effects of sadness and anger on decision making in two studies of a welfare policy case. Data showed incidental sadness to increase the amount of recommended help in comparison to the neutral condition. In addition, neutral individuals gave more assistance than angry individuals.
In a follow-up study, the results from study one were replicated, but the effects were eliminated when cognitive load was increased through a distracting task, suggesting that depth of thought drove the effects. Thus, a positive-negative distinction of emotion is inadequate since variations in the outcome of the experiment indicate that effects of negative emotions are not uniform. Secondly, emotions seem to be disruptive; one cannot expect always to get the same recommended help because the decision is dependent on how the helper is feeling. Thus, emotions seem to “carry over”, affecting normatively unrelated judgments. Thirdly, emotions influence cognitive process patterns—anger providing a shallower processing as opposed to sadness which prompts a more systematic processing—but the changes disappear when cognitive workload is increased.

Similarly, when viewing emotion as social information, emotions of the same valence may have different outcomes dependent on the context. Van Kleef, De Dreu and Manstead (2010) argued that individuals interdependently use others’ expressions as information in ambiguous and uncertain situations and together with the characteristics of the setting (cooperative or competitive) they affect outcomes of decisions made within the setting.

In cooperative settings, affective reactions are weighted more heavily (drawing on processes such as emotional contagion, affect infusion and mood management) while in competitive settings, individuals rely on inferential processes (typically by strategic inferences drawn from the counterparts’ expression). In turn this causes the same emotion to have different effects depending on characteristics of the situation. For
instance, anger expressed in a typical cooperative setting will inflict avoidance motivation and result in reduced cooperation while it would cause approach motivation and increased cooperation in a competitive setting (Van Kleef, De Dreu & Manstead, ibid). Following the same logic, expressions of sadness or distress (similar to fear) in a cooperative situation causes approach motivation and increased cooperation while it causes avoidance motivation in a competitive setting, with inaction or increased competition as a result. Thus, such findings reveal that anger, on the one side, and sadness and distress on the other side, invoke different behaviors under similar conditions even though they have similar valence.

3.7 Chapter Summary

Selection of theory was made from three main areas based on their fit to the setting, each other, the purpose of this dissertation (cf. Figure 4) as well as viewing emotion as an underlying theme. The first area regarded communication, in which I presented the Brunswikian lens theory as an explanation of how vocal emotion may be coded and perceived in communication. Since communication between caller and call taker is restricted to telephone-based communication, causing a reduction in cues, I also addressed media choice theories. These theories have a modus operandi grounded in a choice of medium which is dependent on one’s purpose of the communication. This review also revealed a tension between media trait theories—which along Brunswikian theory make use of cues—and social theory, which focuses on compensating techniques in order to provide for sufficient communication. In turn, this suggests that call takers are able to compensate for some restrictions of the media through development of competence and contextual conditions.
The second area regarded a review of research in the emergency call taker domain. It emphasized contextual conditions in terms of that routines function as enablers and delimiters of organizational and individual action. This review also addressed how organizational routines may be established. The review revealed differences between a capability perspective and a practice perspective of routines. Despite apparent differences, there is common ground in terms of focus on individuals, degree of tacitness, degree of stability and change and importance of the context. However, the two perspectives describing routine research also share an apparent lack of using emotions as a vantage point. The third area reviewed rational and irrational decisions within the medical domain. The review brought attention to differences of how individuals process information through affective-laden and cognition-laden process patterns. Furthermore, this section addressed how affective information, or (emotion) may be expressed, transferred and decoded in organizational settings, but also how it affects decision making in terms of when one is experiencing emotion as opposed to when it is viewed as social information. Taken together, this review puts emotion into an organizational context in terms of how emotions are communicated vocally and how emotions may affect decision making capabilities. It also identifies a theoretical gap, where emotion is an overlooked, yet likely aspect to influence routine-based behavior within an organizational setting.
4. **Method Considerations**

This chapter describes the process of researching the emergency call taker setting. Particular emphasis has been put on how I methodically and methodologically have approached the setting. The setting is complicated to research due to its fast-paced nature and ethical considerations. Therefore, in order to make the research process transparent, concerns regarding sources of data, data analysis as well as quality indicators of research are put forward in this chapter. I will start by addressing the methodical underpinnings, moving on to specifics of the different stages of data collection and data analysis. Finally, I will elaborate on quality indicators, ethical considerations as well as reflect on my role as a researcher.

4.1 **Research Approach: Reasons for Multiple View Points**

Researching the emergency call taking context is complicated since it shows an epistemological variation. Emotions are subjective in terms of perceiving and experiencing them, but also have an objective dimension which can be estimated through measurement of vocal expressions. In addition, emotions involve coordination of intrasubjective cognitive and physiological patterns in order to respond to changes in our environment. In other words, cognitive patterns correlate with changes in our physiological apparatus—seen as modal specific expressions (facial, postural and/or vocal expressions). Emotions may therefore be seen as responses to changing conditions of our world (cf. Frijda, 1986). However, the reverse relationship is also true; emotions provide for certain action tendencies. Furthermore, appraisals of our world may influence which emotions and thereby which physiological changes that comes to the fore. Thus, emotions may be both subjective and objective, related to thought, physi-
ological patterns and actions, and not necessarily captured with a single method.

A first consideration to be made is the source from which emotion derives. The two first studies focus on perception of expression (emotion from the outside) while the latter two focuses on call takers’ experience and management of emotion (management of both callers and their own emotions). The rationale for such an approach is that by focusing on expression of emotion in the first two studies, an understanding of which expressions that are present emerges, their intensity and how these patterns relate to the prioritization process. However, such a procedure is typically narrowed down to emphasize rather few variables which in turn de-contextualize the complexities associated with making decisions in this high-velocity environment. In other words, it is less contextualized and lacks possibilities to find out about how call takers derive priorities and what role emotions have in this process. Therefore, the two latter studies have a more explicit experience focus and a more proximal character as regards closeness between call taker, researcher and the context.

Similarly, when turning to routines, the distinction between the ostensive and performance aspect of a routine (cf. Feldman & Pentland, 2003) also imply different methods to be used. In order to capture understanding of the routine and actions related to the routine or the functions of emotion in routines, I used ratings of emotions in calls, interviews, observations and archival records.

My ontological view is that the world is multidimensional and people reach knowledge about the world by approximations. Epistemologically, certain methods reveal certain aspects of a phenomenon while
they exclude others (Mingers, 2001). There can be causal linkages between phenomena, but individuals only discover a limited set of them as well as vary in interpretations of them. Individuals’ perceptions could change due to mutual exchange via insight or language, rendering reconstruction of the event and in the long run also of the environment itself. Such ontology implicitly draws on a pragmatic approach alleging an objective world where causal linkages are present, but also emphasizes the subjective interpretations of the world. Thus, no matter how quantified data gets, it still relies on interpretation priming understanding of the world. Thus, interpretation can neither be completely free of value, nor mirror objects in an objectively perfect manner (Fisher, 2007).

I have taken the position that call takers act and are aided by procedures which are formally regulated by the organization. However, I also recognize that call takers act on imperfect information. For instance, the medium that is used for communication may provide for difficulties in communication, such as silence or inaudible speech, expressions which are incongruent with symptoms as they express a mismatch between non-verbal and verbal information, callers may not know how to communicate their condition, and callers may not tell everything they know or they may even exaggerate symptoms in order to get help. Therefore call takers make their priorities based on available rather than exhaustive information and try to relate the information towards present routines. Having said this, I also recognize that call takers do not make priorities which are stringently value-free. Choice is dependent on individual skills and takes place within (and sometimes outside) boundary conditions set by the organization. In turn, such a statement affects the choice of research design,
leading to the use of a range of methods spanning organizational documentation as well as methods capturing call taking in action.

Examples of this are that the stages of the research process departed from a common conceptual stage (see Figure 7). The conceptual stage was rooted in a review of previous research of emotional expression and detection when using electronic media (email). Prior to being included in the dissertation, it was extended to emphasize multimodal communication. This stage also involved making initial contacts with representatives of SOS Alarm as well as gathering publicly available material from SOS Alarm.

The next step was to research which emotions that were considered as important in the setting. Furthermore, I needed to map decisions (priorities) that were made in the setting. Thus, the field study (Study 1) focused on establishing a baseline for emotions (which emotions were perceived as common/uncommon) as well as the relation between the distribution of emotions and priorities in the setting. Thus, the field study offered possibilities to find relations among emotions and priorities, but it did not point to causal aspects of the variables in the setting. In order to nuance matters further, an experiment was conducted.

The experiment emphasized on finding out whether expressions of emotions contributed to priorities made. Authentic voice segments, deriving from Study 1 (see selection procedure in Study 1) were used.

In other words, Study 1 did not only serve as means for finding out a baseline of emotions and priorities in the context, but also served as a selection procedure for the empirical material used in Study 2.
While Study 1 and 2 regarded descriptions of the setting, as in the type of stimuli the call takers were facing in their everyday job, it became clear that these descriptions functioned in dissatisfying ways in terms of finding out how call takers derive priority (see Figure 7). Thus, by taking a more proximal approach, by means of Study 3 and 4, I tried to develop a rich understanding of how to deal with emotional exposure in this mediated setting. But, I also wanted to depict how call takers manage (their own and callers’) emotions. Study 3 and 4 was therefore contextualized...
using in-depth interviews, participant observation and a range of organizational documentation, analyzed with an inductive content analysis.

4.2 Empirical Material
The empirical material derives from multiple sources within the SOS Alarm setting (Appendix 7). There are call taker ratings of emotional expressions of authentic emergency calls as well as authentic emergency calls from which acoustic parameters were abstracted. This source served as data for Study 1 and 2. There are also in-depth interviews with call takers from two different emergency centers, field observations (including notes of informal talks with staff and co-listening to approximately 500 emergency calls), educational material, website and policy material as well as annual reports and quality reports constituting data for Study 3 and 4 (see Table 7).

Due to the different research stages, there are separate sections dealing with considerations for data analysis for each stage. The first section deals with conditions for quantitative data analysis while the second section adds structure to the process of how data was analyzed qualitatively prior to making meta-level inferences.

4.3. Considerations of Quantitative Data Analysis
As previously mentioned, statistical methods were used in Study 1 and 2 in order to analyze data. First of all, it is important to emphasize that parts of the statistical data is approximations rather than objectively identified data. In other words, the ratings conducted in Study 1 were approximations of emotional expressions and perceived need of help, not objectively measured parameters. However, a selection of the material from Study 1
was later assessed for such objective measures in Study 2. This section will elaborate on specific and overarching methodical considerations, whereas more detailed considerations, such as the different statistical techniques used for analysis and selection of voice parameters, are addressed in more detail in Study 1 and 2.

4.3.1 Obtaining Calls for Analysis

The 146 ratings of authentic emergency calls obtained for Study 1 may be considered as a relatively small number of observations if compared to the annual number of calls call takers assign health care priorities to. However, even though being small, the body of calls is large enough to undergo statistical analysis and be generalized to typical experiences in the work setting.

First, after consultation with representatives from SOS Alarm it was clear that the number of emergency calls is believed to be more prevalent in conjunction to holidays when there are large groups of people transporting themselves. In turn, this is a reason for avoiding data gathering in direct conjunction to such events, particularly since they may be considered as extraordinary events causing overrepresentation of certain events and consequently an overrepresentation of certain emotional events. Thus, a lengthy time-period for data gathering could include two or more holidays. Therefore the chosen period for data gathering was shorter (approximately two weeks) and conducted during spring without any larger scheduled public holidays. However, the time-period for data gathering was long enough in order for call takers to be scheduled to different shifts in order account for variability of different work sessions. To give an estimate regarding numbers of calls used for analysis in other stu-
dies, Wahlberg (2004) obtained all calls made to a emergency center during one week (N = 2866), but later ended up with 144 calls for final analysis. Karlsten and Elowsson (2004) sampled healthcare-related calls (N=565) during one week.

Second, data gathering was stratified and randomized. Neither the call takers nor I knew which calls that were to be included in the study since it is impossible to know about the content of the call prior to the call being received. Call takers were also instructed to rate a selection of calls. Calls regarding healthcare matters, as opposed to calls regarding police matters or rescue/fire cases, were included. In all, this streamlines and narrows the sample considerably.

Table 6 shows the annual distribution of priorities of emergency calls and the priorities in this dissertation. The level of help need in Study 1 was assessed according to an inverted and more nuanced scale than the priority ratings for actual action. Thus, priority 1 in the actual setting corresponds to level 7 and 8 in Study 1. The proportion of top-priority cases is similar in the sample to the calls made in 2010 in total. However, it is important to emphasize that the calls included in the left column are not only 112 calls, but also calls of other healthcare-related nature, made by authorizes rather than the public. Possibly, this could explain the high percentage of priority 2 in the left column of Table 6. Consequently, the table serves as a comparison in relative rather than an absolute manner.

The selection of call takers conducting the ratings was made by voluntary participation. The quality manager of the emergency center sent out an email request to call takers at the center and upon response, call takers were contacted and sent material by the researcher.
Table 6. An Annually-Based Distribution of Priority Levels Compared with the Priority Levels of Study 1

<table>
<thead>
<tr>
<th>SOS Alarm (2010) (N = 112 764)</th>
<th>Sample Study 1 (N =146)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prio 1 37 % Help need 7-8</td>
<td>41%</td>
</tr>
<tr>
<td>Prio 2 42% Help need 5-6</td>
<td>18%</td>
</tr>
<tr>
<td>Prio 3 10% Help need 3-4</td>
<td>17%</td>
</tr>
<tr>
<td>Prio 4 11% Help need 1-2</td>
<td>24%</td>
</tr>
</tbody>
</table>

4.3.2 The Procedure of Conducting Ratings

In order for call takers to conduct the ratings in the live setting, it was deemed important that the rating procedure minimized interference with work in general. Call takers were therefore asked to rate the first minute of the first call within a 30 minute interval. They attached a reference number to the rating in order to facilitate further tracking of the call. The time-frame for rating the first minute of the call was determined after discussion with SOS Alarm representatives. They considered the opening-phase to enclose the most emotionally charged material. If the call lasted less than 1 minute the call takers were instructed to rate the time the call lasted. The procedure may have contributed to an under-representation of happy expressions since these expressions are likely to surface after solving a dilemma and may therefore not be captured within the set time-limit. For a richer description of the instruction sent to the call takers, consult appendix 5.
4.3.3 The Material Used for Rating

The material used for rating emotions followed Ekman’s (1972) categorization of basic emotions. Likert-scales have previously been given an almost imperative status in psychological research. However, a forced-choice format may complicate research since few response alternatives could inflate accuracy of emotion recognition (Russel, 1994). Therefore, at the end of the rating sheet, there were two additional questions. First, there was an open alternative (with a possibility of a categorical rating from 0-10) where call takers could add additional emotional expressions not captured by the basic emotions. There was also a free-text possibility to add details about calls. The free-text possibility was used in several different ways. For instance, call takers stated whether callers were perceived to be in pain or whether there was a conflict between caller and call taker, but also to label variants of emotions such as anxiety (see Appendix 6).

Furthermore, beside the emotional category and free-text possibilities there was an intensity rating (scale 0-10) and help need rating (1-8). In order to avoid order effects of the ratings, the material was completely counterbalanced. Since we did not have immediate access to audio files or logs at the time, the help need rating was attached in order to mirror the prioritization made by the call takers (using the normal SOS scale from 1 to 4). The rating material was purposely kept to one A4-page per call in order to reduce call-taker workload by having to turn pages and ponder about ratings in an overall time-pressured situation.
4.3.4 Delineation of Variables

There are three variables present in Study 1; emotional category, intensity and help need. Categorical and intensity judgments are argued to be emotional judgments—intensity being a cue of the emotion concept (cf. Juslin & Laukka, 2003). Since the variables are related, it would be less meaningful assessing only intensity without matching it towards an emotion. Furthermore, intensity has been described as an important facet when assessing emotion, but also as a characteristic possible to single out via attendance to specific cues (cf. Planalp, 1998; Juslin & Laukka, 2001; Juslin & Laukka, 2003; Juslin & Scherer, 2008). Second, the rating of help need—supposedly more cognitive in character—mirrors the authentic prioritization call takers make. Since variables show different characteristics (emotional and cognitive), the design contributes to delineation of variables and thus minimize use of strategic ratings, in particular since there are lives at stake and the procedure is traceable. It is argued to be unlikely that call takers would benefit by strategically “upping” ratings of emotion in relation to help needed since an inherent characteristic of the job is to differentiate symptoms from non-symptoms. An increase in emotions and intensity in relation to help needed would possibly draw attention to difficulties of conducting such a work task. In addition, mismatching the authentic prioritization with the help needed rating would increase cognitive strain in an overall time-pressured situation and is therefore not expected to occur. Finally, partial correlations indicated relationship be-

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14 Thus, there is a resemblance between variables assessed in Study 1 and variables usually assessed by instruments, such as the Geneva Emotion Wheel (cf. Scherer 2005, Tran, 2004), used when assessing discrete emotions,
tween coupled variables, which was also maintained, without decreasing to any large extent when controlled for other variables (except when controlled for intensity).

4.3.5 Experimental Material for Study 2

As previously mentioned, the material from Study 1 provided the basis for the material used in Study 2. The procedure of selecting calls for analysis consisted of filtering in a two-step blind process. The initial data corpus (call taker ratings) was pre-analyzed searching for clear and intense ratings in the most commonly expressed emotion (fear). It resulted in 40 ratings (in the sample of 146 ratings), ranked as the most clear and intense expressions. The reference numbers for these ratings were sent back to the quality manager of the emergency center who retrieved them from the call archive, obtaining addresses to the callers, enabling the sending of an informed-consent form to the caller (see Appendix 2). In total, seven full-length authentic emergency calls were consented and approved for the study.

The seven calls were re-assessed by two inter-raters as regards neutral and different emotional expressions during the call. Agreements between the inter-raters were included in the study. The selected intervals for fear and neutrality underwent analysis using Praat-software (Boersma & Weenink, 2010) and coded into experiment stimuli.

The complete stimulus set for Study 2 was programmed within the Unity 3D (version 3.3.0f4, http://unity3d.com/) environment with the programming language JavaScript, and finally compiled into a Windows-executable project. In order to uphold integrity of callers as well as directing attention towards nonverbal content, a low-pass filter was applied to
all of the sound files. By removing frequencies above 500 Hz (using a Hann-shaped filter) the procedure made phonetic information unintelligible, while affective information, such as F0, voice intensity and temporal aspects (cf. Scherer, 1972) and voice quality (van Bezooijen & Boyes, 1986) were preserved. The stimulus set was then complemented with the rating scales of intensity and help need, presented in randomized order for each individual listener without any time constraints and with possibilities of listening to each stimulus numerous times in order to make their judgments.

4.4 Consideration of Qualitative Analysis of Data

Analysis can be performed in steps of data reduction (moving from raw data such as audio files or notes to a coherent and rich descriptive material), data display (to search the descriptive material for recurring patterns or themes iterating between theory and empirical material) and conclusions/verifications (putting emerged themes and recurrent patterns into the research question context) (cf. Miles & Huberman, 1994, p. 10).

It is important to emphasize that the gathering of the material was done iteratively. Reading academic literature, making interviews, obtaining archival records and performing observations were all done iteratively. Throughout the process, I tried to reduce and aggregate a large material by moving from separate data sources into aggregation, comparing across data sources.

4.4.1 Archival records

The archival records were the first data source to be tapped since it was to a large extent publically available. Thus, it partially constituted a base for
the conceptual stage (see Figure 7) and aided in development of the research questions. Annual reports, reports on performance quality, activity reports and website material (and later, upon access to the organization, internal educational material) was obtained, skimmed and highlighted. The material was read numerous times and was a source that was kept open in order to be able to contrast findings between different years. Themes were continuously highlighted and served as a compass in the large body of material and later guided attention to pieces to be more closely re-read. The highlighted sections were reduced into themes by making notes directly into the documents\textsuperscript{15}.

4.4.2 Interviews
The interviews took place in conjunction to call takers’ ordinary working sessions. The interviewees had received an email request (see Appendix 1) made by the quality manager of the emergency center. Upon response they were scheduled for an interview (see Appendix 3). At the time for the interviews, an adjacent room to the actual emergency room was used. The interviews were recorded using a dictaphone in order to be able to go back and listen to recordings for details. Transcriptions from the first emergency center (N=8) were prepared for analysis through verbatim transcriptions conducted the same day or the following days from when the interview was conducted. The four interviews conducted at another

\textsuperscript{15} An example of such a procedure was when core values of empathy, unique competence and ability to focus were presented on the SOS Alarm webpage. This provided a somewhat incongruent view as compared with how emotional management is recommended to be conducted in internal educational material, particularly since the suggested recommendations for emotional management may interfere with the possibility to focus.
emergency center where recorded, but transcribed in a summarized manner. The interviews were also complemented with descriptions of paralinguistic cues (such as indications of emotional expressions) in order to derive as rich a material as possible. The cues were incorporated into the transcription from memory and upon transcribing the files. All of the transcriptions were provided with a 1/3 page margin in order to make room for notes of emerging themes.

4.4.3 Observations

According to Silverman (2006, p. 88-93), a useful way to record observations is by taking notes on what people do, how they do this, how they characterize what is going on, what assumptions they make and what I see as a researcher. On the days for interviews, I split the day between interviews and observations by conducting an interview followed by observation or vice versa. There were also days when I only conducted observations. This allowed me to pose verifying and disproving questions chronologically as well as categorically between call takers.

The type of field notes taken regarded descriptions of the working environment, direct observation of behavior during calls (such as nonverbal expressions), talk and finally interpretations of the talk, behavior and environment. Thus, the procedure does not only differentiate between different sources of data such as interviews, observations and archival records, but also differentiate data within the source (Mårtensson & Lee, 2004). Throughout the day, the notes were continuously revised during breaks, and later on, the same day or the next coming days, transcribed into a computer file. The field notes were coded in terms of direct observations in plain font, talk (between call takers) in cursive font and inter-
pretations of actions and talk in red typing. The field notes were then prepared with a 1/3 page margin, printed, closely read, continuously noting themes as described in the sections for archival records.

Beside the field notes from the observation, I also wrote a separate memo-file (≥ 175 pages) containing issues regarding the overall procedure of conducting a PhD, such as dealing with critique at seminars within the research school, tutoring sessions and meetings with representatives outside, but related to, the emergency domain. This source did not explicitly or specifically concern the data collection process, but it later aided in contextualizing interpretations and providing rich descriptions of call-taker work.

4.5 Data Display of Qualitative Data

4.5.1 Data Display in Study 3 and Study 4

Aggregated descriptions were first compared within each data source. The interviews were compared with other interviews, archival records with archival records and observations with observations. Later, the different data sources were collapsed and compared for emerging themes, but also compared with literature on the topic. Thus, it is important to emphasize that the analysis does not strictly follow a grounded approach. Instead, empirical observations have been influenced by theoretical insights (Goldkühl & Cronholm, 2010). For instance, the initial conceptual stage gave research questions for Study 1 and 2. However, as there was an observed discrepancy between what callers expressed and what call takers felt which in turn may affected how they managed calls, literature on emotional expression was complemented with literature on emotional
management. This provided additional insights on how the setting could be researched and analyzed. Such a procedure systematically builds aggregation by revealing core themes. The core themes were compared across sources. A sample exposé of themes is displayed in Study 3 and Study 4. The following statements exemplify of how themes emerged:

Being a professional means "keeping a cool head and warm heart". We must allow our feelings to be included, to get to know them. At the same time we must suppress their expressions as we must act quickly.

Different variants of the quote were found in the internal education material. The theme of emotion regulation was compared against perceptions from the interviews. ("I" stands for interviewer and "CT" for call taker).

I: But do you need to be stoic in the situations then?
CT: Yes...not to be pissed ...
I: Mmm ...
CT: Or rather, not so that you give away that you are angry. You are indeed angry, but it is a matter of not conveying it.
I: You can feel the feeling but do not ...
CT: [Interrupts] ... Convey it ... and it is difficult ... really difficult ... it is difficult for every human being ... or being pissed at a human being ... and speak friendly to them ...
I: Hmm ...
CT: Without it is shining through.

The excerpt below was categorized being similar to the quote above in terms of suppressing emotions. When compared against field notes from observations the following excerpt is an example of suppression:
"I had a hanging earlier today." Partly they say this with a smile, something that could be interpreted as pride in their professional capacity. I know something you perceive as being sensitive, but I can handle it—an internal power and/or control dimension. There also seems to be a relatively high degree of regulation and the idea is that this could affect the assessments because in order to suppress feelings, there is a constant need to block out a lot of contextual information.

But comparing different sources also revealed a nuanced picture of emotional management. For instance, one call taker expressed in the interview:

CT: In many cases you do not get anywhere and say that now we finish this conversation. Either you say that there is help on the way or you say that this is nothing…YOU ARE NOT LISTENING “click [imitates the sound of hanging up the phone]” and then you hang up the phone.

Equivalence in the field notes was seen in:

It looks as if they close down co-listening very quickly. They close down conversations quickly when the decision on an appropriate action is very evident. It may well be that you do this too quickly in order to get on with new calls, but also because they do not want to collect too much emotional baggage?

Finally the different themes were put in context of emotion regulation and emotional labor. The first example (two first excerpts) was labeled as an overarching category of intrapersonal response-focused regulation or surface acting while the latter (third and fourth excerpt) was labeled as interpersonal situation modification. Reading and iterating between theories on emotion, emotional regulation, emotional labor, tran-
scripts and archival records, several different themes emerged. The combined result of management focus (intrapersonal or interpersonal) and management technique is found in Study 3.

Another example of data display is seen in Study 4 (see Table 3 in Study 4). Different sources of data where compared regarding the decision-making procedure. Themes successively developed into a difference of organizationally prescribed ways of conducting call taking and how call takers actually conduct work. There are expressions of intuition-based processes from the organization\textsuperscript{16}, but typically they are not expressed in a systematic manner. However, call takers continuously use this route to solve ambiguity in calls.

4.5.2 Conclusions and Verification in Study 3 and Study 4

Since this chapter concerns how the research process was conducted, no specific conclusions are presented here. A summary of conclusions are found in Chapter 5. Furthermore, conclusions from each article, which constitute a basis for the meta-level inferences, are also presented in detail in relation to the research question in Chapter 5.

Throughout the process, I have fed back material to SOS Alarm in various forms. Initially, I presented my research plan at a national internal

\textsuperscript{16} An example of an intuition-based expression from internal educational material: [...] As a rule, it is better to reach a decision based on what you know rather than postponing the decision. [...] Often we have to use both facts and intuition. Intuition = A variety of evidence one cannot express, but know that you have + How the other sounds + Experience + Feeling. This means that intuition is often based on more knowledge than the facts one can enumerate. If one is panicking, intuition may be dangerous because you have not the feeling under control.
conference where the research council from SOS Alarm was present. I was also in contact with both the physician at the local center and the head physician of SOS Alarm on several occasions. Later, in order to verify conclusions and obtain a perception of how well the conclusions represented the working environment, the material was fed back to call takers of the emergency center in two different ways. Since the different articles were finalized at different stages, the quotes and observations were either fed back via email correspondence or via a meeting at the emergency center. The feedback I then received included call takers noting difficulties in remembering what had been said during interviews and observations and apologies for not being able to contribute specifically, but responses also came back in terms of recognition such as:

That call was not so easy to forget. A pretty unpleasant conversation I have to say. Nothing indelible, but you do not really forget it just yet.

But also minor comments such as:

The quotes sound like me;)

In further addition, material was recurrently sent to specific external parties within the MIT\textsuperscript{17} research community, EIS\textsuperscript{18} in Linköping and MAM\textsuperscript{19} throughout the whole research process for individual feedback discussion, and presented and discussed at seminars several times a year in each of these communities. This could be characterized as an ongoing

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\textsuperscript{17} MIT is a national Swedish research school with participants from a dozen institutions and an emphasis on management and IT.

\textsuperscript{18} EIS is the department of Economic Information Systems at Linköping University.

\textsuperscript{19} MAM is the department of Management at Blekinge Institute of Technology
academic review process. Furthermore, early versions of the studies were accepted at conferences. For instance, Study 1 was accepted to a conference on technology and methodology for security and crisis management. Study 3 was accepted to the Emonet conference after a double-blind review and then later on, when revised, selected to be included in the biannual edition of the book Emotions in Organizations. Study 4 received extensive feedback from one editor and three independent reviewers prior to being put into its present form. All of the studies (Study 1-4) were presented (as a poster) at Indek 2011.

4.6 Foundations for Inferential Quality

In order to make meta-level inferences, using a mixed method design, certain requirements need to be fulfilled. I will present requirements that facilitate judgment of rigorous research, but I will leave the actual inferences to the final chapter and the judgment on fulfillment of requirements of mixed methods to the reader. Precautions that were made in order to increase research quality are summarized in Table 7 and explained below.

4.6.1 Design Suitability

Drawing on Tashakkori and Teddlie’s (2010) framework for evaluating mixed methods, I turn to design and interpretation matters of the research process. First, the suitability of mixed methods is justified by the complex nature of emotions and routines interacting in the workplace. In general,

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20 Indek 2011 was a national conference for scholars and practitioners within the industrial economics and technology domain in Sweden. The conference theme was “Innovation, ICT and Internationalization”.

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different methods are seen as a way of validating each other. It does not necessarily have to be like in the natural sciences, were an object viewed from different angles reveals a more truthful picture. Instead, in social research the very same object can have different shapes dependent on the angle from which the researcher is conducting the data triangulation, making data richer, but not necessarily more credible (Silverman, 2006. p. 290-292). Combining different methods reveal certain aspects of a phenomenon and leave out others (Mingers, 2001). Interviews and observations provide for comparison of statements of what is perceived to be done and observations of what is perceived to be done from an observing point of view. Interviews also address aspects of experience and understanding while observations address actions and performance. Similarly (and aligned with Study 1 through 4) different sources may capture different aspects of the same phenomenon. For instance, call takers may be affected by experiences they cannot verbalize (which make the experiences hard to access through interviews) while they may be accessed through use of either observations or indirect measures deriving from judgment studies (or vice versa—that call takers can account for influences not perceivable by an observer). In all, these factors motivate multiple rather than single methods as a suitable design for increasing the understanding of roles of emotions in emergency call-taker work.

4.6.2 Within- and Between-Design Fidelity

The two stages of gathering empirical data are accompanied by certain conventions for each stage. When gathering and analyzing data from the qualitative stage, I tried to follow principles of qualitative research (cf. Klein & Myers, 1999). For instance, I kept the sources separate until a
first round of analysis was made and then compared across sources. In turn such a procedure complies with a principle of a hermeneutic circle.

By using multiple methods, such as interviews and observations, I also considered the principle of contextualization, the principle of multiple meaning and a principle of suspicion (see sources of data and precautions made in order to grant research quality in Table 7). For instance, informants knew they were being observed which may cause adaptation of actions according to expectations. Since interviews are situations where the researcher and the participants interact with each other, it would be difficult to account for modifications of behavior using a single method. Taken together, use of multiple methods, observations and sequential interviewing as well as not letting informants get familiarized with the interview questions conform to Klein and Myer’s (1999) principle of suspicion, principle of multiple meaning as well as principle of context. In other words, it is important being sensitive to systematic “distortions”. The context is also a moving target which is hard to recreate, thus the multiple methods increase the possibility of capturing different aspects of the same phenomenon, which in turn increases understanding of the setting.

Continuous interaction between me as a researcher and the call takers affected understanding of the setting, but with an awareness that preconceived ideas may affect what is seen. Thus, questions of verification as well as disproving interpretations were not only chronologically posed, but also between categories of people in order not to let preconceptions unduly color gathering and analysis of data (see Table 7). Furthermore, different types of call takers (i.e. under training, newly employed and more experienced call takers), the quality manager, and the physician
of the centre as well as the site manager were all addressed. In other words, questions deviating from the initial template were posed in different settings spiraling off to new questions. In turn, this complies with dialogical reasoning (since initial understanding had to be revised) and the interaction principle (since questions spiraled off into additional questions). However, there may still remain systematic distortions as the staff learns as a consequence of that I narrowed observations and asked certain kinds of questions. Therefore, I conducted interviews at a second emergency center in order to compare call taker perceptions. Similarities between responses would increase the likelihood that there are specific characteristics of work rather than strategic displays.

As regards following conventions associated with quantitative research, examples are seen in the selection procedure. Study 1 and 2 rely on selecting procedures which affect the possibility to make generalizations. Despite that rather few (N=7) call takers sent back ratings (N=146) the selection procedure is representative to work conducted on typical work days. 7 call takers correspond to the number of individuals present during a work shift. As regards Study 2, where calls were consented by callers (N=7) from the original pool of calls (N=146), the firm selection procedure strengthens ecological validity. If interested in vocally expressed emotions, 7 calls hold plentiful cues to be used as a stimulus set in an experiment. Furthermore, the use of material from Study 1 in Study 2 also strengthens the ecological validity, but in turn the ecological validity may be downplayed by participants not being actual call takers.
4.6.3 Analytic and Theoretical Consistency

The quantitative stage offers methods which are less dynamic once they are initiated while the methods in the qualitative stage were more flexible and dynamic. Thus, the qualitative stage could be described as a discovering route while the quantitative was a confirming route establishing the emotional landscape of the setting. Furthermore, the methods for analyzing emotions are perceived to meet common conventions for analyzing emotions within each stage.

One way of approaching a complex phenomenon is by means of multiple sources. Denzin (1989, p. 236-246) argued that triangulation should be separated into data, theory, methodology and investigator triangulation. Above, I have accounted for data and method triangulation. Regarding investigator triangulation, Study 2 involved assessments of cues by more than one rater, and Study 1 and 2 have been co-authored, thus bringing in more than one investigator. In addition, research was discussed within groups at MIT, EIS, MAM, conferences and peer reviews also providing a form of investigator triangulation as the material has been reviewed several times. Together, the studies typically employ theory triangulation since the concept of emotion is carried across a number of literatures, such as communication, decision theory, information systems and organizational theory.

4.6.4 Interpretative Agreement and Generalizability

Several instances provided for interpretative agreement. For instance, there was correspondence between SOS Alarm representatives and the researcher by emails at numerous occasions. The contacts emphasized on scheduling meetings, but also interpretations of organizational documen-
tation, questions about how to conduct work as well as interpretation of findings. There were also meetings of different types. Early in the research process, I attended a national workshop presenting my research. Finally, in terms of selection of material for Study 2, two inter-raters reassessed the whole material from Study 1 in order to create a representative selection.

I believe it is more scientifically rigorous to present precautions made in order to prevent biases, rather than evaluating the actual precautions. The latter is therefore left to the reader of this dissertation. The principles put forth by Klein and Meyers (1999) aim at providing guidance for conducting research, primarily regarding matters of rigor. The principle of abstraction and generalization, however, corresponds to applying findings, channeled through use of the hermeneutic circle and principle of context, to general and theoretical concepts describing human engagement. In other words, it is similar to how research can be generalized across domains. Lee and Baskerville (2003) stated a starting point for generalizations as being either empirical (E) or theoretical (T). In turn, the direction of the generalization is either empirical (E) or theoretical (T) rendering a 2x2 matrix. Study 3 and 4 typically offer ET generalizations since I reflect on empirical contributions to theory rather than testing hypotheses. However, as described in Study 3, reading of theory was done simultaneously as data collection, making it difficult to claim that the starting point for analysis was either theoretical or empirical. The reverse is more apparent in Studies 1 and 2, where I used a theoretical starting point, crafting research questions to be tested. Thus, the direction of generalization in this case was from theory towards empirical contexts in order
to determine a baseline for emotional expression in the particular setting. However, the generalization is also an EE-generalization since the findings would be applicable to the empirical setting of emergency call taking, at least in terms of the emergency center in this study.

Finally, an important type of generalization in this research has been from theory to theory (TT)—the assembly of theory from different academic fields to provide a basis for the analysis of emotions in emergency call taking. Rather than aspiring to explore any of the fields fully, I have sought out research literature that can help construct and make sense of the rich empirical descriptions. By drawing on sources from these diverse fields, I make the claim that the resulting assembly of theories is useful in furthering the understanding of roles of emotions in such a work setting as emergency call taking.

4.7 Ethics Approval
Prior to entering the SOS Alarm setting, an ethics application was submitted to a regional ethics committee. The original application was first turned down by a regional committee, but later on, when appealed, got a conditioned approval from the national committee (Central Ethical Review Board, 2008. Decision: Ö 7-2008). The conditioned approval emphasized that if data from callers and call takers where to be included in the study, both parties needed to give their consent—a procedure which was complex.

Informed consent could easily be obtained by asking the call takers, while the procedure of obtaining consent from callers was significantly more complicated. First, I considered it to be unethical asking callers for participation in the study in conjunction to making their calls (a pro-
procedure suggested by a member of the ethics committee). Considering the nature of the setting, callers where suspected to experience vivid emotions, causing their emotions to possibly affect their judgment. Thus, it would be difficult to state that the consent would have been an informed consent. In addition, asking for consent during the call would take time and draw attention away from the purpose of the call. Secondly, it was complicated establishing contact with callers after the calls—since I should not be knowledgeable about the identity of callers prior to their consent. This matter was resolved by using SOS Alarm representatives as an intermediate step in the process. Call takers were instructed to select calls (see Study 1) and attach a reference number to each call. Since SOS Alarm routinely record and store all incoming calls for 90 days, representatives could then track and retrieve addresses to mail an informed-consent request (authored by me) to each caller.

The interviewed call takers consented to participate at the time for the interview. While observing call takers, I also co-listened to approximately 500 authentic calls in order to get the gist of the interactional structure of such calls. Notes were taken regarding call taker management and caller expression, but no demographic or personal details were recorded that would enable identification of the caller. Any information shared by the call takers about callers was conducted in non-identifiable manner. This process was carefully regulated by a professional non-disclosure document.

4.7.1 Personal Reflections

By writing the dissertation, I have also come to view research as a time for learning craftsmanship of science. It is my firm belief that contempo-
rary researchers need to grasp an arsenal of different methods in order to conduct efficient and relevant research.

The process of accessing the emergency context involved mixed feelings for two different reasons. First, writing the ethics proposal caused a lengthy and complex procedure with numerous contacts between SOS Alarm parties, local, regional and a national ethics committee and me. In the past, several studies have got an ethics approval without an informed consent from the caller, while I was strained by continuously crafting and re-crafting my ethical proposal. Despite any mishaps and prolonging in the process of getting the ethical approval, the process of writing gave me an opportunity of carefully crafting my thoughts.

Second, engaging in studies at an emergency center involves facing emotionally challenging situations. Often one can only imagine the emergencies people can face and it becomes almost impossible to prepare for listening to these events. Engaging in the research process became an eye-opener for me in terms of how fragile and delicate the call taker job is. The writing of field notes served me in an almost therapeutic manner. Besides providing an interesting and detailed source of data, it also helped me to deal with emotions arising from listening to emergency calls.

At times, I felt sad listening to sad calls, other times angry when listening to injustices, or even fear when not knowing how dilemmas would be solved when people at the other end of the line were facing a certain death. Sometimes, I was even disgusted when I listened to the “War Stories” of emergency call takers. They expressed knowledge about for instance suicide that the public is unaware of. The aim of using field notes was to gather detailed information about call-taker work. Indeed,
this helped me understand how it is being a call taker. The field notes also served as a source where information could be stored in writing, giving a detailed description of call taker work, but also as a source giving closure to emotional experiences. Furthermore, a common problem with individuals working in emergency settings could be labeled as “who helps the helper”. Therefore, and in addition to using the field notes as a debriefing source, I investigated possibilities of having debriefing sessions with a vicar. However, I never came to use this resource since I considered the field notes to be a sufficient debriefing tool.

4.8 Chapter Summary

This chapter started out by explicating the research approach. Considering the multifaceted nature of emotions and routines as concepts together with the fast-paced and ethically sensitive nature of the setting, a mixed method approach was considered to be most useful. The prevailing view is that relationships may be observed, but observations are not value-free—instead it is a matter of approximations.

The research process was conducted in consecutive stages, where a conceptual stage spiraled off into a quantitative stage (Study 1 and 2) and a qualitative stage (Study 3 and 4) prior to a stage where meta-inferences, drawing on the former three, were made. The empirical material used included a number of sources and methods. Ratings of emotional expression and help need in authentic emergency calls (N=146) in relation to priorities, a stimuli of content-masked speech of fear expressions from authentic emergency calls, in-depth interviews, direct observation and a range of organizational documents were used.
Specific conventions for each stage were addressed. In terms of the quantitative stage, matters of the rating procedure, representativeness of the sample, delineation of variables as well as selection of specific calls to include in Study 2 were addressed. In terms of the qualitative stage considerations of data reduction, data display and conclusions were addressed. These considerations were then put in context by addressing quality indicators granting research quality. Factors such as design suitability, fidelity within and between different methods, analytical and theoretical consistency, interpretive agreement and generalizability were addressed.

I addressed ethical concerns and personal reflections regarding the research process. The ethical concerns regarded conducting research within the domain of emergency call taking. This setting is compromised with value-laden and delicate aspects since the process of decision making cannot be interrupted, changed or influenced due to the difficult decisions call takers have to make. There were also considerations regarding preserving the integrity of both callers and call takers. Finally, and connected to the ethical concerns, I addressed personal reflections regarding the research process. These reflections mainly regarded how to cope as a researcher within this domain of research as I many times directly took part of emotional aspects of emergency call taking work.
Table 7. Summary of Data Sources, Method for Analysis and Precautions for Rigorous Standards

<table>
<thead>
<tr>
<th>Source(s) and quantity of data</th>
<th>Study 1</th>
<th>Study 2</th>
<th>Study 3 and Study 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>146 ratings of emotional expressions, intensity expression and help need in authentic emergency calls.</td>
<td>• Authentic (8 fear and 8 neutral) vocal emotional expressions, derived from 7 authentic emergency calls, together with two rating scales (intensity and need of help) formed the basis for experiment material.</td>
<td>≥ 60 hours of field observations</td>
<td>• 12 in-depth interviews (18 hours of recording)</td>
</tr>
<tr>
<td>Analysis of data</td>
<td>• Correlation analysis and test of differences.</td>
<td>• Correlation analysis and test of differences.</td>
<td>• ≥ 400 pages of educational material.</td>
</tr>
<tr>
<td>Precautions made to achieve research quality</td>
<td>• Randomized selection of calls within purposely selected calls.</td>
<td>• Selection of data by means of informed consent.</td>
<td>• ≥100 pages of website and policy material</td>
</tr>
<tr>
<td></td>
<td>• Combination of forced-choice and open-ended questions.</td>
<td>• Trained inter-raters independently selecting intervals.</td>
<td>• ≥ 400 pages of annual reports</td>
</tr>
<tr>
<td></td>
<td>• Randomized and counterbalanced rating scales.</td>
<td>• Randomized and counterbalanced rating scales.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Designing a work wise non-interfering rating procedure.</td>
<td>• Content-masked speech using a Hann-shaped filter.</td>
<td></td>
</tr>
</tbody>
</table>
5. **Summary of the Studies**

Each of the studies contributes to the purpose of the dissertation, but they do so in different ways. I will briefly account for findings and results followed by the contribution to the overall purpose of the dissertation.

**Study 1: Community Voices: Emotional Voices of Help in Emergency Call Taking**

In the field study, emergency call takers rated callers’ emotional expressions in authentic emergency calls (N=146), level of intensity and expressed need for help. Fear and sadness were perceived as the two most typical emotions. There were also significant differences between intensity scale-levels in fear (Levels 7-10; $U = 186, p < .000$) as well as between intermediate and high levels of sadness (Levels 5-10; $U =104.5, p < .014$) and surprise (Levels 5-10; $U =104.5, p < .014$). Furthermore, the level of help need was differentiated between intermediate and high levels in fear expressions (Levels 5-8; $U = 384, p < .031$) as well as within high levels of surprise (Level 7-8; $U = 622.5, p < .002$). Partial correlations for fear, help need and intensity suggested that intensity contributes to perceived need of help. In other words, it is not only the emotion per se, but also the intensity of expression that is important when prioritizing emergency calls.

**Contributions to the Purpose**

In order to develop understanding of the function of emotions in routine-based triage, a baseline of emotion needed to be established. The reason for empirically investigating, by means of a field study, was the sparse
previous literatures that explicitly dealt with a view of the caller which went beyond “the hysterical caller”. At the same time as the study focused on selected variables, derived through initial readings and contact with emergency representatives, it had a proximal character since it was conducted within the setting of routine-based triage work. Thus, the relationships (correlations) provided building blocks for what kind of emotional landscape call takers are facing.

**Study 2: Vocal Emotional Expressions: Proxies for Decision Making in Emergency Calls?**

By using a low-pass filtered speech stimulus, participants (N=22) were able to discriminate fear expressions (t (350) = 2.79, p = .006) from neutral expressions. There was an indication that fear expressions were devoted more help than neutral expressions (t (350) = 1.83, p = .067). In turn, judged intensity of expressions and judged help need showed a strong correlation (r = .92). Partial correlations indicated that participants use intensity (mean dB) as a cue to infer the intensity/help need relationship (r = .87).

**Contributions to the Purpose**
The second study contributed to describing the influence of emotions in the setting by focusing on the most typically expressed emotion (fear) found in Study 1. The study validated and strengthened findings from the first study since calls from the first study were used a stimulus set in the second study. The experiment supported findings from the first study in terms of that intensity of expression was strongly correlated with perceived help need.
Fear and neutral expressions were possible to discriminate and results were indicative to that fear expressions were devoted more help. The indicative results could possibly stem from that fear and neutral expressions were selected from the same pool of calls. In turn, this may have caused neutral expressions to be more similar to fear expressions than they would have been if selected from a neutral pool.

**Study 3: Managing Negative Emotions in Emergency Call Taking: A Heat-Model of Emotional Management**

Study 3 focused on emotional management strategies of call takers. More specifically, how do emergency call takers manage double-faced emotional management—i.e., their own and the caller’s emotions—simultaneously? Multiple strategies were identified. The range of strategies included hiving (selecting and modifying) calls, elaborating on (by deploying attention and reshaping/reappraising) content of calls, auralizing (by externalizing an emotional barrier) as well as taming emotional expression (by regulating expressions of emotions). The set of emotional management strategies were summarized in the HEAT-model and compared with organizationally prescribed ways of displaying and managing emotions. The management strategies in use were partially in line with and partially in conflict with the organizationally prescribed routines.

**Contributions to the Purpose**

Results from Study 1 and 2 constituted a foundation, showing that emotional expressions are present, but also likely to influence decisions emergency call takers make. However, expression of a specific emotion may not reciprocate in the individual who is facing it. Thus, a more thorough
investigation of how the call taker coped with emotional expressions as well as how they cope with their own emotions was motivated. Study 3 therefore contributed to the overall purpose by providing insights into how emergency call takers make use of specific management strategies, which are aligned as well as not aligned with organizational prescriptions, in order to conduct routine-based triage work.

**Study 4: The Rationale for Irrationality: Uncertainties and Ambiguities in Emergency Call Taking**

The findings reveal an imperative of speedy management, but also that information ought to be thoroughly examined—a matter which causes tension between rational, intuitive and emotional capabilities. Call takers make use of the decision support system, but decisions are made following dual routes. The primary route emphasizes a protocol-based (de)constructive technique, where “bits of data” (i.e. symptoms) are matched against the decision support system—a route that mainly reduces uncertainty. Along the second route, call takers resolve ambiguity by non-protocol-based procedures, attending to “deviations”, using non-rational (intuitive and emotional) skills. Somewhat counterintuitive, the formalized procedure of using the DSS is highly dependent on skills resolving ambiguity—these skills break the logical sequence found in the uncertainty-reducing activity by framing which matters to attend to and consequently which questions to pose to the caller.

**Contributions to the Purpose**

While study 3 had a focus on how to manage emotions—peripherally addressing how call takers make decisions—Study 4 had an explicit focus
on reason-based and non-reason based procedures of decision making in this context. The study also demonstrated how intuition and emotion can be components in individual routines and modify the enactment of organizational routines. A summary of key findings for all studies are presented in Table 8.

Table 8. Summary of Results and Findings in the Studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Summary of Results</th>
</tr>
</thead>
</table>
| Study 1 | • Discrimination of different emotions was possible and fear and sadness were the most typical expressions.  
• Emotions perceived to be more intense were also perceived to indicate more help needed. Fear was perceived to be most intensely expressed as well as expressing the most need of help. |
| Study 2 | • Discrimination between fear and neutrality was possible. Participants were unaware they were assessing these variables.  
• Expressions of fear were indicative to being devoted more help than neutral expressions.  
• The degree of intensity of fear and neutral expressions was strongly correlated with the degree of perceived help.  
• The psychoacoustic cue of intensity (mean) was used to infer the relationship between perceived intensity and help needed. |
| Study 3 | • Call takers used different strategies to manage callers. Management was dependent on whether call takers had an internal (intrasubjective) focus or whether they focused on the communication with the caller (intersubjective focus). The strategies hiving, elaboration, auralizing and taming were identified.  
• Fear and sadness were perceived to be easier to manage in comparison to anger. Anger was also perceived to more easily “carry over”, potentially affecting other domains of work. |
| Study 4 | • When prioritizing, call takers use dual routes for decision making. They reduce uncertainty, but also to resolve ambiguity. Thus, the nature of the call determines the dominant approach the call taker uses.  
• Uncertainty regards matching symptoms towards the decision support structure while resolving ambiguity regards tacit components, listening for what is not said, vocal cues (emotions, but also sounds of the environment in general). |
6. **Study 1: Community Voices: Emotional Voices of Help in Emergency Call Taking**

The study has been submitted to Journal of Applied Communication.
ABSTRACT

Among the thousands of emergency calls each year, call takers need to prioritize and assign appropriate levels of help. This field study focuses on perceptions of emotional expression, level of intensity in relation to perceived help needed in authentic emergency calls (N=146). Fear and sadness were perceived as the two most typical emotions. Fear correlated with intensity (r=.64) at the same time as clear fear expressions were significantly separated from less clear expressions within high levels of intensity (U = 186, p < .00). The clarity of sadness (U =104.5, p < .014) and surprise (U =104.5, p < .014) were significantly separated between intermediate and high levels of intensity. Furthermore, the level of help needed was differentiated between intermediate and high levels in fear (U = 384, p < .031) expressions as well as within high levels of surprise (U = 622, 5, p < .002). Partial correlations among the most typically expressed emotions, help need and intensity suggested intensity to contribute to perceived help need. In other words, it is not only the emotional per se, but also the expression of intensity, that is important when prioritizing emergency calls. These issues are further discussed in terms of to what extent policy alignment may be accomplished in telephone-based healthcare settings.
INTRODUCTION

There are 18 SOS Alarm centres in Sweden. Annually, there are approximately 900000 calls where callers are in need of an ambulance. Call takers answering these calls work independently in an office landscape, but are also connected and cooperate through a network-based platform. Work is substantially protocol-based and the platform provides interview and decision support in the form of an emergency medicinal index (Annual reports from SOS Alarm 2006-2008). Emergency call taking is also a work setting where vivid emotions are assumed to be expressed (Tracy & Tracy, 1998). Call takers need to listen, establish communication and prioritize the necessary help in a flood of linguistic and paralinguistic expressions, by the mode of telephone, according to protocol procedures. Thus, the emergency call centre setting constitutes a healthcare provision where work characteristics may influence the outcome of treatment (cf. Kyrouz & Humphreys, 1997).

The reasons for paying attention to emotions in this setting are two-fold. Firstly, emotions can be communicated vocally and consciously (cf. Juslin & Laukka, 2003; Scherer, 2003) as well as being contagious—causing individuals to unwittingly “catch on” to the expressions of others (Hatfield, Cacioppo & Rapson, 1994). Thus, the call taker setting constitutes a work setting where emotions not only need to be acknowledged, but also managed. Not surprisingly, such management of emotions results in the consequence in of individuals feeling stressed due to experiencing estrangement from their true selves and real feelings (Sloan, 2003). In other words, it is distressing to listen to emotional hardships while resisting feeling them. Secondly, emotions influence intrapersonal processes
that are crucial when making decisions (cf. Pham, 2007; Loewenstein & Lerner, 2003). For instance, Small & Lerner’s (2008) study regarding a welfare policy—a situation similar to emergency call takers who are guided and restricted by protocol procedures—revealed that induced sadness increased the amount of recommended help in comparison to a neutral condition. In addition, neutral individuals gave more assistance than angry individuals. In a follow up study, the results from the first study were replicated, but the effects were eliminated when the cognitive load was increased through a distracting task, suggesting that depth of thought drives the effects. Such a finding concerns differentiation of cognitive patterns that are dependent on what emotions that are experienced—a situation that may apply to the emotional landscape of emergency call taking.

Emotional management is dependent on the occurrence, form, duration and intensity of the emotion per se (Eisenberg & Spinrad, 2004; Gross, 1998a). Therefore, it is important to understand the terrain of the emotional landscape. From a call taker and caller point of view, it is important to identify emotions in order to further identify emotions that could potentially carry over and affect the call takers´ triage. Commonly expressed emotions may influence judgments and prioritization more often, but uncommonly expressed emotions may also influence judgments and prioritization since call takers are less familiar dealing with these emotions. Furthermore, when having to assess emotional states, individuals are helped, not only by the assessing of the category of others´ emotions that they perform in everyday life, but also by using loudness and talking speed as important cues (Planalp, 1998). Therefore, and in align-
ment with previous research findings (Juslin & Laukka, 2001; Eisenberg & Spinrad, 2004; Gross, 1998), intensity may be a factor to consider in relation to the perceived need for help. In summary, there is a need to clarify distribution of callers’ expressions in order to be knowledgeable about which expressions call takers should embrace and which they should regulate—so as not to be lead astray by them.

In this field study, call takers judge category of emotion and intensity of emotion, as well as expressed need of help in calls to the emergency center. The purpose of this paper is twofold; firstly, we want to report call taker perceptions of common and uncommon expressions of emotion from callers. Secondly, we want to understand the relationship between perceptions of expression and perceived help need. The remainder of the paper is organized as follows; firstly, we review literature on expression and detection of vocal emotional expression and the intersection of emotion and judgment. Secondly, we address the methods and procedures used in the study. Thirdly, we address the results of call takers’ ratings of emotions, intensity and help needed. Finally, we discuss and conclude the findings, as well as discuss future research questions within the emergency call taker domain.

**Vocal Communication of Emotion**

Speech is a channel revealing a plethora of cues about the sender (Bachorowski, 1999). Besides linguistic information, speech also holds numerous paralinguistic cues. Emotions are seen as interruptions to ongoing events (Frijda, 1986), thus causing synchronization of a range of different processes in order to cope with a situation (Scherer, 2000). These responses are mirrored in the autonomic and somatic nervous systems (cf. Cacioppo, et al., 2004).
Researchers converge on that discrimination of vocal emotional expressions, at better than chance level, is possible (cf. Banse & Scherer, 1996; Pittam & Scherer, 1993; Scherer, 1986; Scherer, Banse, Wallbott, & Goldbeck, 1991; Van Bezooijen, 1984; Wallbott & Scherer, 1986). Anger and sadness are generally better communicated than fear and happiness (Scherer, 2003. See Table 1) and tenderness (Juslin & Laukka, 2003). For instance, identification ratios for anger are high in both western and non-western cultures.

Table 1. Identification accuracies of vocal emotions in (a) Western and (b) non-Western nations. Adapted from and Scherer (2003)21

<table>
<thead>
<tr>
<th>Variable</th>
<th>Emotion</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Anger</td>
<td>Fear</td>
<td>Happiness/Joy</td>
<td>Sadness</td>
</tr>
<tr>
<td>Identification accuracy (in %) (a)</td>
<td>77</td>
<td>61</td>
<td>57</td>
<td>71</td>
</tr>
<tr>
<td>Identification accuracy (in %) (b)</td>
<td>64</td>
<td>38</td>
<td>28</td>
<td>58</td>
</tr>
</tbody>
</table>

One major concern of decoding and encoding studies is the lack of ecological samples. Researchers (cf. Scherer, 1986; 2003; Juslin & Laukka, 2001; 2003) have argued that the same emotion may be expressed in different ways with different configurations of voice cues. Laboratory studies with actor portrayals may reveal a different set of

emotional cues if compared with natural samples. In earlier studies, there may have been too few acoustic parameters to assess the differentiation between emotions. For instance, Banse and Scherer (1996) showed that many of the 14 different emotion labels in a standard content paradigm\textsuperscript{22} were grouped into families—being categorically similar, but differing in intensity. More recently, Spackman, Brown and Otto (2009) found differences across untrained and trained speakers’ expression of the same emotions. However, no accompanying relationship was found in the accuracy of detection of the expressions—suggesting that there may be multiple ways of expressing the same emotion.

Naturally occurring emotions may be a promising candidate for moving research forward. Voice data from therapy sessions and healthcare providers have been used (cf. Laukka et al., 2008; Haskard et al., 2008). However, authentic speech research faces difficult methodical considerations; factors such as number of speakers, the duration of expressions and recording quality, are making research complicated (cf. Johnstone & Scherer, 2004 p. 224). Few researchers have investigated perceptions of emotional expressions in calls to emergency centers. Exceptions may be found in Vidrascu and DeVillers’ (2005) study of which emotional cues, in positive and negative speech, are responsible for emotion perception. They also conducted a study of primacy for lexical versus paralinguistic

\textsuperscript{22} A standard content paradigm refers to a stimulus that is created by keeping the verbal material constant across trials at the same time as the nonverbal material is varied. Differences in decoding of material are attributed to the emotional expression.
features (2006). The first study (2005) indicated $F_0$ and intensity$^{23}$ features to be most relevant for discrimination between emotions. The second study (2006), revealed that fear was best (and sadness worst) recognized by lexical features. Overall, the study indicated higher lexical accuracy over paralinguistic accuracy. However, these studies used automatic detection techniques rather than human judges and did not relate emotional expression to perceived need of help.

**Consequences of Emotion-Judgment Interaction**

From a community perspective, it would make less sense if calls with certain emotional expressions were given primacy due to the expression of these emotions. Therefore, in order to provide for equal help irrespective of emotional expression, call takers use the Swedish Emergency Medicinal Index when prioritizing the need of help$^{24}$. However, emotional expressions may be difficult to overlook and call takers may be at risk of catching unwanted emotions (cf. Hatfield, Cacioppo & Rapson, 1994) or they have to regulate themselves (cf. Gross, 1998 a and b) in order to not let emotions interfere with the process of making priorities. The influence of emotions on decision making is not uniform. A positive versus negative categorization of emotion is not an optimal categorization since the literature review on the topic reveals a more fine-grained picture. How-

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$^{23}$ Fundamental frequency ($F_0$) refers to the rate of opening and closing of the vocal folds across the glottis. Intensity refers to the energy needed to produce speech and is measured in decibel.

$^{24}$ The index provides decision support by giving an overview of categorized symptoms (ranging from allergies to assault) with attached suggestions of priorities a call should have on an ascending scale ranging from 4 to 1 (where 4 is the least severe and 1 is the most severe). Juxtaposed to the index is an interview guide with sample questions on what to ask for each respective symptom.
ever, for simplistic reasons (covering the whole range of effects on decisions goes well beyond the scope of this paper) we use positive and negative categorizations as a starting point. On a general note, positive emotions (such as happiness) make people expansive, inclusive and impulsive and decisions are typically fast (Isen & Means, 1983)—especially for simple tasks (Mayer & Bremer, 1985). Happy people make broader categorizations (Isen & Daubnlan, 1984) and show looser and less organized associations (Fiedler, 1988). They also take more risks if losses are deemed to be small (Isen & Geva, 1987). Happy people are not mindless, even though they prefer heuristic judgments and discriminate impulsively if personally uninvolved, but they can head to detailed and controlled processing (Forgas & Fiedler, 1996) if notified. Call takers are rarely expected to hear expressions of positive emotions at the emergency centre and thus, are less likely to be affected by these emotions. On the contrary, negative emotions are expected to be more prevalent in this setting, but their influence on judgment is less uniform. For instance, individuals induced with disgust have been shown to account for more severe moral judgments (Haidt, McCauley & Rozin, 1994). There are also differentials between fear and anger (Lerner & Gonzalez, 2005; Lerner and Keltner, 2001). Fear is associated with increased risk perception (for example, with terrorist attacks)—and showing avoidance motivation, while anger decreases the perceived level of risk and showing approach motivation (Fischhoff, Gonzalez, Lerner, & Small, 2005).

In an emergency call situation it could be assumed that expressions of negative emotions (such as fear, sadness and anger) cause call takers to form mood-congruent judgments, bringing negative feelings towards po-
tential callers and therefore evaluating them more negatively (Forgas, 2003; Johnson & Tversky, 1983). However, other researchers state the contrary that negative emotions induce repair motives, making individuals more likely to provide additional help (Baumann, Cialdini, & Kenrick, 1981; Cialdini, Darby, & Vincent, 1973). Moreover, other predictions claim less uniform differentials between the effects of anger and the effects of sadness on judgments (Small & Lerner, 2008). Since anger is related to heuristic judgment, while sadness has been shown to lead to systematic processing (Lerner & Tiedens, 2006; Tiedens & Linton, 2001). In fact, anger is more similar to happiness due to its heuristic processing features (Bodenhausen, Sheppard & Kramer, 1994) than to other negative emotions. The reason for this may be found in appraisal dimensions. Anger is associated with a meta-level sense of certainty—affecting individuals to believe that they have sufficient information to shape their judgments. Sad individuals show less certainty in evaluations, making them seek additional information (Tiedens & Linton, 2001). Furthermore, sadness and anger tend to bias perceptions of saddening and angering events to occur (DeSteno, Petty, Wegener; & Rucker, 2000). In addition, individuals expressing anger and sadness have been shown to be persuasive to angry and sad recipients respectively (DeSteno, Petty, Rucker, Wegener, & Braverman, 2004). Thus, there seems to be an emotional matching bias where those specific emotions show an additive effect on expectancies for an event when the event itself possesses those emotional overtones. In other words, when there is an affective-material fit between the message and the recipient, the effect of emotion on cognition seems to be strong.
In summary, there is an argument that emotional influence on judgment is more homogenous for positive emotions than for negative emotions.

Research Questions

Call takers must make an overall assessment of both linguistic and paralinguistic information in order to be “persuaded” of what to include/exclude as an assessment criteria. Therefore, it is important to account for prevalence of different emotions and thus the first research question is:

**RQ1: Which emotions do emergency call takers perceive in the voice of the callers?**

Emotions are argued to be categorically similar, but expressions of intensity may help differentiating them (cf. Banse & Scherer, 1996; Spackman et al., 2009). Therefore, we will study:

**RQ2a: How do emotional and intensity expressions relate?**

Furthermore, emotions affect cognitions (cf. Small & Lerner, 2008) and therefore it is important to study whether emotional expression of callers is related to the priority allocated to the calls. The final research question is therefore as follows:

**RQ2b: How do emotional and help needed expressions relate?**

**METHOD**

Prior to accessing the emergency context, an ethics application was written. The ethics application was approved by the Central Ethical Review Board in Sweden (see Decision: Ö 7-2008).
**Participants**

All call takers were asked for participation by the quality manager of the emergency center. Call takers were then contacted by email and upon approval, were sent material to be used when rating the calls. The mean age of call takers was 39.5 years and on average they had 6.2 years of employment. In total, 7 call takers returned 146 ratings for analysis (with an average of 20.1 rating per call taker, ranging from 4 to 50 calls per call taker).

**Procedure**

The research design uses a voice sample that is randomized since call takers rated calls to the emergency center. It was not possible to collect data for the duration of the calls, but calls typically last longer than a few utterances and less than several minutes. In order to establish a sampling procedure that would minimize interference with work, call takers were instructed to rate calls regarding only health care matters\(^\text{25}\), within a 30 minute interval. The call takers were instructed to rate emotional expression, level of intensity and help needed for the first minute as well as attach a reference number to the rating in order to facilitate further tracking of the call. The time-frame for rating the first minute of the call was determined after discussion with SOS Alarm representatives. They considered the opening phase to enclose the most emotionally charged material. If the call lasted less than 1 minute, the call takers were instructed to

\(^{25}\) Call takers receive a number of different types of calls. There may be calls regarding emergency medicine, fire, police but they also need to handle automatic fire alarm in buildings.
rate for the entire duration of the call. By rating calls in direct conjunction to when they are made call takers face a situation which is in alignment with an ordinary call taker procedure.

**Material**

The material used for rating emotions followed Ekman’s (1972) categorization of basic emotions. It has been identified that vocal expression of anger, sadness, fear and joy (and to a lesser extent disgust) can be discriminated at better than chance levels (Banse & Scherer, 1996) and they were therefore included in the study. Tenderness has also been recognized as possible to discriminate at better than chance levels (Juslin & Laukka, 2003). However, tenderness was excluded from the material since it was considered to be expressed more by call takers than by callers. In addition, even though disgust has been argued to be difficult to discriminate it was included in the study since calls were expected to invoke disgust.

The final material contained scales (where 0 equalled no expression and 10 very clear expression) for categorical perception of emotion and for intensity of emotions (where 0 equalled not at all and 10 very strong). A forced-choice format may complicate research since few response alternatives could inflate the accuracy of emotion recognition (Russel, 1994). Therefore, in line with Frank and Stennet (2001) and Juslin and Laukka (2001), additional precautions were made. At the end of the rating sheet there were two additional questions, an open alternative (with a possibility of a categorical rating from 0-10) where call takers could add additional emotional expressions not captured by the basic emotions. There was also a free-text possibility to add details about the calls. Furthermore, in order to avoid order effects of the ratings, the material was counterbalanced with regards to both category (which emotion) and numerical rating.
(10-0) for the category and intensity ratings. Finally, there was a question asking to what extent the call takers perceived the caller to be in need of help (where 1 equalled very little and 8 a lot). The rating material was purposely kept to one A4-page per call in order to not significantly increase call taker’s workload by having to turn pages in a time-pressured situation. A call taker’s set of sheets allowed them to conduct up to 50 ratings each.

**Data Analysis**

Firstly, an additional category of emotion (anxious) was derived by calculating the mode of the free-choice emotion. This category was chosen because several responses to the free-choice emotion question described expressions of anxiety. The ratings for all emotions were then transformed into z-scores for each of the call takers. The means and confidence intervals (95%) were then calculated on the z-scores for each emotion—across all the call takers ratings together. Normalizing ratings of each call taker to zero eliminated between-subject differences, thus enabling the treatment of the data as an entire dataset. Firstly, the z-values underwent correlation analysis and then, the strongest correlations underwent partial correlation analysis in order to rule out variance among fac-

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26 Call takers continuously prioritize incoming calls on a scale from 1 to 4. The priorities are related to a medicinal emergency index where 1, on an ascending scale, is the most severe. Since we did not have immediate access to audio files or logs at the time, the rating was attached in order to mirror the prioritization made by the call takers. The rating scale was also further nuanced using 1-8, rather than 1-4. 1-2 corresponded to priority 4 on the authentic scale, 3 -4 to priority 3, 5-6 to priority 2 and 7-8 to priority 1.
tors. Finally, tests between different scale-levels of intensity and help needed were conducted. However, the distribution for the z-values across specific scale levels did not meet the requirements for parametrical testing, rendering use of Mann-Whitney U-test.

**RESULTS**

Call takers’ judgments of anger, fear, sad, happiness, disgust, surprise and anxiousness are shown in Figure 1. The result shows that fear was the most typically perceived emotion in calls to the emergency center.

![Graph showing mean ratings and confidence intervals for emotions](image)

*Figure 1. Mean ratings and confidence intervals (95%) for all emotions across all calls with data transformed into Z-scores for each call taker.*

The spread around the mean, depicted as a CI95%, shows no overlap to the next highest rated emotion, sadness. Sadness is also significantly set apart from the means of the other emotions judged as angry, happy, disgusted, surprised and anxious since the CI95% does not overlap. Disgust
has a low mean and a narrow CI95%, and therefore is the least typical perceived emotion of all.

Table 2 shows correlations between judged emotions, judgments of emotion intensity and help needed. The results show overall medium/weak correlations among rating scales, indicating low redundancy information between scales. The strongest correlation (r=.64, p<.01) is between fear and intensity. Fear correlates with sadness (r=.53, p<.01), whereas its correlations with other emotions are ranging from -.31 to .20. It should be noted that fear has a weak correlation with help needed (r=.21, p<.05) as such, but it is also the emotion out of all emotions with the strongest correlation to help needed. Among all correlations, the third strongest correlation (r=.40, p<.01) appears between the judgment of emotion intensity and help needed.

Figure 2 shows the relationships between judgment of emotional expression and intensity (left panel) and judgement of emotional expression and help needed (right panel). The means for different emotions for both panels reveal a somewhat scattered distribution. In the left panel, emotions seem to cluster at low levels and then continuously rise and separate towards higher levels. Fear, sadness and surprise show increase in z-score means, step by step, with increased intensity. This is most notable for fear (left panel).
Table 2. *Pearson correlations for call takers judgments of the emotions, fear, sad, happy, disgust, surprise, anxious, and call takers judgments of intensity of emotion and help needed.*

<table>
<thead>
<tr>
<th></th>
<th>Fear</th>
<th>Sadness</th>
<th>Happiness</th>
<th>Disgust</th>
<th>Surprise</th>
<th>Anxiousness</th>
<th>Intensity</th>
<th>Help needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
<td>.04</td>
<td>.06</td>
<td>-.18*</td>
<td>.15</td>
<td>-.09</td>
<td>-.18*</td>
<td>.13</td>
<td>-.09</td>
</tr>
<tr>
<td>Fear</td>
<td>.53**</td>
<td>-.31**</td>
<td>.16</td>
<td>.17*</td>
<td>.20</td>
<td>.64**</td>
<td>.21*</td>
<td></td>
</tr>
<tr>
<td>Sadness</td>
<td>- .29**</td>
<td>.23**</td>
<td>.02</td>
<td>.08</td>
<td>.39**</td>
<td>.11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Happiness</td>
<td>- .17*</td>
<td>-.07</td>
<td>-.06</td>
<td>-.18*</td>
<td>.14</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disgust</td>
<td></td>
<td>.19*</td>
<td>.03</td>
<td>.15</td>
<td>-.15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surprise</td>
<td></td>
<td></td>
<td>-.08</td>
<td>.25**</td>
<td>.12</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiousness</td>
<td></td>
<td></td>
<td></td>
<td>.07</td>
<td>-.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>.40**</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* *p < .05, **p < .01*
Figure 2. Relationship between mean ratings of emotional expression and mean ratings of help needed (left panel) and mean ratings of emotional expression and mean ratings of intensity (right panel).
The steep rise between level 9 and 10 (Mean range 1.71 to 2.58, see Table 3) was not significantly separated ($U = 74$, $p < .30$).

**Table 3.** *Mean ratings and confidence intervals (95%) for selected emotions in comparison within levels of intensity and help needed.*

<table>
<thead>
<tr>
<th>Factor level</th>
<th>Emotion</th>
<th>Mean</th>
<th>CI95% Lower</th>
<th>CI95% Upper</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity 10</td>
<td>Fear</td>
<td>2.58</td>
<td>1.96</td>
<td>3.20</td>
<td>13</td>
</tr>
<tr>
<td>Intensity 9</td>
<td>Fear</td>
<td>1.71</td>
<td>0.66</td>
<td>2.78</td>
<td>9</td>
</tr>
<tr>
<td>Intensity 7</td>
<td>Fear</td>
<td>0.86</td>
<td>0.35</td>
<td>1.37</td>
<td>16</td>
</tr>
<tr>
<td>Intensity 10</td>
<td>Sadness</td>
<td>1.05</td>
<td>0.36</td>
<td>1.73</td>
<td>13</td>
</tr>
<tr>
<td>Intensity 4</td>
<td>Sadness</td>
<td>0.00</td>
<td>-0.59</td>
<td>0.59</td>
<td>10</td>
</tr>
<tr>
<td>Intensity 10</td>
<td>Surprise</td>
<td>0.26</td>
<td>-0.37</td>
<td>0.90</td>
<td>13</td>
</tr>
<tr>
<td>Intensity 5</td>
<td>Surprise</td>
<td>-0.49</td>
<td>-0.84</td>
<td>-0.14</td>
<td>18</td>
</tr>
<tr>
<td>Help need 8</td>
<td>Fear</td>
<td>1.36</td>
<td>0.84</td>
<td>1.88</td>
<td>38</td>
</tr>
<tr>
<td>Help need 7</td>
<td>Fear</td>
<td>0.68</td>
<td>0.18</td>
<td>1.18</td>
<td>22</td>
</tr>
<tr>
<td>Help need 5</td>
<td>Fear</td>
<td>0.47</td>
<td>0.01</td>
<td>0.95</td>
<td>15</td>
</tr>
<tr>
<td>Help need 8</td>
<td>Sadness</td>
<td>0.55</td>
<td>0.16</td>
<td>0.94</td>
<td>38</td>
</tr>
<tr>
<td>Help need 7</td>
<td>Sadness</td>
<td>-0.16</td>
<td>-0.33</td>
<td>0.30</td>
<td>22</td>
</tr>
<tr>
<td>Help need 5</td>
<td>Sadness</td>
<td>0.55</td>
<td>-0.07</td>
<td>1.16</td>
<td>15</td>
</tr>
<tr>
<td>Help need 3</td>
<td>Sadness</td>
<td>-0.30</td>
<td>-0.082</td>
<td>0.20</td>
<td>11</td>
</tr>
<tr>
<td>Help need 8</td>
<td>Surprise</td>
<td>0.09</td>
<td>-0.21</td>
<td>0.39</td>
<td>38</td>
</tr>
<tr>
<td>Help need 7</td>
<td>Surprise</td>
<td>-0.45</td>
<td>-0.67</td>
<td>-0.23</td>
<td>22</td>
</tr>
</tbody>
</table>
However, it is also notable that level 9 enclosed the smallest number of observations of all scale-levels (N=9). When further consulting the rise of different scale-levels of fear, the distribution becomes clearer. It was noted that level 7 was separated from level 10 (Mean range 0.86 to 2.58) in the confidence interval and it was also significantly separated (U = 186, p < .000).

Means for sadness was step by step differentiated between level 10 to level 4 (Mean range 1.05 to 0.00) and also significantly separated (U =104.5, p < .014). The mean rating for surprise differed for each level between level 5 and 10 (Mean range 0.26 to -0.49) and were also significantly separated (U = 189, p < .004). Statistics for these cases were based on all calls (N = 146), which were distributed over the range of level of intensity 0 to 10 (N = 7 to N= 18).

Similarly, statistics for help needed were based on all calls (N = 146) which were distributed over the range of level of help needed 1 to 8 (N = 11 to N = 38). Judgements of emotional expression in conjunction with judgements of help needed are shown in the right panel (see Figure 2).

The overall pattern was scattered with mean troughs at low and intermediate levels, but also towards higher levels of help needed. The sharp rise of anger between levels 1 and 3 of help needed stood in contrast to the patterns of the other emotions, but it was not significantly separated (U =78, p<.25). Furthermore, there was a sharp increase in means for sadness between levels 3 and 5 of help needed (Mean range, -0.30 to 0.55), which was indicative of significance (U =118.5, p<.061). As shown in confidence intervals, means for level 7 and 8 differed for fear, sadness and surprise (Mean range 0.68 to 1.36 for fear, -0.16 to 0.55 for sadness.
and -0.45 to 0.09 for surprise). The difference in help needed for respective emotion was not significant in fear ($U = 531, 5, p < .081$) or sadness ($U = 538.5, p < .064$), whereas it was significant for surprise ($U = 622, 5, p < .00$). However, it is also important to emphasize that the rising trend in means of fear between means of level 5 and level 8 for fear (Mean range, 0.47 to 1.36) in help need was significant ($U = 384, p < .031$).

Considering the relationships between judgments of fear, sadness, intensity and help needed, as shown in the correlations (Table 2) and as functions of each other (Figure 2), a crucial question arises—to what extent the variance in one factor is a part of another factor? Table 4 shows partial correlations for the highest correlations from Table 2, with each factor altered and used as a control variable.

Table 4. Partial correlations for help needed, intensity, fear and sadness, with each factor altered and used as control variable.

<table>
<thead>
<tr>
<th>Control variable</th>
<th>Help need</th>
<th>Fear</th>
<th>Intensity</th>
<th>Help needed</th>
<th>Sadness</th>
<th>Intensity</th>
<th>Help needed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity</td>
<td>Sadness</td>
<td>-.02</td>
<td>.39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity</td>
<td>Help needed</td>
<td>.06</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help needed</td>
<td>Sadness</td>
<td>.51</td>
<td>.37</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help needed</td>
<td>Fear</td>
<td>.61</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>Sadness</td>
<td>.08</td>
<td>.03</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear</td>
<td>Intensity</td>
<td>.35</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sadness</td>
<td>Fear</td>
<td>.55</td>
<td>.17</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sadness</td>
<td>Intensity</td>
<td>.38</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The highest correlation between fear and intensity (r=.64) is still the highest correlation when controlled for help needed (r=.61) and sadness (r = .55) (Table 4). The correlation between fear and sadness (r = .53) is still almost the same when controlled for help needed (r = .51) but less so when controlled for intensity (r = .39). The highly interesting correlation between intensity and help needed (r= .40) is not descended to any extent when controlled for sadness (r=.38) or fear (r=.35).

**DISCUSSION**

Before answering the research questions, we will address matters related to the design of the study in a methodical discussion. An observant reader may, at first glance consider the variables to be non-independent in terms of verbal and nonverbal content. However, we consider that the variables can be assessed separately, even though they may be expressed simultaneously. Emotion category and emotion intensity are separable (cf. Planalp, 1998; Juslin & Laukka, 2001; Juslin & Laukka, 2003; Juslin & Scherer, 2008). Furthermore, it is unlikely that call takers modify the authentic prioritization by overwriting it with a “lower” help needed rating. Particularly since there are lives at stake and the procedure is traceable. Neither is the contrary likely, call takers would not benefit by strategically “upping” ratings of emotion in relation to help needed since an inherent characteristic of the job is to differentiate symptoms from non-symptoms. An increase in emotions and intensity in relation to help needed would possibly draw attention to difficulties of conducting such a work task. In addition, mismatching the authentic prioritization with the help needed rating would increase cognitive strain in an overall time-pressured situation and is therefore not expected to occur. Finally, partial
correlations indicated relationship between coupled variables, which was also maintained, without descending to any large extent when controlled for other variables.

There are additional methodical concerns regarding call takers’ assessment of emotional expressions for the first minute of the call. The fact that fear and sadness may both be expressed, within the interval of the minute for rating—with expressions possibly interchanging—may contribute to a rather rough measure (and it is partially mirrored in the correlation between fear and sadness; cf. Table 2). However, the overall relatively weak correlations among emotions were indications for little redundant information in the use of rating scales for this study.

Addressing the first research question—it becomes evident that emergency call taking is a special instance of emotional work since employees are facing a continuous stream of negative expressions. Fear, sadness, anger and anxiousness are perceived more typical than happiness, disgust and surprise. It may be that fear, sadness, anger and anxiousness are more prevalent than other emotions in this study, but it may also be that they are easier to decode, making them easier to detect. Even though not directly comparable—since previous studies of emotion expression suffer from a lack of authentic recordings—the distribution of the results of this study shows similarities to decoding studies of emotional expression. For instance, anger, sadness and joy have been discriminated successfully and disgust has been shown to be harder to convey (Banse & Scherer, 1996; Juslin & Laukka, 2003). In this study, judgments of sadness and anger are more common than disgust, which turned out to have a low value in mean and a narrow CI95% indicating
that it was the least perceived emotion of all. However, a similar result—low-typical-expression—was found for happiness even though this emotion has been shown to be rather easy to decode. In addition, results for expressions of fear deviated from those for laboratory-based decoding studies (but were similar to Vidrascu & DeVellier’s 2005 study using computational automatic detection in an emergency setting) since it was the most typical emotion in this study although it has been decoded with lower accuracy than both anger and sadness in other decoding studies (Banse & Scherer, 1996; Juslin & Laukka, 2003). Therefore, the results are likely to be attributed to prevalence in this particular context, rather than to the ease with which emotions can be decoded.

Returning to both parts of the second research question—it is interesting to note that correlations between fear and intensity, fear and sadness as well as intensity and help needed were the three strongest correlations. Since fear was the most typical emotion perceived by call takers, judgments may reveal variability in the rating scales, and hence, contribute to an increase in correlations. However, the CI95% depicted in Figure 1 show a range not much more than approximately .40 standard deviations between upper and lower boundary and is not considerably different when compared to the range of the other ratings. An interpretation of this finding may be that discrimination between fear and sadness could be difficult in this particular setting. Nevertheless, as indicated previously, it may be that fear and sadness are possible to decode, but expressions of them may occur during the minute for rating which, in turn, makes them correlate even though they are decoded separately and accurately.
This finding becomes even more interesting when considering the relationship to intensity and help needed. It becomes evident that there is a continuous and rising trend of means of intensity for fear, sadness and surprise (compare Table 3 and Figure 2, left panel). Fear expressions showed a significant difference within high levels of intensity (levels 7-10). Expressions of sadness and surprise were only significantly different between intermediate and high levels (level 4-10 and 5-10 respectively) of intensity. In terms of help needed, there were significant differences between intermediate and high levels of fear (level 5-8) as well as within high levels of intensity in surprise (7-8). Thus, the result indicates that, in calls with a prominent help needed, expressions of fear and surprise are both clear and intense.

When considering partial correlations for fear, sadness, help needed and intensity, intensity correlates to help needed when controlling for fear and sadness (see Table 4). Such a finding suggests that it is not only the emotion per se that is important when determining need of help, but also the intensity of the expression. However, it is also important to emphasize that fear and/or sadness need to be present since intensity, as a variable, cannot alone account for these findings. Using solely intensity as an explanatory variable would be like trying to depict an emotional motive without a background. In other words, intensity needs to interact with another variable to be meaningful.

The result of this study has common denominators with, but also deviates from, recent studies of emotional judgment. Emergency calls contains both linguistic (what is being expressed) and paralinguistic information (how it is being expressed). Call takers ought to prioritize based on
linguistic rather than paralinguistic content—symptoms ought to be considered to a larger degree than how the symptoms are expressed. Even though not directly supported by this study, it is likely that it is difficult to single out linguistic symptoms from the paralinguistic emotional expressions. In other words, it leads one to speculate how resistant call takers can be regarding emotional matching bias, where expressed emotions affects expectancies for an event when the event itself carries an emotional overtone (cf. DeSteno et al., 2004).

Other interesting facets are the differences between expressed and experienced emotion. Even though there was not any control for induced emotion, emotion regulation (of call takers) or emotional contagion (caller expressions inducing an emotion in call takers and vice versa) it becomes interesting to compare Small and Lerner’s (2008) study with this study. This is of particular interest since call takers must assess both linguistic and paralinguistic material in order to judge what to include or exclude as a criterion for prioritization. In Small and Lerner’s (2008) emotion-induction study, sadness was devoted more help than a neutral condition. In turn, individuals in a neutral condition provided more help than in an anger condition. In this study, sadness coincided more with help than anger (see right panel Figure 2). However, expressions of fear in this study outperformed both sadness and anger in terms of being intensively expressed as well as being devoted more help as was shown by the significant difference within high levels of help need. Unexpectedly, surprise turned out to be significantly separated between high levels of help needed (level 7-8), which possibly indicate its relation to the changing environment that the caller is facing in an emergency situation. In
turn, this leads one to further speculate to what extent it is possible to be aligned with the healthcare policies of assigning equal help regardless of expression. In particular, since, when the helped need is little or moderate, anger expressions are clear and, when the need of help is prominent, expressions of fear and sadness are both clear and intense.

**Future Research**

How are the emotional expressions of callers affecting the call takers’ process for making decisions? It would be interesting to further investigate the impact of negative emotions, in particular fear, sadness and surprise, on emergency call taking since they are perceived as more intense than other expressions and they show a relationship with priorities made in this setting. In order to establish causality between the influence of emotion and decision-making capabilities, both experimental and field experimental approaches seem to be promising veins to proceed in. The emergency centre may be a forum for asymmetric prevalence of callers’ and call takers’ emotions. For instance, a caller may express fear of giving birth while the call taker experiences happiness of assisting with delivering the baby. In order to stay aligned with organizational routines, the call taker needs to regulate the emotional experience into a neutral mode. The call takers may therefore face dissonant displays (fear expressions of callers) to what they are feeling (happiness), which in turn, puts demand on regulation strategies. Furthermore, different regulation techniques may be applicable for different emotions. For instance, regulating expressions of happiness may not correspond to regulating expressions of sadness, surprise or fear.
REFERENCES

Annual reports from SOS Alarm (2006-2008).


7. **Study 2: Vocal Emotional Expressions: Proxies for Decision Making in Emergency Calls?**

The study has been accepted to the EMONET 2012 conference. EMONET is an email list that facilitates scholarly discussion of matters relating to the study of emotion in organizational settings. The list was established in January, 1997 and has over 700 members across the globe. Representatives from EMONET also arrange international bi-annual conferences since 1998.

The conference of 2012 is to be held at Hanken School of Economics, Finland. Information and descriptions of possible contributions are addressed below:

Theoretical and empirical papers are invited on any topic of relevance to the study of emotions at work, including:

- determinants of emotion
- nature and description of emotion
- processes and effects of emotion at organizational, team and individual levels\(^{27}\).

\(^{27}\) Information regarding the Emonetlist and the conference was obtained through the official website of the Emonet network. See [http://www.emotionsnet.org](http://www.emotionsnet.org)
ABSTRACT
This study focuses on whether discrimination of expressions of fear in authentic emergency calls is possible, whether fear expressions are devoted more help than neutral expressions and finally, whether the intensity of expression is related to the level of help needed. By using a low-pass-filtered speech stimulus, participants (N=22) were able to discriminate fear from neutral expressions (t (350) = 2.79, p = .006). Furthermore, there was an indication that fear expressions were devoted more help than neutral expressions (t (350) = 1.83, p = .067). In turn, judged intensity of expression and judged help need showed a strong correlation (r = .92) at the same time as partial correlations indicated that participants use acoustically measured intensity (mean dB) as a cue to infer the intensity/help need relationship (r =.87). The findings are further discussed in terms of the implications of emotional expression in call taker work.
INTRODUCTION

Social interactions benefit from expression and the detection of emotions (cf. Mayer, DiPaolo, & Salovey, 1990; Mayer & Geher, 1996; Salovey & Mayer, 1990). Emotional expressions may travel both visual and vocal routes and may cause individuals to not only “catch on” other individuals’ emotions (Hatfield, Cacioppo & Rapson, 1994), but to also cause regulation of social behavior (Ekman, 2003; Russel, Bacharowski & Fernandez-Dols 2003; Gross, 1998 a & b). A setting where expression and the detection of emotion are important is in emergency call taking. In particular, “negative”²⁸ emotions (such as anger, fear and sadness) are likely to be more prevalent, and more intensely expressed in these settings (Vidrascu & Devillers, 2005, 2006).

Due to the prevalence and intensity of negative emotions in emergency call taking, these emotions may be difficult to disregard and may inflict emotional contagion. Thus, at the same time, they may be a force causing call takers’ decisions to drift from normative routines on how to make prioritizations. For an example, fearful individuals have shown pessimistic risk estimates and to be risk-averse, while angry individuals have been shown to show optimistic risk estimates and to make risk-seeking choices (Lerner & Keltner, 2000). Such findings may be explained by differences in processing of information, in particular, anger is associated with top-down, heuristic processing patterns while sadness is associated with more detailed, bottom-up processing (Lerner & Tiedens, 2006). Call

²⁸ “Negative” refers to categorization of emotion on a valence scale, ranging from positive to negative, rather than having a normative connotation.
takers could be affected by caller expression, which may make them dwell in calls (due to the bottom-up nature of sadness), terminate calls too quickly (due to the heuristic nature of anger) or even estimate risks in a faulty manner (due to influences of fear and anger). Furthermore, besides viewing emotion as an intrapersonal phenomenon, emotions also provide interpersonal signals that functions as information in social decision making. For instance, Van Kleef, De Dreu and Manstead (2010) argued expressions of anger to cause avoidance motivation and reduced intention to cooperate if expressed in a cooperative setting whereas it caused approach motivation and increased intention to cooperation in a competitive setting. In addition, expressions of sadness or distress (similar to fear) caused increased cooperation expressed in a cooperative setting, but increased competition expressed in a competitive setting. Therefore, it is of interest, to study whether emotional expression causes fluctuation in the perceived levels of help needed. In this study we address fear because it has been shown to be a commonly expressed emotion in this type of setting (Svensson, 2011; Vidrascu & Devillers, 2005, 2006), and because it may have distinct effects for decision-making capabilities when making risk assessments.

The remainder of the study is structured as follows: Firstly, we will review literature on communication of vocal emotion with regards to expression, detection and utilization of acoustic cues to infer emotional state. Secondly, we address the difficulties and possibilities of vocal expressions in authentic speech research in comparison to posed expressions in laboratory settings. Thirdly, we explain our method and analyze concerns for this study. Next, we address the results of the acoustic and expe-
rimental analysis of the stimulus set. Finally, we discuss our findings and propose follow-on research with which to proceed.

**Vocal Emotion**

Speech is a channel revealing a plethora of cues about the sender (Bachorowsky, 1999). Emotional states are often inferred through both speech (Planalp, 1996) and affect bursts (Simon-Thomas et al., 2009). Researchers have reached consensus on that discrete emotion can be decoded at better than chance levels (cf. Banse & Scherer, 1996; Juslin & Laukka, 2003). Anger and sadness are generally better communicated than fear and happiness, and also better communicated than tenderness (Juslin & Laukka, 2003). It is argued that decoding ratios of emotional expressions can be traced down to physiological changes in the vocal apparatus that enable discrimination of emotion-specific voice cues and patterns. Even though there is consensus on discrimination of emotion per se, there is disagreement on number and type of cues used to infer emotion in speech (cf. Scherer, 1991; Spackman, Otto & Brown, 2009). Therefore, before considering the differences between studies using posed and authentic speech, we will review cues that are critical to analyze when assessing fear.

**Vocal cues of fear.** Categories of psychoacoustic cues range from pitch, intensity and voice quality to temporal aspects—and each cue can be measured in specific ways. For instance, fundamental frequency ($F_0$) refers to the rate of opening and closing of the vocal folds across the glottis. Contour refers to the sequences of $F_0$ across utterances, but is difficult to assess and many studies refer to qualitative measures (Cowie et al., 2001). Jitter refers to small, rapid and random perturbations in $F_0$ during
opening and closing of the vocal folds across speech cycles. Voice intensity refers to the energy used to produce speech and is measured in decibel, whereas voice attack refers to the rise/rate of amplitude of voiced speech segments.

Voice quality (H500) is related to the relative proportion of total acoustic energy above or below a certain threshold frequency (Scherer, Banse & Goldbeck, 1991) and formant frequencies (F₁) refers to frequen-

Table 1. Empirical Predictions for Fear/Anxiety for Acoustic Cues.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Vocal cue</th>
<th>Predictions for fear/anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pitch</td>
<td>F₀ (M)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>F₀ (SD)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Contour</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Jitter</td>
<td>+</td>
</tr>
<tr>
<td>Intensity</td>
<td>Voice intensity (M)</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>Voice intensity (SD)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Attack</td>
<td>-</td>
</tr>
<tr>
<td>Voice Quality</td>
<td>High frequency energy (H500)</td>
<td>+/-*</td>
</tr>
<tr>
<td></td>
<td>Formant frequency (M)</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Formant frequency (bw)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Formant frequency (Prc)</td>
<td>-</td>
</tr>
<tr>
<td>Temporal Aspects</td>
<td>Pauses</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>Speech rate</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Regularity</td>
<td>-</td>
</tr>
</tbody>
</table>

The predictions refer to relative values. Thus, (+) indicates relatively high levels of the cue; (−) indicates a lower level of respective voice cues; (/) indicates inconclusive predictions.

* Juslin & Scherer, 2008 (p. 90) claim increase in H500 whereas Juslin & Laukka (2003) and Laukka et al. (2008) claims intermediate or inconclusive findings.
cy regions where the amplitude of energy is deemed to be high. Temporal aspects of speech often refer to pauses, velocity and regularity of speech. It is likely that expressions of fear and anxiety are present in emergency calls. Differences between them need to be addressed for clarification. Anxiety is not considered as a basic emotion, but encapsulates facets of fear, uncertainty, distress, apprehension and worry (Lang, 1985). Anxiety and fear also deviate on a temporal dimension, with fear typically showing a shorter duration than anxiety. These expressions are similar and difficult to discriminate between, and will therefore be reviewed jointly and be included under the same label in this study. Table 1 shows empirically derived predictions for voice cues of fear and anxiety (Juslin & Scherer, 2008).

**Researching authentic speech.** Typically, vocal emotion has been studied through a *standard content paradigm*, where actors portray verbal expressions. These expressions are then decoded by participants and deviations among decoders are attributed to non-verbal influence of the expression. Studies using real-life speech are fewer and are surrounded by methodical difficulties. Voice data from the aviation industry, therapy sessions and game shows (cf. Hargreaves, Starkweather & Blacker, 1965; Kuroda et al., 1976) have been used in some studies and the voice of health care providers has been analyzed from a quality of care perspective (Haskard, 2008) in another. Few researchers, however, have investigated perceptions of emotional expression in emergency calls. Exceptions may be found in Vidrascu and DeVillers’ studies of whether emotional cues, in positive and negative speech, are responsible for emotion perception (2005) and in their study of lexical versus paralinguistic
features (2006). The first study (2005) indicated $F_0$ and intensity features to be most relevant for identification and discrimination of and between emotions. The second study (2006) revealed that fear was best (and sadness least) recognized by its lexical features. Overall, the studies indicated higher lexical than paralinguistic accuracy.

There seem to be trade-offs between laboratory-based studies and authentic speech research in terms of stimuli quality. The results of laboratory based studies have indeed provided interesting findings regarding the different acoustic cues that are associated with different emotions. However, comparisons between emotional expressions when the expressions are posed and studies of authentic speech are difficult. For instance, posed expressions have been argued to suffer from exaggeration in comparison to everyday expressions (Scherer, 1986). There seem to be differences of expressions amongst speakers, but this does not necessarily affect decoding accuracy (cf. Spackman, Brown & Otto, 2009). There may be a shortage of prototypical displays of basic emotions in authentic speech research (Cowie & Cornelius, 2003; Vidrascu & Devillers, 2005), or vital aspects of authentic speech may be beyond awareness and control causing difficulties in actually posing genuine emotional expressions (Bachorowski & Owren, 1995). Additional difficulties are seen in the relationship between experienced emotion and selected utterances for analyses, duration of expressions, the quality of recordings and number of speakers (Johnstone & Scherer, 2004, p. 224) as well as the role of background noise. Thus, methodical difficulties of obtaining valid, authentic voice samples seems to have led to their underutilization due to a more
convenient alternative obtaining samples of posed (and perhaps prototypical) speech.

Based on the initial literature review, it is reasonable to assume that it is possible to discriminate between vocally expressed emotions. Following Vidrascu and Devillers’ (2005) research, we want to investigate whether it is possible to discriminate between vocal expressions of fear and neutrality in voice. Thus, the first research question is as follows:

*RQ1: Is there a detectable difference between vocal emotional expressions and neutral expressions?*

Since both positive and negative emotions signal that conditions are changing (Frijda, 1986), we reason that negative expressions are proxies for need of help. However, in an emergency situation it does not necessarily mean that callers are granted this help, since call takers ought to assess symptoms, rather than how symptoms are expressed. Therefore, we state the second research question as follows:

*RQ2: Do emotional expressions generate more help than neutral expressions?*

Finally, if failing to confirm the second research question, our concern turns to whether the magnitude of expression affects the perceived level of help needed. In other words, since the magnitude of a negative expression could indicate a more severe incident and thus more need for help, our third research question is:

*RQ3: Do intense emotional expressions generate a higher perceived level of help needed than less intense emotional expressions?*
METHOD

The stimulus set in this study was developed from a larger data set of authentic emergency calls. Call takers at an emergency center were asked for participation by the quality manager of the emergency center. At an early stage of the research process, incoming emergency calls were rated according to Ekman’s (1972) categorization of basic emotions. In total, 7 call takers returned 146 ratings for analysis, with an average of 20.1 ratings per call taker. The mean age of call takers was 39.5 years and, on average they had 6.2 years of employment. The only contact the researchers had with the callers was the informed consent requests that were sent out via representatives of the emergency center. Thus, in conformance with the ethical clearance of the study, no demographic data were gathered about the callers.

Participants

A stimulus set was created from the consented calls and then presented to employees at an academic institution (N= 22), 13 females and 9 male with a mean age of 33.2 years (SD = 7. 17). The participants were asked for voluntary participation without receiving any economic compensation.

Procedure

Prior to accessing the emergency context considerable time was spent writing an ethics approval. The ethics application was approved by the Central Ethical Review Board in Sweden (see Decision:Ö 7-2008). The procedure for selecting calls for a stimulus set was filtered in a two-step blind procedure. The first step regarded obtaining authentic voices, and is described below:

In order to access any content and extract acoustic parameters from the calls, an informed consent had to be obtained from the callers.
The research design includes a voice sample selection that is randomized. There were no means of controlling which kind of calls that were received by call takers. In order to obtain voice data and call taker ratings, call takers rated emotional expressions of the first minute of the first call within every 30 minute interval. If the call lasted less than 1 minute, the call takers were instructed to rate the time the call lasted. Call takers answers different kinds of calls, but only calls regarding health care matters were considered for inclusion in the study. The sample consisted of 146 unique voices, with a possibility to express a wide range of emotions. It was not possible to collect data on the duration of the calls, but calls typically last longer than a few utterances. The emergency center routinely records and stores all incoming calls for 90 days, which enables call takers to retrieve calls at a later date. The rating material therefore also included a reference number that enabled tracking of calls, and thus distribution of an informed-consent request to callers.

**Selection of emergency calls.** The second step of the blind procedure regarded selection of the emergency calls that contained fear expressions. The initial data corpus (146 call taker ratings) was sent back to the researchers who made a pre-analysis of the call takers’ ratings. The pre-analysis was based on prevalence and rated intensity of expressed emotions. A total of 40 emergency calls were selected since the emergency center could not handle a larger number of address retrievals. The reference numbers for these calls were sent back to the quality manager of the

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29 Call takers receive a number of different types of calls. There may be calls regarding emergency medicine, fire, police but they also need to handle automatic fire alarm in buildings.
emergency center, who retrieved the calls from the system and obtained addresses for the callers, thus enabling the sending of an informed-consent form to the caller. In total, 7 full-length, authentic emergency calls were consented and approved.

**Extracting voice parameters.** Since the rating conducted by each call taker was an overall rating of the first minute of the call, there may have been expressions of different emotions at different times in the audio file. Thus, the obtained calls were reassessed by 2 inter-raters. Firstly, a pre-test on authentic calls from educational material, retrieved from SOS Alarm, was conducted in order to achieve a baseline between inter-raters. Secondly, the inter-raters rated the first minute of the calls for utterances of the two clearest expressions of basic emotions (Ekman, 1972), together with the intensity of these emotions. Thirdly, two expressions of neutrality in each call were identified in order to be able to achieve a baseline revealing differences between emotional and neutral expressions within each call. Next, the inter-raters also noted intervals of 4 seconds where both emotional and neutral expressions were present. Finally, these ratings were compared and only excerpts where the two inter-raters were in agreement on emotion category and temporal intervals were included in the study. In total, inter-raters agreed upon 11 out of 14 possible expressions, rendering an overall joint inter-rater reliability of .79. Out of the 11 agreed emotion expressions, 7 involved fear (expressed in 5 calls). Out of 20 possible temporal intervals (2 intervals x 2 emotions x 5 calls), 11 intervals overlapped completely, rendering a joint reliability of .55.
A similar procedure was conducted in order to retrieve neutral expressions. Neutral expressions from the 5 earlier selected calls were abstracted by matching overlapping temporal intervals. Out of 10 possible intervals (2 intervals x 5 calls), 8 intervals overlapped, giving a .80 joint reliability.

In total, there were 19 intervals considered for inclusion in the study. Measurement of acoustic cues is conducted in a relative manner. In other words, there may be differences in levels of acoustic cues between speakers when expressing fear and neutrality. Therefore, it was considered reasonable to include at least one voice interval that is considered neutral and one that is considered to be expressing fear for each caller, rendering a total of 16 expressions (8 judged to express fear and 8 judged to express neutrality).

**Analysis of voice cues.** The selected intervals for fear and neutrality underwent acoustic analysis using Praat-software (cf. Boersma & Weenink, 2007). Using Praat enabled us to extract the following acoustic cues for comparison: Pitch (F0 M, SD, and Max), voice intensity (M, SD as well as HF500), speech rate (voiced segments/duration) and duration for the expression. The sample was pitch-adjusted for female (100-500 Hz) and male (75-300 Hz) voices. To obtain HF500, the edit window of Praat was opened and an LTAS (long term average spectrum) was calculated for each expression. High frequency energy (HF500) was manually calculated by dividing the high frequency energy (mean) by the low frequency energy (mean) for the cut-off value of 500 Hz. Speech rate was assessed via manually calculating time for voice segments dividing it with the total duration of the interval. All voiced segments were included since
affect bursts would be equally valid to infer emotional state as speech would (cf. Simon-Thomas et al., 2009). The software enables abstraction of several other acoustic cues, but due to uncontrolled background noise, cues such as jitter, shimmer and formant frequencies could not be extracted since they may report measurement error (see Perry, 2000). The results of the extracted cues are presented in Table 2.

**Experiment stimuli.** In order to uphold the privacy of callers, as well as directing attention towards non-verbal content, a low-pass filter was applied to all of the sound files. By removing frequencies above 500 Hz (using a Hann-shaped filter), the procedure makes phonetic information unintelligible, while affective information, such as F0, voice intensity, temporal aspects (cf. Scherer, 1972) and voice quality (cf. van Bezooijen & Boyes, 1986), seem to be preserved. Thus, the complete stimulus set consisted of the 16 selected intervals paired with 2 rating scales. The first rating indicated the intensity of the emotional expression (0 = nothing at all to 10 = very intense). The other rating regarded the level of help needed expressed by the caller (0 = none at all to 10 = large). The stimulus set was randomized for each individual listener, in terms of both emotional expression and the two rating-scales. Each sound file occurred twice, with the help needed and intensity question randomly assigned, giving a total of 32 ratings to conduct in the experiment. There were no time constraints for conducting the ratings and the participants were allowed to listen to each stimulus numerous times in order to make their judgments. The experiment was conducted using custom computer software programmed within the Unity 3D (version 3.3.0f4, http://unity3d.com/) environment with the programming language Java-
Table 2. Acoustic Measures of Neutral and Fear Expressions in Selected Intervals

<table>
<thead>
<tr>
<th>Measure</th>
<th>Expression</th>
<th>Empirical Predictions for Fear/Anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Neutral (N=8)</td>
<td>Fear (N=8)</td>
</tr>
<tr>
<td><strong>Pitch (Hz)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$F_0$ (M)</td>
<td>189,43</td>
<td>200,51</td>
</tr>
<tr>
<td>$F_0$ (SD)</td>
<td>44,30</td>
<td>40,57</td>
</tr>
<tr>
<td>$F_0$ (Max)</td>
<td>337,80</td>
<td>346,82</td>
</tr>
<tr>
<td><strong>Intensity (db)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voice intensity (M)</td>
<td>54,66</td>
<td>58,86</td>
</tr>
<tr>
<td>Voice intensity (SD)</td>
<td>10,89</td>
<td>9,79</td>
</tr>
<tr>
<td>HF 500 (HF(dB)/Lf(dB))</td>
<td>74</td>
<td>71</td>
</tr>
<tr>
<td><strong>Temporal aspect</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech rate (voiced seg-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ments/second)</td>
<td>4,63</td>
<td>6,01</td>
</tr>
<tr>
<td><strong>Duration/sec (M)</strong></td>
<td>2,15</td>
<td>3,36</td>
</tr>
</tbody>
</table>

Thus, (+) indicates relative high levels of the cue; (−) indicates a lower level of respective voice cues; (/) indicates inconclusive predictions.*Juslin & Scherer, 2008 (p. 90) claim increase in HF500 whereas Juslin & Laukka (2003) and Laukka et al. (2008) claims inconclusive findings due to variation of findings in other studies.

RESULTS

Aligned with the first hypothesis of finding vocal differences between fear and neutral expression, a baseline of expressions needed to be established. Thus, there should be differences in acoustic cues between intervals expressing fear and neutrality.
Table 2 shows the cues for fear and neutral intervals, as well as how they correspond to previous empirical predictions of acoustic cues. Previously, intensity (M) and HF500 have shown inconclusive empirical predictions (indicated by /) of how these cues may change. Thus, besides SD of intensity, the other cues are aligned with previous established empirical predictions. In turn, the prediction of SD is the smallest difference between fear and neutrality in any of the measurements. Since individual variation in voice may account for expressions sounding more or less fearful, it is necessary to establish a within-subject baseline prior to making between-subject comparisons. Thus, differences between fear and neutral expressions need to be assessed for each expression in the emergency call. The listeners’ judgments of the intensity in fear and neutral expressions along with the level of help needed for fear and neutral expressions are depicted as CI95 in Figure 1 and Figure 2 respectively. Fear and neutral expressions are grouped for each speaker (separated by a dotted line). As can be seen in Figure 1, there is an overall higher mean for fear expressions (M = 5.1 and SD = 2) when coupled with respective neutral expressions (M = 4.5 and SD = 1.9). There is at least one fear expression that has a higher intensity than the neutral expressions in each of the calls, with exception of expression four.

When making comparisons of fear and neutral expressions across the range of expressions in all calls, there are in total 10 fear expressions showing a higher mean than neutral expressions, 2 cases that are equivalent and 2 neutral expressions showing a higher mean than fear expressions. Similarly, fear expressions (M = 5.2 and SD = 2.1) were typically identified needing more help than neutral expressions (M = 4.8 and SD =
Figure 1. Intensity Judgments of Fear and Neutral Expressions.
1.8), as Figure 2 shows. There is at least one fear expression that is rated higher than the neutral expressions for each speaker, with exception for speakers four and five.

When comparing fear and neutral expressions within calls across the range of expressions in all calls, there are in total 2 fear expressions showing a higher mean than neutral expressions,
9 cases that are equivalent and 3 neutral expressions showing a higher mean than fear expression. However, it is also important to remember that all of the expressions were sampled from a pool of fear expressions. In turn, this may cause even neutral expressions to sound fearsome.

The differences between fear and neutral expressions for intensity and help needed are further mirrored in t-tests. There was a significant difference in intensity between fear and neutral expressions (t (350) = 2.79, p = .006). Therefore, the first research question could be verified; there was a significant difference between emotional and neutral expressions. The second research question could not be verified since there was not a significant difference between emotional and neutral expressions in
terms of perceived level of help needed. However, results were indicative of a difference according to commonly accepted scientific standards ($t(350) = 1.83, p = .067$).

Regarding the third research question of finding out whether intense expressions are devoted more help than less intense expressions,

\begin{figure}[h]
\centering
\includegraphics[width=\textwidth]{figure3}
\caption{Mean Correlations Between Perceived Help and Perceived Intensity}
\end{figure}

correlations of intensity and help needed ratings were conducted. Figure 3 shows mean correlations between perceived help needed and perceived intensity ($r = .92$).

Data for fear and neutral expressions seem to cluster. The group of 9 data points at the top-right corner of Figure 3 includes 6 fear expressions and 3 neutral expression, further indicating discrimination of emo-
tional expression. Thus, the high correlation together with the discrimination of expressions makes it possible to confirm the third hypothesis. In other words, the high correlation and discrimination of expressions demonstrates that calls with intense expressions are judged to require more help than calls with less intense expressions.

Table 3 shows inter-correlations between participants’ ratings (intensity mean and help needed mean) and acoustic cues. The results show overall medium/weak correlations among acoustic cues and participants ratings, indicating less redundant information between scales. However, besides the intensity/help needed correlation ($r = .92$) there are five other significant correlations.

The correlation between the mean of the intensity ratings and mean of the intensity acoustic cues ($r = .67$) implies that participants used this acoustic cue as a proxy to infer intensity, but also to infer help needed ($r = .60$). It also seems as if HF500 correlate ($r = .59$) with the intensity ratings.

The remaining significant correlations among acoustic cues may be explained as psychophysical relationships. For instance, assuming that individuals have a habitual onset of neutral speech, an increase in F0 (Max) due to fear would cause an increase in standard deviation of speech, which in turn is mirrored in the correlation.
Table 3. Correlations Between Participant Ratings and Acoustic Cues

<table>
<thead>
<tr>
<th></th>
<th>Intensity rating (M)</th>
<th>Help needed rating (M)</th>
<th>F0 (M)</th>
<th>F0 (SD)</th>
<th>F0 (Max)</th>
<th>Intensity (M)</th>
<th>Intensity (SD)</th>
<th>HF 500</th>
<th>Speech rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity rating (M)</td>
<td>1.00</td>
<td>.92**</td>
<td>-.08</td>
<td>-.26</td>
<td>-.33</td>
<td>.67**</td>
<td>.10</td>
<td>.59*</td>
<td>.09</td>
</tr>
<tr>
<td>Help needed rating (M)</td>
<td>1.00</td>
<td>-.10</td>
<td>-.32</td>
<td>-.42</td>
<td>.60*</td>
<td>.24</td>
<td>.46</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>F0 (M)</td>
<td>1.00</td>
<td>.49</td>
<td>.36</td>
<td>-.25</td>
<td>-.12</td>
<td>.02</td>
<td>.36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F0 (SD)</td>
<td>1.00</td>
<td>.86**</td>
<td>-.57*</td>
<td>-.28</td>
<td>.06</td>
<td>-.08</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F0 (Max)</td>
<td>1.00</td>
<td>-.51*</td>
<td>-.22</td>
<td>-.03</td>
<td>.02</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity (M)</td>
<td>1.00</td>
<td></td>
<td>-.14</td>
<td>.18</td>
<td>.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity (SD)</td>
<td>1.00</td>
<td></td>
<td></td>
<td>.46</td>
<td>-.39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HF 500</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Speech rate</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** p<.01
*  p<.05
Furthermore, there is a positive correlation within types of cues, but negative correlations between types of cues. The inverse relationship between intensity (M) and F0 (SD) and F0 (Max) may be explained by having a strong onset of voice (related to F0-measures) which, in turn, would make it difficult to maintain an intense expression throughout the speech sequence, hence the negative correlation.

Table 4. *Partial Correlations of Intensity-help needed Controlling for Voice Cues*

<table>
<thead>
<tr>
<th></th>
<th>F0 (M)</th>
<th>F0 (SD)</th>
<th>F0 (Max)</th>
<th>Voice Intensity (M)</th>
<th>Voice Intensity (SD)</th>
<th>HF 500</th>
<th>Speech rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensity and Help needed</td>
<td>.92</td>
<td>.92</td>
<td>.93</td>
<td>.87</td>
<td>.93</td>
<td>.91</td>
<td>.93</td>
</tr>
</tbody>
</table>

Considering the relationships between judgments of intensity and help needed, as shown in Figure 2, and the other variables shown in Table 3, a crucial question is to what extent is the variance in one factor is a part of another factor. Table 4 shows partial correlations for the intensity-help needed correlation, with each acoustic cue altered and used as a control variable. There is no dramatic decrease in correlations between intensity and help needed when controlled for the other cues. In fact, some minimal increases in correlations are seen when controlling for F0 (Max) (r = .93), voice intensity (SD) (r = .93) and speech rate (r = .93), whereas there is a decrease when controlling for the mean of voice intensity (r = .87) and HF500 (r=.91). In turn this indicates that participants respond to the intensity of callers’ expressions.

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DISCUSSION
The acoustic analysis of the different voice cues suggests differences between expressions of fear and neutrality, which is aligned with previous empirical predictions, excepting the standard deviation of intensity. Returning to the research questions stated earlier, it becomes evident that the first research question could be answered “yes”—participants successfully discriminated between vocal expressions of fear and neutrality ($t (350) = 2.79, p = .006$). Discrimination between these expressions is particularly interesting since participants were not aware that they were assessing them. They did not know about the categorization of fear and neutral expressions prior or post to rating since they were requested to assess intensity and help needed for the expressions, yet they were able to discriminate between them.

However, discrimination of expression does not exclusively cause participants to infer help needed. Thus, the answer to the second research question could not be determined clearly, but it is important to emphasize that the results are indicative of verification ($t (350) = 1.83, p = .067$) according to commonly accepted scientific standards. The strong correlation between intense expression and help needed ($r = .92$) confirms the third research question; the more intense the expressions, the more need for help the expression is perceived to indicate. This is further strengthened by the clusters in the correlation in Figure 3 since 6 of the 9 expressions at the top right corner of Figure 3 (indicating high levels of intensity and help needed) were fear expressions.

The results are further strengthened by analysis showing that the variables are clearly delineated. In addition to there being a strong corre-
lation between perceived intensity and rated help need there was little dependence of absolute ratings between the variables. When controlling for ratings of the raw data, 62% of the ratings differed on one or more scale levels. Inter-correlations between ratings and voice cues suggest that certain cues were used to infer intensity and help needed, and also to delineate cues since there were medium/weak positive correlations within types of cues and negative correlations between types of cues. The decrease in the partial correlation between intensity and help need when controlling for the mean (dB) of intensity suggests that participants respond to this cue when making assessments, rather than responding to other cues. In further addition, such a finding adds and question the body of research that has not been able to confirm voice intensity (mean) as a cue for inferring fear (cf. Juslin & Scherer, 2008; Laukka et al., 2008). However, the small decrease in partial correlation also makes clear that multivariate statistics are preferable in order to further explicate contributions of acoustic cues to judgments.

Not being able to affirm the answer to the second research question may be related to limitations of the study. Firstly, it is important to pay attention to the term neutrality since it is a construct that has received very little scientific attention. It is a construct that may be interpreted as more or less emotion, rather than constituting an actual emotion category. Thus, there is reason to believe that the selection procedure for obtaining the emotional intervals may cause marginalization of the results. For instance, fear and neutral expressions were sampled from the same pool of emergency calls. Since the calls were rated by call takers for perceived expressions of fear, neutral expressions from these calls may express cues
that reveal little overall difference between fear and neutrality. In other words, neutral expressions in our sample are possibly pushed more towards fear expressions than neutral expressions coming from a neutral sampling pool. Despite successful discrimination between fear and neutrality, the magnitude of expression may have been too low to clearly infer help needed. In addition, it is also important to address the duration of the expressions used in this study. Assessing short expressions (such as intervals of 4 seconds) does not equate to assessing full length calls. However, such intervals may work as proxies to create an overall impression of the emotional tone in the voice. In particular, snapshot evaluations (peaks and ends) of affective intensity of a full-length situation determine evaluation of a whole event (Fredricksson, 2000), but also loudness (which roughly corresponds to intensity) seems to be an important cue when assessing emotional state (Planalp, 1998).

Furthermore, even though the voice sample was authentic, it does not completely conform to the requirements of ecological validity since the stimulus set was tested on participants who were not call takers. This makes the result less generally applicable in the call taker domain than if actual call takers conducted the ratings. There may be identification or regulation strategies at play, as well as culturally affected perceptions, causing inaccuracies in the results obtained in this study. However, one must also consider that encoding and decoding of emotion and intensity is still a human capability. There is no reason to believe that the sample used in this study would be any different to other randomized samples. In turn, this strengthens the findings of this study.
The results of this study has common denominators with other studies in terms of encoding and decoding results of emotional expressions, but it also deviates from other studies. For instance, the study opens for discussion whether the emotional content of emergency calls actually affects the priorities the call takers make. This is of particular importance since emergency call takers are supposed to make priorities based on what is said rather than how things are said. In other words, there should be primacy of lexical information over non-verbal information. Since the procedure of this study contributed to elimination of lexical information (using a Hann-shaped filter), we can suspect that intense emotional expressions contribute to the priorities made. However, we cannot claim that they are the sole contributor to cause the priority since we do not control for contagious effects of emotion. Instead, in an authentic emergency call, it is likely that there is a cognition-based process of work and that there is interaction effects between non-verbal and verbal content affecting the priority. Thus, it is important to remember that emotional expression functions as signals in social decision making. The same expression (fear) may have different outcomes in terms of motivation to help dependent on the situation is framed as a cooperative or competitive setting (Van Kleef, De Dreu & Manstead, 2010).

It leads us to speculate how resistant can call takers be regarding emotional matching bias, particularly since expressed emotion has been seen to affect expectancy of an event when the event itself carries emotional overtones (cf. DeSteno et al., 2004). Thus, emotional expression may tilt priorities—even in authentic emergency calls. Then again, it is not absolutely clear that the emotional content of the call is just distorting
the call taker judgment; it is worthwhile investigating whether the emotional content could actually improve decision making, for example, by decreasing the time needed to reach a decision or by sensitising the call taker to an urgency that the caller has difficulty expressing in words.

**Future Research**

In order to create sustainable policies for making priorities based on rationalistic assumptions—all callers being entitled to equal help regardless of their expression—it becomes increasingly important to systematically assess emergency call takers on their capabilities to assess emotional expressions. In fact, the profession of emergency call taking is dependent on making such inferences. Furthermore, experimental designs similar to this one, are therefore encouraged. For instance, despite difficulties of obtaining valid voice samples due to the delicate nature of emergency call taking, it would be possible to make experiments based on both non-verbal and verbal stimulus sets where interaction effects of paralinguistic and linguistic expressions become apparent. The setting of emergency call takers would be able to provide a solid base for emotional expressions since calls are routinely recorded at a satisfactory and standardized quality.

**REFERENCES**


Have We Learned? Ten Years On (Research on Emotion in Organizations, vol 7: 257-286), Emerald Group Publishing Limited.


The study was published as a book chapter:


Further details about the publication can be accessed via:

www.emeraldinsight.com
ABSTRACT
This chapter focuses on management of emotions in an emergency setting. More specifically, how do emergency call takers manage double-faced emotional management – i.e., their own and the caller’s emotions—simultaneously? By triangulating interviews, observations, and organizational documentation with theories on emotional management multiple strategies were identified. The range of strategies included hiving (selecting and modifying) calls, elaborating on (by deploying attention and re-shaping/reappraising) content of calls, auralizing (by externalizing an emotional barrier) as well as taming emotional expression. The set of emotional management strategies are concluded in a Heat-model. The model is further discussed in terms of performance efficiency; in terms of how emotional aspects may interfere with decision-making capabilities as well as how well-being can be maintained for call takers.
INTRODUCTION

CT 2 (Male/Very Experienced). ‘‘I have run over a person [call taker imitating the caller]’’. I found where he was, which means I located him and made all the alarms and so on. Then I ask him, how are you? ‘‘I’m okay [call taker imitating the caller again]’’. How is the person doing that you hit? ‘‘He is probably not so good because there are parts of him in the car [call taker imitating the caller]’’. Before I understood (…) parts in the car [call taker talking quietly to himself] it took a couple of seconds—two seconds went by—I thought parts in the car [call taker talking quietly to himself as if he is thinking]. Are there human limbs in the car? Yes, he replied.

The excerpt above provides an example of the severity of incidents as well as the need for emotional management when dealing with emergency calls. Previous work has used tape recorded calls to police and emergency centers to provide a sense of the interactional structure of emergency phone calls (see Whalen, Whalen, & Zimmerman, 1990; Whalen, Zimmerman, & Whalen, 1988; Zimmerman, 1992a, 1992b). Less has been written about how call takers manage their own and callers’ emotions during emergency calls. For exceptions see Tracy and Tracy (1998), who addressed emotional labor at 911-emergency centers using a communication perspective, and Shuler and Sypher (2000) who described workers not only coping, resisting, and suffering but also seeking out emotional labor as a rewarding organizational activity. Swedish emergency call takers ought to be empathic in a situation where they make priorities based on information provided over the telephone. These priorities
ought to be consequent and aligned with the Swedish emergency medicinal index.  

Following the trend of how affective phenomena influence behavior for organizational members (see Barsade & Gibson 2006; Brief & Weiss, 2002) and how emotions can and ought to be managed (see Ashkanasy, Zerbe, & Härtel, 2002) emergency call taking creates an interesting arena for research. First, the job requirement of being empathic at the same time as not being affected by the caller’s emotional status, and thereby making inconsequential decisions, breaches emotional management in an almost paradoxical manner. How do call takers manage hot emotional and cold cognitive skills simultaneously? Second, management of emotions is two-way (double-faced). Call takers must manage their own emotions as well as those of the callers, often by striving for neutrality (Tracy & Tracy, 1998). Third, management of emotions occurs in a setting which has not been fully researched.

Emotions in mediated environments are interesting because the setting provides a reduction in communication of nonverbal expressions. In comparison to the multimodality of face-to-face interactions, where nonverbal expressions facilitate sociality by intensifying or toning down emotional expression (Lee & Wagner, 2002), telephone communication seems to be leaner. However, even though telephone communication is considered to be leaner than face-to-face and videoconferencing (Daft & Lengel, 1984), the use of such communication enables recognition of

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30 The call takers use an electronic emergency medicine index that provides decision support. The index provides an overview of categorized symptoms (ranging from allergies to assault) with attached suggestions of priorities an incident should have on an ascending scale ranging from 4 to 1 (where 4 is the least severe and 1 is most severe). Juxtaposed to the index is also an interview guide with sample questions on what to ask for each respective symptom.
emotions. Anger and sadness are generally better communicated than fear, happiness, or tenderness (Juslin & Laukka, 2003) when using a vocal channel. Fourth, a body of research provides insights on emotional contagion and may explain why individuals may not only detect emotion but also become infected with the same emotion (see Hatfield, Cacioppo, & Rapson, 1994). Call takers may identify expressions from callers (or co-workers) but do not necessarily experience the emotion themselves—in other words no contagion occurs. This may be a result of training or experience in dealing with these matters.

This study seeks to understand use of emotional management strategies of emergency call takers. The management of negative emotions such as anger, fear, and sadness is considered to be especially important since they are deemed to be frequently occurring expressions in emergency settings. These emotions appear to be more easily detected and are also seen to affect information processing and therefore affect decision making. The research draws on data from a Swedish emergency call center setting, on the one side, and studies from psychology and sociology on the other side. I will answer how call takers manage emotions — especially anger and sadness in order to make judgments and decisions that are aligned with organizational requirements. I will also address the consequences the management of emotions.

The remainder of this chapter is structured as follows; first, it presents a literature review on emotion and judgment interaction, the intersection of emotional labor, and emotional regulation together with consequences of managing one’s emotions. Second, methods and limitations of the study undertaken are presented together with the context of Swe-
dish emergency call takers. Third, empirical illustrations of emotional management of emergency call takers are addressed. Fourth, consequences and implications of emotional management are highlighted by proposing a Heat-model of emergency call taking. Finally, further research questions are discussed.

**Emotional Influences on Judgment**

Emotions influence judgments (see Frijda, 2004; Damasio, 1994; Pham, 2007) and may affect the process of prioritizing. Extensive reviews on the topic of affective phenomena have been presented elsewhere (see Scherer, 2005). There is already a great body of literature covering the degree of causality between cognition and emotion and vice versa (for discussions on this topic see Ekman, 1992; Izard, 1992; Ortony & Turner, 1990) and due to the limited scope of this study the relationship of affective influences and cognition will be reviewed jointly rather than focusing on causality between the two.

Emotions may mistakenly be attributed to irrelevant objects or causes (Pham, 2007, “incidental affect”) and this may be the case even when decision makers deny influence of emotions on the current decision (Loewenstein & Lerner, 2003). In terms of specific emotions, anger, sadness, guilt, and shame deviate from each other although they are typically characterized as negative emotions. Anger typically shows an external attribution pattern, meaning that others are to blame for events for perceived threats or injustices (Averill, 1983). Guilt and shame typically arises due to internal attributions, the self is to blame (Neumann & Strack, 2000). Sadness occurs when something of importance is lost without a blameworthy target (Barr-Zisowitz, 2000; Ellsworth & Smith, 1988) and it
slows the cognitive and physiological systems in attempts to regain energy to adjust to the situation (Izard & Ackerman, 2000).

The appraisal-tendency framework (Lerner & Keltner, 2000, 2001; Lerner & Tiedens, 2006) proposes that different emotions (such as anger and sadness) have different effects on both content and process depending on the cognitive appraisals linked to the emotion. Cognitive appraisals of anger and sadness differ in personal agency creating somewhat different perceptive lenses. The pattern for sadness relates to external circumstances (such as attributing situational causes for a behavior) while the pattern for anger is related to the individual being responsible for the event (Smith & Ellsworth, 1985). Furthermore, anger and sadness differ in terms of appraising certainty (Smith & Ellsworth, 1985), in turn affecting systematic versus heuristic process patterns. Anger, in comparison to sadness, provides a meta-level sense of being confident when making judgments. Anger is therefore argued to be more similar to happiness (Bodenhausen, Sheppard, & Kramer, 1994), showing less depth of processing than for instance sadness, even though both are considered being negatively valenced.

In all, this implies when call takers experiences sadness they may be more likely to help, be more accurate and spend longer time in the calls due to engagement in systematic processing. On the contrary, angry call takers may be less likely to help, be less accurate and spend shorter time in the calls due to more heuristic processing. Small and Lerner (2008) experimentally tested carry over effects of sadness and anger on decision making in two studies of a welfare policy case. Participants had to make a decision in a welfare case whether to change level of assistance
(on a four point scale) to the welfare recipient or not. Data showed incidental sadness to increase the amount of recommended help in comparison to the neutral condition. In addition neutral individuals gave more assistance than angry individuals. In a follow up study, the results from study one were replicated, but the effects were eliminated when cognitive load was increased through a distracting task, suggesting depth of thought driving the effects.

The situation resembles an emergency situation, where incidental affect may play a role. In particular since call takers have to make priorities on how urgent the incident is while potentially being under influence of emotions arising from current or previous calls. Call takers are likely to accumulate knowledge through training and experience, protecting against these effects, possibly by regulation of emotions. Considering that the call taker setting is highly dependent on ‘‘neutrality,’’ it is a very interesting venue in which to study the management of emotions.

Managing Emotions at Work

Two streams of research are argued to influence management of call taker’s emotion in this study. The first, emotional labor, refers to emotional management of one’s work situation, derived from organizationally stated display and feeling rules. The other is more broadly defined in terms of psychological and individual emotion regulation. The original concepts of emotional labor adhere to the managing workplace emotion for payment. More specifically, Hochschild (1983) claimed individuals perceive emotional aspects of work to be congruent or incongruent to their work role. Workers may manage emotions through either deep acting or surface acting. The former refers to individuals regulating and modulating their feel-
ings in order to display behavior congruent with a desired organizational display. The latter, surface acting, refer to individuals displaying behavior without subjectively feeling the emotion expressed, causing emotional dissonance (such as smiling in a service setting even though being irritated or angry). None of the displays are genuine displays, however deep acting is a means of modifying the feeling to the situation while surface acting refers to not experiencing the actual feeling but displaying the apparent feeling. Since Hochschild (1983) coined the term emotional labor it has branched off into more distinctive concepts (see Ashforth & Humphrey, 1993; Morris & Feldman, 1996), but the concept of emotional labor used here is the original one. Although incongruent states are considered as negative, the concepts of emotional labor may have both positive and negative outcomes. For instance, call takers may experience incongruent states when surface acting by pretending calmness in a call. But the artificial calmness may have a positive effect on the caller’s experience of the service. The original concepts of deep and surface acting are also comparable with psychological assumptions of emotion regulation.

The concepts of deep acting and surface are binary and can be considered simplistic. However, it is possible to consider that they can be complemented by considering them in relation to Gross’ (1998a, 1998b) emotion regulation model. Researchers converge on emotion regulation as attempts to modify components of an emotional experience (subjective experience, physiology, and expressive behavior) with regard to occurrence, form, duration, and intensity (Eisenberg & Spinrad, 2004; Gross, 1998a). Gross (1998a, 1998b) described emotion regulation as occurring either through antecedent-focused regulation or through response focused
regulation. The outcome of a successful regulation is dependent on sequential stages. Antecedent-focused regulation entails aspects of situation selection, in other words choosing which emotion-inducing situation one should engage in. This is a difficult matter for call takers since they have to answer all calls. Situation modification refers to directly modifying aspects of the situation such as increasing distance to the emotion-inducing situation. Attentional deployment refers to thinking about events that bring on emotions congruent for job performance. Finally cognitive change involves reappraising the situation so that it lessens strain. The other type of regulation process is response-focused regulation and it entails modulation of emotion displays through physical, experiential, or behavioral output. Rather than adjusting the situation, or perception of the situation, the individual modulates the expression in the situation (such as using an empathic tone even though one is feeling agitated or sad).

Tracy and Tracy (1998) and Shuler and Sypher (2000) provide interesting insights on emotional management in emergency settings. Emotional labor in emergency work gets complex when double-faced management comes into play (Tracy & Tracy, 1998). The work role requires both regulations of one’s own feelings at the same time as assisting the caller to be calm in order to get adequate information. Many times call takers need to invoke a sense of “neutrality” which also is demanding. In order to cope with the emotionally challenging work call takers develop strategies. Strategies are found in use of incongruent nonverbal expressions to what is being expressed over the phone. By giving advice call takers may experience a sense of control. They up the priority of the call if feeling insecure about how to prioritize. They self-talk by picturing
how it would to be in the shoes of the caller. They engage in evaluative talk of finished calls with colleagues immediately after the caller hangs up and they do storytelling in terms of reflectively sharing and making sense of emotionally disturbing parts of their jobs (Tracy & Tracy, 1998). Finally Tracy and Tracy (1998) claimed joking about calls was common. Further, Shuler and Sypher (2000) complement the picture by claiming call takers as to seek out emotional labor in terms of comic relief, as a fix and as an altruistic act.

**Consequences of Managing One’s Emotions**

This study will not go into depth regarding the underlying mechanisms of why managing ones emotion may cause burnout, dissatisfaction, stress, or other health problems. However, a brief consideration of this increases the understanding of emergency call taking. One aspect of emotion is the relation to physiological changes in one’s body, creating action tendencies (Frijda, 2004) which in turn prepares angry individuals for ‘‘fight’’ and fearful individuals for ‘‘flight’’ (Cannon, 1932). Such action tendencies are often dealt with in a socially acceptable manner (Lazarus, 1991), either by suppression or inhibiting feelings. The inhibition of the response may result in social acceptance but may provide increased activity in the autonomic nervous system (Gross, 1998b; Pennebaker, 1985). ‘‘Boxing’’ of emotions may therefore overwork cardiovascular and nervous system causing health problems if such activation is prolonged. In addition to health problems, suppressing responses require self-monitoring and self-corrective action in order to ‘‘supervise’’ the process.

A side effect is that cognitive resources are reduced in the situation (Gross, 2001) creating overall memory impairment effects if pro-
longed. Surface acting may therefore put the individual in an incongruent state between feeling and expressing, causing inhibition, or suppression in order to cope.

Indeed, surface acting has been claimed to increase stress, depression, and emotional exhaustion while deep acting has been associated with reduced work stress (Grandey, 2000). The process of reappraising a situation does not require continual self-regulatory effort since the actual emotion is re-interpreted which in turn may leave memory intact. In the long run, such deep acting may cause individuals to adopt schemes that are situation appropriate. In summary, managing emotions affects health and performance. Thus, it is an important aspect to consider when working with potent emotions.

The concepts of emotional labor and emotional regulation match well. Attentional deployment and cognitive change resembles deep acting in terms of more or less modification of the perception of content of the situation. Situation selection and modification reveal a somewhat looser fit with the original concept of deep acting since they refer to the situation itself and not the interpretation of it (as shown by the angle of the box in Fig. 1). But they are still a part that may be chosen and modified which in turn affects how an emotional episode may develop over time.

Studies of emotional regulation do not typically address situations where individuals have to suppress and express emotions at the same time. The overlap between surface acting and response modulation is therefore important. Response-focused regulation and surface acting both deal with regulating expression, but surface acting involves a different display from what is being felt. Furthermore, emergency call taking strat-
egies, earlier mentioned by Tracy and Tracy (1998), do overlap with the suggested framework. Giving advice, self-talk, storytelling, and joking are considered as being placed on the left side of the model (see Figure 1). They all include characteristics of deploying attention to certain aspects or reshaping the perception of the situation. Upping a priority of an incident is considered as a way of modifying the situation. Somewhat contrarily, incongruent nonverbal expressions can be placed at the right side in the model, revealing a discrepancy between emotion and expression of emotion. Of particular importance in the case of emergency call takers is (the right side) regulation, considering that such a regulation will presumably have an effect on judgment and decision-making skills.

**THEORY:**

**GROSS**

(1998)

<table>
<thead>
<tr>
<th>SITUATIONS</th>
<th>ASPECTS</th>
<th>MEANINGS</th>
<th>RESPONSES</th>
</tr>
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<tbody>
<tr>
<td>SITUATION</td>
<td>SITUATION</td>
<td>ATTENTIONAL</td>
<td>COGNITIVE</td>
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<td>SELECTION</td>
<td>MODIFICATION</td>
<td>DEPLOYMENT</td>
<td>CHANGE</td>
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<td>ANTECEDENT-FOCUSED</td>
<td>EMOTION REGULATION</td>
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<tr>
<td>RESPONSE MODULATION</td>
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**HOCHSCHILD**

(1983)

- *Deep Acting*
- *Surface Acting*

The right side is also congruent with a desired organizational display as well as with a regulation strategy associated with increased risk for health problems.

**METHOD**

**Data Collection**

Several data sources were used to conduct the study (Table 1). The purpose of different sources was threefold; first, to get an overview of call taker work—what they do and how they do it; second, to crosscheck collected data for alternative interpretations; and thirdly to be able to com-

### Table 1. Overview of Sources of Data for Analysis

<table>
<thead>
<tr>
<th>Sources:</th>
<th>Time and Pages</th>
<th>Derived from:</th>
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<tbody>
<tr>
<td>Observations</td>
<td>≥ 60 hours of observations together with ≥ 60 pages of written field notes.</td>
<td>Direct observation of call takers, ≥ 20 unstructured interviews in the lunch room or between calls as well as co-listening to ≥500 calls.</td>
</tr>
<tr>
<td>In-depth interviews</td>
<td>≥ 18 hours of interviews and ≥ 370 pages of transcriptions.</td>
<td>12 in-depth interviews with call takers.</td>
</tr>
<tr>
<td>Web resources</td>
<td>≥ 300 pages of educational material.</td>
<td>Password-protected educational material consisting of text files, audio files and video segments used in education of call takers.</td>
</tr>
<tr>
<td></td>
<td>≥100 pages of website material</td>
<td>Derived from the organizational website, searches in databases and newspapers.</td>
</tr>
<tr>
<td>Documents</td>
<td>≥ 50 pages</td>
<td>Policy documents derived from the organization.</td>
</tr>
<tr>
<td>Reports</td>
<td>≥400 pages</td>
<td>Annual reports from the year 2005 (91 p), 2006 (76 p), 2007 (76 p) and 2008 (68 p) and 2009 (84 p). Activity report from 2008 (32p) and 2009 (38p). Quality report from 2008 (68p).</td>
</tr>
</tbody>
</table>
pare management views with employee views. The procedure refers to
difficulties of assessing a phenomenon as emotion. First, emotional expe-
riences are not only expressive but also highly intra-subjective—which
may be a reason for not talking about them. Thus using participant obser-
vation, distributed on different days and shifts to capture changes in
workflow, worked as a trust builder for interview sessions. Second, emo-
tions may work on a subconscious level affecting behavior—also making
it difficult talking about them—in turn making complementary approaches
useful. Third, it may be hard to give retrospective accounts on the role of
emotions. To address this, a combination of action-based observations
and recall perception-based interviews were used in an attempt to validate
findings. Despite apparent difficulties of accounting for emotions a num-
ber of researchers promote reflections on emotional events as bringing
value to studies of emotion in social interactions—perhaps even more so
than directly recording emotional events (Fineman, 2000; Parkinson,
1995).

The interviews focused on overarching elements of emotions and
judgments in relation to work as well as call taker competence and use of
information technology (IT) in order to perform work. The observations
centered on what they do, how they do this, how they characterize what is
going on, what assumptions they make and what I see as a researcher
(Silverman, 2006, pp. 88–93). Information from the observation setting
was fed into the interview setting and vice versa. For instance, the inter-
view guide was revised due to observations of work. Due to call taker
work being time critical, questions that posed considerable elaboration
where fed into the interview session rather than the observation setting. In
order to avoid bias, questions of verification as well as disproving interpretations where not only chronologically posed but also between categories of people such as different types of call takers (i.e. under training, newly employed as well as more experienced call takers) as well as the quality manager, the doctor for the center and the site manager.

**Data Analysis**

The analysis involved an inductive content analysis and encompassed three different stages; data reduction, data display, and conclusion/verification (Miles & Huberman, 1994, p. 10) with consequent iterations between the different steps.

**Stage 1.** Transcriptions of the different data sources were arranged in a standardized manner using a template with a one-third margin. Themes of emotions and strategies for coping with these emotions were continuously coded in respective data source (see Strauss & Corbin, 1990). By coding the participants’ perceptions of emotion in conjunction to strategies for managing emotions, patterns for work actions could be established. Transcripts of field notes and interviews served as the backbone for the data-reduction process. But these transcripts were also complemented with coding of organizational documentation in order to triangulate employee and organizational views.

**Stage 2.** All transcripts were analyzed separately initially but later cross-comparisons between data sources were made. Data occurring at multiple places in multiple sources were considered for further analysis. The strategies of managing emotions seemed to be related to a dual process of emotional management as regards expressions of emotion or
managing emotions through cognitive or event-based processes. An example of how themes emerged is seen in the quotes below:

Being a professional means ‘‘keeping a cool head and warm heart’’. We must allow our feelings to be included, to get to know them. But at the same time we must suppress expressions when we act quickly.

Different variants of the quote were found in the internal education material. The theme was compared against perceptions from the interviews (I=interviewer and CT=all taker).

I: But you need to be stoic in the situations then?
CT 2 (Male/Very Experienced): Yes. Not to be pissed.
I: Mmm.
CT 2 (Male/Very Experienced): Or rather, not so that you give away that you are angry, you are indeed angry but it is a matter of not conveying it.
I: You can feel the feeling but do not?
CT 2 (Male/Very Experienced): [Interrupts] Convey it, and it is difficult, really difficult, it is difficult (y) every kind of human being or being pissed at a human being and speak friendly to them.
I: Hmm.
CT 2 (Male/Very Experienced): Without it is shining through.
The excerpt above was an example of a dual process of suppressing (expressions of) emotions. The theme also had comparisons in the field notes from observations:

I had a hanging before today. ‘‘Partly they say this with a smile, something that could be interpreted as pride in their professional capacity. I know something you perceive as being sensitive but I can manage it. An
internal power or control dimension. It also seems to be a relatively high
degree of regulation and the idea is that this could affect the assessments
on which it constantly needs to block out a lot of information by observ-
ing the suppression of feelings.

Stage 3. The materials were then collapsed and analyzed jointly. Aggregated themes were compared with literature in the field of emotion-
al labor and emotional regulation, and crosschecked for similarities as well as for deviations. The most notable difference found was deviation in terms of the direction of focus when using the management strategies. Not only did it matter which stance call takers had (as regards managing expressions or situations/perceptions of the situation) but also whether they focused on managing themselves or had a main focus on the interac-
tion with the caller.

Finally the material was fed back to the call takers for comments and validation of results. The combination of strategy of management and
direction of focus is discussed further in the proposed Heat-model.

Research Context of Emergency Call Taking
The Swedish public emergency number is 112 when trying to get help from emergency services and the police. There are 18 geographically dis-
tributed SOS Alarm centers in Sweden. In 2007, SOS Alarm had 887 em-
ployees, with an average age of 42 and a gender distribution of 51%
women. In 2008 the staff turnover reached 18% for the metropolitan cen-
ters and 12% for remaining centers. Annually, call takers answer about 20
million calls (the total number of calls for all services, including alarms such as automatic fire alarms). Around 3.5 million calls, annually, are of more complex nature in terms of that call takers make judgments and pri-
oritize the need of health care. The local emergency center in this study has four different shifts that call takers can schedule themselves on. Each of the shifts is 8 h, enclosing half an hour lunch and short breaks. During dayshifts a voluntary debriefing session, lasting half an hour is offered the employees. The call takers work independently in an office landscape but are also jointed and co-operate through a network-based platform. The platform enables transfer of incidents from call taker to call taker as well as between call taker and public authorities making teamwork an important aspect. The platform also provides interview and decision support in terms of the Swedish emergency medicinal index. Communication with the caller is voice dependent while communication between different call takers and authorities are both written and voice dependent within the platform. In parallel to work in virtual workgroups, SOS Alarm emphasizes that call takers ought to have knowledge of their specific region and local markets in order to provide for fast help. The recruitment process emphasizes interviews and testing of problem solving, simultaneous capacity and stress management with the aim of providing for unique SOS Alarm competence (SOS Alarm, 2009). Vivid emotions are commonplace and therefore call takers also need to be emotionally competent. Call taker work involves aspects of managing emotions of both caller and oneself in terms of alignment to institutional feeling rules such as the one expressed below:

When we speak of professionalism there is a tendency to talk about a “Cool head”, i.e. turn off the feeling and be completely rational. The feeling cannot be turned off but we can suppress it. It remains and affects us, but we do not notice it but are able to handle it. Being a professional means “keeping a cool head and warm heart”. We must allow our feelings to be included, to get to
know them. But at the same time we must suppress their expressions when we act quickly.

The call takers acquire continuous internal education but accumulated experience derived from continuous call taking is also considered important aspects of work. The whole educational process takes about a year and costs approximately 450,000 SEK. Call takers are certified on a yearly basis and get approximately 75–100 h of competence development (SOS Alarm, 2009).

**TOWARD A HEAT-MODEL OF EMOTIONAL MANAGEMENT**

The section below provides empirical illustrations of how call takers manage emotions. Throughout the following section ‘‘I’’ represents interviewer and ‘‘CT’’ represents call taker. The final quotes are written verbatim in order to better capture authenticity of call takers expressions regarding their work situation.

**Event and Intersubjective-Focused Regulation**

Call takers deal with a never-ending stream of calls. An organizational goal is to answer all calls within 10 s. Call takers seem to disconnect calls they are co-listening to very quickly. They hastily disconnect from incidents which are considered to have an evident nature. Furthermore, when working with ambulance direction, call takers dwell on answering 112 calls in order for other call takers to take those calls. Such a procedure may be a strategy of making organizational resources available in order to get on with work, such as coordinating resources and directing the ambulance. But it may also be seen as an emotional selection procedure, pre-
venting them from collecting too much of emotional baggage. In a call where an individual had been in a minor car accident and placed in a phone queue to the police, the call taker stayed on the line without the caller hearing. After the call the call taker imitated the caller by saying:

CT 1 (Female, Experienced): [Imitating the caller] She said just wait I will connect you. I mean it is 112, what the hell is this shit, it is still 112 right.

The call taker went on saying:
CT 1 (Female, Experienced): That’s what you hear if you stay on the line. What does he think I do, not working anyway [making a funny face].

Call takers consciously modify emotional calls by modifying the overall situation. In particular angry callers are rerouted to other call takers. One call taker expressed that an overall aim in the calls is to communicate calmness in order for the caller to remain calm. But when communication fails due to too aggressive callers they have the opportunity to modify the situation by terminating the calls.

CT 2 (Male, Very Experienced): In many cases you do not get anywhere and then you say that now we finish this conversation. It is either that you say there is help on the way or you say that this is nothing. YOU CANNOT LISTEN…click [imitates the sound of hanging up the phone] and then you hang up the phone.

Additionally call takers take on different approaches when angry callers get too intense in terms of passing on the call to a colleague who can have a go at the call in a more neutral state.
CT 2 (Male, Very Experienced): The best to say is, now you should talk to a colleague of mine. You do not engage in discussion with callers, but it is not always one can make it, because sometimes you lose patience even though you should not. It is only human.

Furthermore, even though not very common, call takers leave workstations in order to modify their situation and emotion by going for fresh air, drink water, or a cup of coffee, in order to recover a neutral state.

**Event and Intrasubjective-Focused Regulation**

Preparing for calls is a difficult endeavor. In part because the constant flow of calls does not allow time for preparation, but also because they never know what they are facing when answering calls. One call taker expressed it as follows:

CT 3 (Male/Very Experienced): It could be a little kid who makes a hoax call, Ruth who have pressed the wrong button on the phone, a high-rise building burning or an aircraft that have fallen down (y). It is not many jobs that have this incredible dynamism without having any kind of preparation time. If we look on all blue light organizations they still have preparation time. Emergency services get the alarm but they still have seven or eight minutes until they actually arrive to the site and are expected to do something active. The ambulance, the police and the coast guard (…) all our preparation is perhaps two seconds if it is even that.

Call takers do not only select and modify aspects of the calls but also prepare themselves for dealing with emotions by deploying attention to certain aspects of the situation. A role shift from being a civilian into a call taker occurs before entering the workplace. One call taker compared
the work role to the coat of a fireman; ‘‘When having it on the fire of emotions does not get to you.’’ The same call taker also expressed incalls-deployment of nonverbal aspects used in order to sharpen one’s focus.

CT 4 (Male/ Experienced): If you get a CPR (Cardiopulmonary resuscitation) or that it is bad in some sense then you click and receive instructions and then we have them in front of us and do something like this [imitates typing] but there is also more like if you sit up straight (…) let’s work [straightens his position in the chair] instead of sitting like this [sinks in the chair] [laughs].

Changing position from a relaxed position into sitting straight up and leaning forward is common in order to draw attention to what is being expressed in the call. However, other nonverbal aspects such turning away one’s gaze or sometimes, closing one’s eyes, scratching one’s heads, making funny faces, rolling eyes, and biting lips has also been documented. One call taker who received a call regarding a woman running down the street wearing only a fur, twitched and made a funny face and tilted her head.

These nonverbal signs often work as primers for call takers deployment of attention, signaling that there is an ongoing call of more deviant nature. That makes them prepared if the call is rerouted to their workstation. Additionally, a call taker says that ‘‘you talk quite a lot to yourself in this job.’’ Self-talk is seen as a way of deploying attention to vital aspects of call taker work. It is not only done in order to guide behavior but also to induce emotions for one’s work duties. Similarly, self-talk

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is also seen as being reconstructive in terms of talking to oneself in order to persuade oneself of an interpretation of an event. Call takers do engage in self-talk of various natures, from cursing, and empathic talk about callers almost in a sense of labeling the event with an emotional tag, to quiet almost inaudible self-talk.

Additional strategies for regulation of emotions are seen in call takers ways of continuous cognitive change and reappraising of events on an inter- and intrasubjective level. For instance, call takers use euphemisms or technical terms for events during calls. In a conversation with ambulance personnel regarding an elderly patient in an aging home a call taker expressed:

CT 3 (Male/Very Experienced): You can turn around; the person has gone ad mortum. Using euphemisms or technical terms is a way of distancing oneself to emotional events. By cognitively changing and rewriting the description of death the event becomes more distant and manageable. Call takers are also seen to reappraise emotional status of angry callers in order not to be swept up in angry conversations.

CT 5 (Female/Very Experienced): You must try to persuade yourself that they are angry because they are afraid. If you are able to do this you have won to some extent. But some callers are hopeless to talk to. They are just barking and screaming and it is really hard.

Call takers playback recorded calls which are considered as being particularly deviant or where the call taker is considered as having done an extraordinary job. One example of this was when there was call which was inaudible. The call was redirected to another call taker but the call
taker could not make sense of what was being said. Many times such calls are disconnected and labeled as a hoax call but the two call takers kept the line open discussing that it could be an individual speaking Thai.

It turned out to be a deaf person. One of the call takers picked up a private cell phone and texted the caller on the other end of the line. This call was later to be nominated as ‘‘call of the year’’ and was played back to staff at the emergency center but also discussed frequently in the lunchroom.

Expression and Intersubjective-Focused Regulation

It seems as if some call takers create an emotional barrier in order to sustain a neutral mode. During a coffee break I engaged in conversation with an experienced call taker (8 years of employment), on emotional management and preparation when working.

CT 3 (Male/Very Experienced): We have little or no preparation prior to the calls but it is seldom that we cannot deal with feelings.
I: How do you prepare yourself?
CT 3 (Male/Very Experienced): We don’t, you don’t have the time.
I: What is the worst type of calls than?
CT 3 (Male/Very Experienced): Difficult calls are when you can relate in some way or when you do not get your guard up.

The emotional barrier seems to be somewhat of an unaware management technique. First the call taker answers that there is no time for preparation while he later implies preparation by creating an emotional barrier when protecting him from emotional hardships. Later on, in the interview session, the same call taker was asked about the management of emotion in terms of being stoic.
CT 3 (Male/Very Experienced): You need to bring fourth all your professionalism that you hopefully have. This is what we in the organization call the ability to focus, to put a focus on the event. For me anyway it is to depersonalize. I cannot allow myself to think that this is a 35 year old man with perhaps children, family and relatives and so on. This is a 35 year old patient suffering from this (y) who is currently not breathing and has no pulse (y) it is the only thing that is important right now.

I: Hmm…

CT 3 (Male/Very Experienced): Then you have to take the other stuff afterwards.

The call taker deploys attention by depersonalizing the caller. He also states that there are things seeping through, even though he directs attention in a certain direction, by saying that there are other things that have to be dealt with afterwards. Emotional suppression may also come at cost in terms of cognitive functioning. The process of consciously monitoring, not letting unwanted emotions breach through and not letting unwanted expressions to leak out, causes strain on the call takers. When the call taker was asked about a worst case scenario he expressed the difficulties of such an approach. The call taker explained that he had broken down and had to leave the working site for 2.5 h crying. The call involved a husband calling on behalf of his wife who was breathing strangely when sitting on the sofa.

The call escalated into that the woman stopped breathing and the husband had to do CPR. Even though death is not considered as a routine matter he claimed the call not to be specifically deviant but still he experienced the call as one of the worst in his career.
CT 3 (Male/Very Experienced): I think that was what I not really succeeded with this girl (y) the kids came in during the call and it was like it was many aspects and perhaps even if it is part of our job to juggle a lot of balls in the air at the same time it was so much happening at the same time. We had contact with the ambulance, then we tried to chase the spouse grandparents and he said their names, but in the agitated mood he did not remember where they lived. He did not remember their phone number so I had a colleague who sat and was looking into that (y) can they live there [talking quietly to himself]? Very many things went on at the same time and even if I just focused on this matter, it was very many things going on and suddenly the children came in and it became another card to try to play in this game. I think those factors contributed to that I did not manage to focus and depersonalize.

Expression and Intrasubjective-Focused Regulation

Expression regulations are strategies that call takers use when having callers on the line. These strategies are also congruent with desired organizational display rules in terms of “keeping a cool head and warm heart”. Emotions are acknowledged as a part of the calls but call takers have to suppress any emotions in order to strive for neutrality. Suppression or blocking out audible signs in the call takers voice is a complicated process. The call taker must manage and control expressions at the same time as they manage the caller’s emotions and analyze what is being said.

CT 6 (Male/Experienced): An ideal operator must in all situations keep a cool head. No matter how terrible it is. It must be like being objective and address the caller in such a way as to suck out the right information even if the things happening in the background are really bad. In other words it is a matter of not to be led astray and caught up in it. It is actually among the absolutely
most difficult because the feelings that I do express to help the people, at the same time they expose a weakness. You do not like when people are ill, but in principal, in order to help I have to be unmoved by the terrible that has happened. It is sometimes perceived by society as if we are very cool beat.

When call takers were asked about the nature of emotions they feel they are being swept away by, one call taker answers:

CT 5 (Female/Very Experienced): Aggressiveness. It’s rarely that worry infects us. You must be professional. So much we have in our training and our knowledge. We are not caught up in worry but aggression is difficult.

I: So that is common (y) but how it is with sadness than?

CT 5 (Female/Very Experienced): But we must be professional. They do not get helped if they cry in the call and that we also do it. But we have to, we need to, we understand that you are sad, but now we must pull together and do the best until the ambulance arrives.

I: But does it happen that you regulate yourself if there is someone who is very sad? CT 5 (Female/Very Experienced): Yes, what do you mean then?

I: As being stoic?

CT 5 (Female/ Very Experienced): Well, I guess you are stoic but perhaps when you have closed the call it can overflow.

Physical reactions to calls are common, spanning pleasant to unpleasant emotions, but they cannot be revealed. One call taker explained:

CT 5 (Female/Very Experienced): Yes, goose bumps one can get when you hear childbirth and when a child screaming one can get goose bumps. But you could also get it if you become very afraid. Sometimes it happens that they fall down on [a cliff] and it is right on the edge (y) you know up at the hill (…) you hear that they are lying on the edge and one thinks.
I: Yes?
CT 5 (Female/Very Experienced): Well how do we solve this [Titter] but one
cannot say that to the caller.

Call takers are likely to be more affected by anger than by sadness
or worry. These and other emotions raise physical symptoms that need to
be managed (even joy) in order not to reveal non-neutral emotional states.
Interestingly, and somewhat contradictory to what is first expressed re-
garding that worry rarely infects call takers, the call taker uses ‘‘we’’ in-
stead of you when talking about pulling together. Such a statement may of
course be a way of creating common ground between caller and call taker,
but also an expression of regulation since it is not only the caller who
should pull together. Taken together the call takers emphasize that calls
are emotional in terms of both unpleasant and pleasant events and that
suppression or barrier building is an approach, among many approaches,
used when managing emotions. Emotional management techniques seem
to blend (attentional deployment and response focused regulation) in or-
der not to give away any emotional markers changing the callers percep-
tion of the call taker as being neutral. Barrier building also comes at a
cognitive cost since it is a self-regulatory process. This may explain why
the majority of the call takers had difficulties answering whether some-
thing out of the ordinary had happened lately. Another crucial issue is the
divide between feeling and not expressing the emotion. This was de-
scribed earlier in a quote (see Stage 2 in the Method) when a call taker
implied the difficulty of being angry but it was a matter of not conveying
it.
CT 2 (Male/Very Experienced): Or rather, not so that you give away that you are angry, you are indeed angry but it is a matter of not conveying it.
I: You can feel the feeling but do not?
CT 2 (Male/Very Experienced): [Interrupts] Convey it, and it is difficult, really difficult, it is difficult (y) every kind of human being or being pissed at a human being and speak friendly to them.

In other words, response-focused regulation (surface acting) is a difficult endeavor. Besides that there are organizational display rules stating neutrality as a desirable mode of action, emotions also tend to affect judgments. Call takers expressed that it was difficult to let the emotions wear off not to color coming calls, but also that this is an ability you learn after hand.

CT 7 (Female/Experienced): You let it go, in principle at once. In some cases it lasts but then it should be something extreme and then it is the same thing as when you are sad. You go out on the balcony or out in the kitchen and think fucking bitch, drink some water and come in again and have a go at it. It is dangerous to accumulate it so it suddenly happens when I have talked to eight people you find being numb nuts and then when Ruth 93 calls, it is she who may get it instead. That is a little dangerous in our case.

Expressions need to surface not to build up with a potential risk to carryover and affect unrelated decisions. The following section discusses implications— theoretical and practical as well as suggestions for future studies.
DISCUSSION

Theoretical Implications
Superimposing the concepts is valuable since using only an emotional labor framework would have missed how call takers modify the actual situation and not only the perception of the situation. Using the current framework also adds structure to data when comparing themes from data to the results of Tracy and Tracy (1998; see Fig. 1). The double-faced nature of emergency call taking results in a situation where call takers need to focus on inter- as well as intrasubjective aspects. In other words, one needs to manage one’s own emotion (intrasubjective stance) at the same time as focusing on the interaction (intersubjective stance). Combining inter- and intrasubjective factors with management techniques of antecedent-response-focused regulation of emotion renders consequences for call takers as well as callers. The management techniques and consequences of the Heat-model are modeled in Fig. 2.

**Hive (Off).** Call takers in the upper left box have a main focus on the interaction, affecting aspects of the situation rather than the perception of the call (see call takers dispatching angry callers, not to dwell in the calls longer than necessary). Hiving off resembles Tracy and Tracy’s (1998) category of upping the priority and Gross’ (1998a) situation selection and situation modification. Call takers are less likely to experience unwanted emotions considering they are modifying the situation rather than the feeling of the situation. In other words, their wellbeing is likely to remain stable since they are removing the eliciting stimuli by changing the situation. There may, however, be consequences of this management technique. Since time spent in calls becomes less when modifying the
situation the risk for misinterpretations (see due to disconnecting, dispatching, or terminating calls to quickly) increases. In turn this may render callers not getting the help they are entitled to, perceptions of poor service from the caller end as well as increased workload for colleagues who get emotional calls dispatched their way. Contrary, call takers may lack positive feedback or opportunities for learning, since continuous modification of the situation reduces training in managing difficult situations.

Elaborate. Elaboration, represented in the top right box, is consistent with the original concept of Hochschild’s (1983) deep acting, Gross’ (1998a, 1998b) attentional deployment, cognitive change, and Tracy and Tracy’s (1998) categories (incongruent nonverbal expressions, self-talk, evaluation of calls after finishing them, storytelling, and joking). Call takers in this study focus on reshaping the actual emotion intrasubjectively (see the call taker stating that rethinking and self-persuasion of angry callers’ into scared callers was a strategy). Other techniques are to use euphemisms (see relabeling events in order to create an emotional distance to an event). Deploying attention to desirable aspects of a situation will induce emotions that are helpful in work (see the call taker talking about the fire coat and using nonverbal aspects such as changing position in chair in order to induce the right emotion). Potential consequences are seen in terms of maintained wellbeing for the call taker especially since they are replacing the original emotion with a modified version which is more manageable.
Figure 2. The Heat-Model of Emergency Call Takers’ Emotional Management Strategies.

From the caller end, the perception of service can be both adequate as well as insufficient. When reshaping the situation is successful the caller is unlikely to experience difficulties. But if the reshaping is not aligned with the situation it may have consequences for both outcome of the errand as well as the perception of the service. Misalignment may cause call takers to be led astray which in turn may prolong the process or lead to faulty decisions.

**Auralize.** Call takers in the lower left box focus on managing expressions at the same time as having a focus on the interaction. The box does not have equivalence in either of the theories aforementioned earlier. An example of this is when a call taker addresses the lack of time for preparation. The call taker externalizes an emotional barrier (see getting
ones guard up) in terms of that certain emotions or expressions cannot 
leap over in any direction. The strategy is similar to Hochschild’s (1983) 
concept of surface acting, yet different, since the call taker externalizes 
and focuses inter-subjectively, on a semi-permeable barrier filtering out 
unwanted expressions from both caller and call taker rather than monitor-
ing merely one’s own expression. Self-regulation increases cognitive 
workload which in turn has negative effects on memory and decision ca-
pabilities. Besides performance effects it may also affect wellbeing mak-
ing the call taker vulnerable when failing to maintain the barrier (see the 
call taker who did not manage to maintain distance to the husband calling 
on behalf of his wife). Prolonged suppression of expressions is related to 
increased activity in the autonomic nervous system (Gross, 1998b; Pen-
nebaker, 1985), stress, depression, and emotional exhaustion (Grandey, 
2000). Other consequences may be inattentiveness to cues expressed by 
the caller considering the threshold of the emotional barrier not being 
permeable enough. In turn this may lead to ambiguous and confusing 
communication (see the statement from the call taker who claimed they 
can be perceived as too cold) with poor service as a result.

**Tame.** Finally call takers in the lower right corner matches the 
concept of surface acting. These call takers; experience incongruence be-
tween feelings and what they ought to feel in the situation (see the call 
taker experiencing anger but told it was a matter of not conveying it. Si-
milarly, yet differently, the call taker not revealing fear by telling callers 
about how severe the case is). They exercise expression control in order 
not to express what they feel. Furthermore and similar to the previous left 
side box, too much suppression may lead to perceptions of poor service
since the call taker is perceived as too cold while lack of suppression (for instance a call taker who becomes sad during a call) may result in a crisis of confidence also giving the perception of poor service.

The call takers expressed it as more difficult to manage anger than worry and sadness, suggesting that there may be specific rather than global regulation strategies at play. It gets even more complicated thinking that different emotions reveal different management strategies at the same time as the work role involves double-faced management. A caller may be afraid while the call taker experiences sadness, causing an intrasubjective regulation of sadness simultaneously as the call taker must try to manage the caller being afraid. In turn such a situation is likely to affect work performance. Furthermore, by using an emotional lens, implications of work performance and wellbeing consequences are identified for the call takers. All negative emotions are not equal; in fact some may even improve performance in work tasks. Following the APT-framework (Lerner & Keltner, 2000, 2001; Lerner & Tiedens, 2006) different emotions also reveal differences in, for instance, action tendencies and cognitive patterns. Anger shows less depth of processing and provides a meta-level sense of being confident and is therefore argued to be more similar to happiness (Bodenhausen et al., 1994). Sadness, on the other side, accompanies deep and systematic processing (an example of this is the preference to disconnect, dispatch, or even terminate angry callers rather than sad or scared callers). Considering that emergency call taking is a systematic task, when trying to separate a symptom from a non-symptom, a call taker leaning toward sadness may actually benefit in comparison to being angry. Still, when considering the action tendency of being sad in
comparison to being angry, being too systematic will prolong the time between call and action which in turn may cause turmoil. From a performance point of view sadness does not need to be regulated to the same extent as anger yet it may be needed to be managed seen from a wellbeing point of view. From a call taker perspective, paying attention to the two top boxes of the Fig. 2 would generally promote healthier behavior as well as better performance than the two bottom ones. In particular, since it is the perception of the event or the event itself that is changed and not a regulation or inhibition of one’s expression. Finally, a theoretical implication is that the sequential nature of Gross’ model seems to break down. Call takers bear witness to the use of simultaneous strategies within as well as between the categories of emotion regulation. For instance self-talk may serve as not only an attentional deployment scheme but also as a mean for cognitive changing and reappraising a situation. Furthermore, one call taker used not only attentional deployment by depersonalizing but also implied that this was done in the light of that emotions were blocked out and ought to be dealt with later, making it similar to response-focused regulation.

**Practical Implications**

Emotions are acknowledged in the emergency alarm setting but display rules typically indicate suppression as a mean for management of emotions. It would be inappropriate to claim the approach faulty but the potential for unwanted effects on work should be considered. In terms of call taker’s health, inhibition of expressive components of emotions may, if prolonged, lead to unhealthy behavior (cf. Grandey, 2000; Gross, 1998b; Pennebaker, 1985). The organizational preference for suppressing
emotion can be complemented with techniques leaning toward antecedent regulation. One of the call takers reshaped the emotional status of the caller from being angry into being afraid which in turn is strongly recommended technique to utilize. No organizational recommendations, guidelines, or policies in performing such an approach were identified which leads to the conclusion that call takers develop other routines than what is being subscribed by the organization. Awareness or advices about how to elaborate on content of calls are just means of coping with a situation. If the hiving or elaborating fails, there is still the possibility of dealing with the situation by auralizing or taming emotions. However, using solely auralizing and taming leaves little margin for error. Emergency call takers would benefit from training in reshaping of events, in education as well as in continuing professional development. Debriefing sessions are means of reshaping events retrospectively and need to be highlighted and perhaps made explicit and compulsory. The left side in Fig.1 and the top boxes in Fig.2 of the model could be elaborated on considerably in education of new call takers, providing them with an arsenal of reshaping techniques. Despite potential benefits of using antecedent regulation in terms of both wellbeing and performance the strategy also reveals difficulties. Some call takers claim an approach of being “a blank slate” when answering. Preparing by reshaping events may to some degree create a mindset which leads the call taker to miss important information. Therefore too specific regulation techniques may be detrimental, since it is hard to know exactly what to prepare for. Awareness of overall global techniques, (e.g., Gross 1998a, 1998b), may be a good starting point for the call takers. Considering call taking behavior including not only the reshaping of
actual events, but also modification of the situation, different technical solutions, may facilitate work. For instance, when call takers decide to transfer a call due to that they are clinching with the caller, the call could get an emotional tag in the information system preparing the new call taker for what he or she is going to face. In turn such an approach would give call takers, who get a transferred call, a possibility of being emotionally aligned and attuned with the caller. Besides technical solutions the creation of emotional zones, for letting steam out, would be appropriate. Call takers expressed that they had to leave the site, due to frustration or anger, in order to restore a neutral state. Creating emotional zones where these emotions can wear off/build up without a possibility of affecting co-workers would be desirable.

**Suggestions for Future Research**

Due to the intense emotional situations that call takers are exposed to, a validating study to this study would be to learn whether emotional regulation is mirrored in the relatively high turnover. In particular since staff turnover reached 18% for the metropolitan areas and 12% nationwide for SOS Alarm in 2008. At the same time turnover rates reached approximately 20% internationally and 7–15% for other call center environments (see the Report Callcenterbranschen) in Sweden. Yet another opportunity is to proceed with the complex relationship of double-faced management. The divide between managing one’s own and others emotions at the same time as different types of emotions are at play for both caller and call taker is indeed intriguing—but also complicated to assess. As described earlier, a caller may be perceived as being afraid while the call taker experience sadness— making the call taker trying to manage both one’s own
sadness and the callers’ fear. As the call taker experiences a specific emotion, are there emotions or sets of emotions that are harder to manage dependent on what one is feeling intrasubjectively? Finally, emotional management is not only reserved for face-to-face environments of contemporary work.

Characteristics of this study attenuate importance of emotional management in virtual and distance work settings. Bearing the contemporary communication landscape in mind, emphasizing on boundary spanning information technology, brings research on traditional call center settings to the fore. But the relation between emotional management and (multi)modal communication, in for instance computer-mediated communication, is also further encouraged.

CONCLUSION

Emergency call taking involves management of vivid emotions. Call taking at the emergency center is complicated by the fact that call takers manage not only their own but also callers’ emotions. In this study themes of hiving, elaborating, auralizing, and taming emerged. The findings state call takers to manage emotions through various means of consciously/unconsciously modifying the situation, by reshaping/reinterpreting the situation as well as by regulating emotional expressions. In turn such management is dependent on the direction of focus in communication as regards managing one’s own or callers’ emotions. The self-management strategies are also likely to affect decision-making capabilities. However, it seems as if emotions still need to be embraced and adopted as a part of
the work role rather than viewed as a disruptive and disobedient force affecting decision making capabilities negatively.

By superimposing “traditional” theories of emotional regulation and emotional labor, findings became more nuanced than using a single theory. For instance, the way call takers modify the situations would not have been visible if using a single theory of emotional labor. In addition, the use of the two theories added additional structure and support to previous findings of Tracy and Tracy (1998). In further addition, the finding of an emotional barrier seems to deviate from previous findings and does not have an equivalent in either of the two theories used. The two top boxes of the assembled Heat-model (see Fig. 2) are argued to raise more desirable behaviors than the two bottom ones. These two strategies are perceived as putting less strain on cognition as well as maintain call taker wellbeing. Therefore the organization could emphasize considerably on implementing education on global management strategies for reshaping events. Following the findings of this study raises questions of whether there are caller emotions that are perceived difficult to manage dependent on what the call taker is experiencing intra-subjectively. The study also shows emotional management to enclose environments were communication is mediated.

Emotional management and its relation to use of technology/media is interesting considering the increase of information and communication technologies, work dispersion, and globalization associated with contemporary work.
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Study 4: The Rationale for Irrationality: Uncertainties and Ambiguities in Emergency Call Taking.

The study has been submitted to Journal of Management & Organization.
ABSTRACT

Emergency call takers need to make fast and accurate priorities in a high-velocity environment—a complicated and emotional job. By triangulating data from a Swedish emergency setting a tension between uncertainty-reducing and ambiguity-resolving activities was identified. The tension emphasizes a protocol-based (de)constructive procedure, where “bits of data” (i.e. symptoms) are matched towards pre-determined categories of a decision support system—a procedure which connotes to an organizational prescription of reducing uncertainty. In parallel, call takers resolve ambiguity by attending to “deviations” that interrupts workflow, using a non-protocol-based (drawing on call takers intuitive and emotional skills) procedure. The empirical evidence is assembled in a problem framing model that states complimentary use of formal and informal procedures to successfully manage emergency calls. The findings are further discussed in terms of implications for decision-making in this setting as well as for competence development of call takers.
INTRODUCTION
Call centers represent the current Zeitgeist of being clean, fast, precise, nice-to-have and always there for us (Dormann & Ziljstra, 2003). In this realm we also find emergency call centers, which operate by making protocol-based decisions in a context characterized by emotions, technology and velocity. Swedish workers in this setting face a demanding job as they annually prioritize approximately 700,000 healthcare related calls. Emotional expressions of callers in emergency calls cause call takers to manage the callers’ emotions as well as their own emotions (Shuler & Sypher, 2000; Tracy & Tracy, 1998). Usually emotional management is conducted through the maintaining of professionalism by displaying positive and negative emotions in appropriate ways—typically by masking negative emotions (Kramer & Hess, 2002), but in the case of emergency call takers management also takes place by a striving for neutrality (Tracy & Tracy, 1998). Besides the need for emotional management, emergency calls are further complicated by the call takers pending need for information. Adjacent health care settings offer a possibility to assess patients in a multimodal manner, as professionals in these settings can see, listen, touch or even smell the patient—conditions that may improve decision accuracy. However, call takers are restricted to a single modality—their hearing.

Emergency call taking also needs to be both fast and analytic, with premises of the decision carefully evaluated, since even small errors may lead to severe consequences. At the same time the time critical nature of the setting may cause primacy for a fast and, perhaps, less thorough approach. In this endeavor, call takers are aided by an electronic decision
support system (DSS) which provides suggestions on how to align priorities with medical imperatives. The DSS draws upon a sequence of questions, a medicine index, which should help the call taker delineate symptoms and thus derive a correct priority. The use of such a system provides a routine that ought to guarantee standardized and equal help to callers regardless of their expressions. However, as much as a DSS adds structure to the decision process sudden interruptions of routines, habitual responding, breakdown of coordinated action and misunderstandings in speech exchange systems may inflict complications in crisis situations (Weick, 1990) and therefore affect how call takers arrive at their decisions. Thus, this study connects to and challenges the binary and still existing perception that communication is ordered, clear and consistent and that actors are rational entities within organizations (cf. Ashcraft & Tretheway; Mumby & Putnam, 1992; Eisenberg, 1984) Traditional normative models may not always capture the dynamics of such volatile environments. Interactions of emotions, intuition and traditional rational-based decision making are therefore continuously requested (cf. Dane & Pratt, 2007; Coget & Keller, 2010).

This study focuses specifically on what role emotions and intuitions play in emergency call taking? By means of this qualitative and exploratory study I aim to unveil under which conditions emergency call takers use non-reason-based (informal, intuitive and emotional) as opposed to reason-based (formalized and rational) decision strategies as well as how these processes complement each other. First, I review research that describes use of information, delineating uncertainty and ambiguity, in order to contextualize the communication setting. In connection to this
review I account for individual decision making in emergency settings by means of reason-based and non-reason-based processing. Second, I address the setting of the emergency center, methods and limitations of the study. Third, I state the findings of the study. Finally, I connect the empirical section with literature within previously mentioned areas in order to raise questions for connected fields.

**Differentials of Uncertainty and Ambiguity in Medium-Based Communication**

Making priorities in emergency call taking is complicated by a number of factors. Firstly, no matter if communication is verbal, non-verbal or if the caller is silent it is still informative to the call taker. Secondly, the interaction cycle is short and learning is therefore asymmetrical. It is only the call taker who repeats the procedure of emergency calls while callers rarely make more than a few calls in a lifetime. Thus, the setting provides for few possibilities to develop mutual understanding, which in turn puts emphasis on reducing uncertainties and ambiguities in communication.

The assessment of the patients’ conditions is done by means of asking questions, but also by peripheral routes resolving subtle indistinctiveness of expressions. In this study uncertainty and ambiguity are recognized as different, but related concepts. In other words, a situation may be both uncertain and ambiguous, but may be reduced or resolved dependent on how the problem is framed (cf. Schrader, Riggs & Smith, 1993).

Uncertainty regards “imprecision in precision of future consequences conditional on present actions” (March, 1994, p. 74) and is a matter of current state of knowledge and possible extrapolations to future states. Informational theorists (cf. Shannon & Weaver, 1949) and decision
theorists (cf. Andersson et al., 1981) viewed uncertainty as a lack of information. Organizational researchers have followed a similar vein, identifying uncertainty as the gap between the information that the organization has and what it needs (Galbraith, 1973). The gap between present and future information is typically bridged by additional gathering of information. However, as it is not efficient to randomly collect information in order to reduce uncertainty, the process needs to be guided by a mental model such as a script, routine or a rule. Reducing uncertainty involves collecting information about variables, which functional relationships are already known in prevailing mental models. Thus, uncertainty reduction is a process of matching stimuli to a prevailing model. One such mental model is the decision support system (DSS) that call takers use.

**Uncertainty, Ambiguity and the Decision Support System**

The DSS provides cognitive support in an overall stressful and complex decision environment. The DSS provides an overview of categorized symptoms (spanning from, for instance, allergies to assault) with attached suggestions of the priorities that calls should have on an ascending scale ranging from 4 to 1 (where 4 is the least severe and 1 is the most severe). The system is an expert system which requires the call taker to identify symptoms while identification of certain symptoms leads to suggestions on how to prioritize (the functional relationships of the variables are known). Thus, by asking the callers questions, call takers continuously accumulate information about symptoms which they can match to the decision support system and thereby reduce uncertainty. The organizationally prescribed way of making a priority is depicted in Figure 1.
Figure 1. Schema for emergency call taker decision making
Figure 1 shows an eight-step procedure of managing emergency calls. First, the call taker always needs to ask what has happened (see Q1). Second, the call taker needs to find out where the accident has taken place, and also needs to obtain phone number and address to the location (see Q 2 and 3). Such a procedure is important since if the connection fails or the patient becomes unconscious the call taker can try to reconnect to the caller. Question 4 regards assessing vital parameters of the patient’s condition by asking a series of yes/no questions. If “yes” alternatives are indicated, there is an indication of a high priority. If the patient is not fully conscious, the caller is asked to carefully shake the patient (see box 7 and Q 10). If the patient is still unconscious, there is a shortcut leading to the highest priority and the call taker is requested to look up the section of unconscious individuals in the medicinal index. Third, if the patient is awake (or regains consciousness) assessment is made by asking open-ended questions (see Q 5-9). If there is suspicion of acute illness, the call taker immediately assigns the highest priority and then goes to the correct section in the medicinal index (see box 6). If the problem is defined and it is not considered the highest priority, the call taker needs to find out more about the patient’s condition and then go to the corresponding section in the medicinal index (see box 4 & 5).

However, the caller and call-taker interaction is often less straightforward than asking questions and receiving answers. For instance, verbal statements (claiming not being in pain) and non-verbal expressions (moaning or breathing strangely) may contradict each other. Callers may also express multiple but similar symptoms or callers may not be able to adequately account for what they or a peer are feeling. In
consequence, the concept of ambiguity regards multiple meaning and conflicting interpretations (Daft & Lengel, 1984) or unclear goals with obscure causal relationships to obtain goals (March & Olsen, 1976)—a situation where individuals must choose which information or source of information to act upon (Weick, 1995). For obvious reasons ambiguity may not be untangled because of an increase in information (as in multiple and consecutive questions), in fact additional questions may complicate things further. Resolving ambiguity is therefore characterized as a constructive process of finding which cues to act on, their values in a mental model or even finding the mental model itself. The relation between uncertainty and ambiguity is depicted in Table 1.

Table 1. Problem Framing Matrix in Emergency Call Taking Management

<table>
<thead>
<tr>
<th>Ambiguity Low</th>
<th>Uncertainty Low</th>
<th>Scenario 1</th>
<th>Values known</th>
<th>Functional relationships known</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Scenario 2</td>
<td>Values unknown</td>
<td>Functional relationships unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scenario 3</td>
<td>Values known</td>
<td>Functional relationships unknown</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Scenario 4</td>
<td>Values unknown</td>
<td>Functional relationships unknown</td>
</tr>
</tbody>
</table>

Scenario 1 is better described as an evident case where the caller clearly communicates symptoms, the call taker identifies the symptoms and matches them towards the decision support system (see Table 1). Scenario 2 regards an uncertain situation, which is not necessarily ambiguous, but in which it is hard to determine values of the existing va-
riables. A call taker may fail to detect a symptom which otherwise may have lead to a higher or lower priority. For instance, the expression of chest pain is not, on its own, a symptom of a heart attack, but combined with radiating pain from the chest towards the arm the first diagnosis is confirmed. Failure to detect the latter symptom may render an improper assessment. Scenario 3 is characterized by known variables and values whereas the functional relationships of these are unknown. A caller may verbally express symptoms that are aligned with the DSS. However, the call taker may sense that the expressions are not authentic or sense that the actual situation is not fully reflected. Thus, the call taker becomes hesitant about how to incorporate the variables into a model for action. Scenario 4 is when the call taker is confident in assessing the emergency calls, but the communication process prevents the call taker from obtaining valid information from the caller. Silence, affect bursts (short emotional non-speech expressions) or even lack of verbal expressions from the caller may indicate that something is wrong or even that the call is not an authentic one. Call takers therefore need to construct a mental model by assessing the value of the variables as well as their functional relationships.

**Decision Making in Emergency Settings**

Making fast decisions at the same time as making analytic decisions may imply quality tradeoffs. Fast decisions decrease response-times, but may be unreflected. Analytic decisions may be reflected and correct, but be more time consuming. Moreover, fast and analytic decision making draws on different assumptions of how information is processed. Even though reason-based and non-reason-based conceptualizations may be grossly oversimplified depictions of these phenomena, they have earned attention
across research programs (cf. Kahneman, 2003; Sloman, 1996) and it has also been brought up in the emergency room context (cf. Coget & Keller, 2010).

**Reason-based decisions.** Previously, decision making has been described to emphasize a sequential route of cognition and expectation-based calculus (Loewenstein, 2001). Decision makers need to define a problem, generate possible criteria, rank the different criteria as regards importance to the problem, and assess alternative solutions before the optimal solution is finally chosen (Bazerman, 1998; Simon, 1968). Typically, medical decision making conforms to such a process. Doctors classify symptoms into categories, such as allergies or trauma, continuously refining their assessment by additional questions, conducting tests that successively eliminate causes. These algorithmic procedures derive partly from statistics and probabilities of conditions and their treatment, but also from cumulative experiences of scholars in medicine (Groopman, 2007). Thus, reason-based decision making is a matter of narrowing down the alternatives to actionable solutions. Furthermore, such reason-based procedures tend to converge with logical rationality since an individual preferring A to B and B to C should also prefer A to C (Pham, 2007). Call takers need to identify and order symptoms, such as if the individual is awake, breathing or in shock trying to uphold principles of transitivity. In other words, if an awareness criterion is violated, assessment of healthcare priority should be performed according to awareness rather than shock. Such a procedure grants quality and efficiency since all callers need to receive treatment based on what they say and not how they say it. However, rational individuals may soon be overwhelmed by the many
alternatives they face. I therefore turn to theories of dualistic processing since individuals are equally likely to make use of intuitive and emotional information. Dualistic theories advocate a reason-based system that leans towards sequential, slow, effortful, rule-governed, flexible and neutral processing whereas a non-reason based system stands for fast, parallel, automatic, effortless, associative, slow-learning and emotional processing (cf. Sloman, 1996; Kahneman, 2003). The latter system is further elaborated below.

Non-reason-based decisions: Intuition. Intuition refers to processes judged to share characteristics with an associative, non-verbal and experiential system (cf. Sloman, 1996; Kahneman, 2003). Intuition regards pattern recognition and pattern matching rather than a consequent ranking of alternatives. Studies on doctors reveal experienced doctors to arrive at diagnosis fast with little or no deliberate thought (Groopman, 2007), but they also seem to balance rational, intuitive and emotional poles (Coget & Keller, 2010). Similarly, in other high-velocity and high-reliability organizations soldiers and firefighters seem to generate one solution to a dilemma to thereafter enact it rather than generating several solutions and compare these (Klein, 1998). Intuition may be a result of previously conscious actions which through repetition have been traced into automaticity. Such a procedure enables decision makers to consider a range of information without conscious thought (Simon, 1987). However, subtle stimuli may trigger schemas for action (Klein, 1998), making intuition a presumably non-conscious rather than a pre-conscious (cf. Sinclair, 2011). In other words, activation of such stored knowledge hinges on stimuli that activate it. Thus, in line with Dane and Pratt (2007, p. 1), I con-
sider intuition to function “as affectively charged judgments that arise through rapid, non-conscious, and holistic associations”. I will therefore further elaborate on affective matters in order to shed light on how individuals may process information in the emergency context.

**Non-reason-based decisions: Affect.** Emotional researchers have argued that individuals may catch emotional expressions (Hatfield, Cacioppo & Rapson, 1994), but also use emotional expressions as social information (Salancik & Pfeffer, 1978) in ambiguous situations (Gump & Kulik, 1997) aligning themselves to the counterpart when it is perceived as appropriate to do so (Barsade, 2002). Furthermore, emotional expressions are argued to have different effects in interpersonal settings dependent on whether the setting is characterized as cooperative or competitive (Van Kleef, DeDreu & Manstead, 2010). Anger expressed in a cooperative setting will inflict avoidance motivation and reduced cooperation while it results in increased cooperation in a competitive setting. Expressions of sadness or distress in a cooperative setting is argued to inflict increased cooperation, but is also argued to inflict decreased cooperation in a competitive setting (Van Kleef, DeDreu & Manstead, 2010).

On an intrapersonal note, the disposition of positive affect may appear as organizationally desirable since it contributes to flexibility and assimilation of ideas, superficial and fast processing (Clore, et al., 1994). Somewhat contrary, negative affect seems to promote systematic and detailed bottom-up processing, narrow attention, increasing external focus towards changing one’s situation (Clore et al., 1994; Loewenstein & Lerner, 2003). In other words, putting negative emotions in relation to transitivity, negative emotions appear rationally and logically desirable.
considering that an employee then identifies and evaluates possible alternatives before taking action to a larger extent than when being under the influence of positive emotions. However, not all negative emotions are the same.

Lerner and Keltner (2000, 2001) and Lerner and Tiedens (2006) advocated different emotions (such as anger, fear and sadness) to have different effects on both content and process depending on the cognitive appraisals linked to the emotion. Appraisals associated with anger, fear and sadness cause diverging perceptive lenses. The pattern for sadness relates to external circumstances (such as attributing situational causes for a behavior) while the pattern for anger is related to personal attributions (Smith & Ellsworth, 1985). Furthermore, individuals experiencing anger assesses certainty and uncertainty differently than those who experience fear and sadness in terms of appraising certainty (Smith & Ellsworth, 1985), causing systematic versus heuristic process patterns. Fear is related to appraisals of uncertainty and situational control (Lerner & Keltner, 2001). Anger, in comparison to fear and sadness, provides a meta-level sense of being confident when making judgments causing less deep processing. Thus, angry call takers may be less likely to help, be less accurate and spend shorter time in the calls due to more heuristic processing.

Small and Lerner (2008) experimentally tested carry-over effects of sadness and anger on decision making in two studies of a welfare policy case. Data showed incidental sadness to increase the amount of recommended help in comparison to the neutral condition. In addition, neutral individuals gave more assistance than angry individuals. In a follow-
up study, the results from study one were replicated, but the effects were eliminated when cognitive load was increased through a distracting task, suggesting depth of thought driving the effects. In turn, this implies, when experiencing fear and sadness, that call takers may be more likely to help, be more accurate and spend longer time in calls due to engagement in systematic processing.

In all, the task of prioritizing contributes to that call takers face both uncertainty and ambiguity. To solve this dilemma a decision support system need to be used. Despite seemingly rational procedures, call takers are likely to make use of both formal reason-based as well as informal non-reason-based processes. Before empirically illustrating under which conditions reason and non-reason based processes are used, I will address the case and method used to investigate the call takers.

METHOD

The Emergency Call Taking Context

The Swedish public emergency number, like many countries in the European Union, is 112 (the equivalent of 911 in the U.S. and 999 in Britain). There are 18 geographically distributed centers in Sweden. SOS Alarm averaged 873 employees in 2010, with an average age of 43 (62% women). The local emergency center in this study has four different shifts. Each of the shifts is 8 hours, enclosing half an hour lunch and short breaks. During dayshifts a voluntary debriefing session that lasts half an hour is offered the employees. The call takers work independently in an office landscape, but are also jointed and cooperate through a network-based platform. The platform enables the transfer of incidents from call taker to call taker as well as between call taker and different public au-
The platform also provides interview and decision support in terms of the Swedish emergency medicinal index (see Figure 1 for a process description). Communication with the caller is voice dependent while communication between call takers and authorities are both written and voice dependent within the platform. SOS Alarm advocates that call takers should have knowledge of their specific region and local markets in order to provide fast assistance. The recruitment process emphasizes interviews and testing of problem solving, simultaneous capacity and stress management with the aim of providing unique SOS Alarm competence. The call takers acquire continuous internal education, but accumulated experience derived from continuous call taking is also considered as important aspects of the work. The educational process takes about a year and costs approximately 450,000 SEK (65,000 $). Call takers are certified on a yearly basis and get approximately 45 hours of competence development using mainly a digital learning management system.

**Data Collection**

In this study, three different sources of data were used; 1) Interviews with call takers from two different centers, 2) observations of call taker work and 3) archival records in terms of internal education material, activity reports, annual reports and work descriptions (see Table 2). Interviews were conducted in Swedish in order for call takers to be confident and able to nuance inquiries. The transcriptions were translated into English after the analysis was made in order to preserve richness of call takers perceptions as much as possible. The reason for using different sources was threefold; first to get an overview of call-taker work—what they do and how it is done; second to cross-check collected data for alternative
interpretations and third to be able to compare management views with
employee views. The triangulation method also helped minimizing com-
plications that may rise when studying such a multilayer phenomena as
non-reason-based processes. For instance, non-reason-based experiences
are highly intrasubjective—which may be a reason for not talking about
them. Thus, using participant observation (distributed on different days
and shifts to capture changes in the workflow) as means for capturing

Table 2. **Overview of Sources of Data for Analysis**

<table>
<thead>
<tr>
<th>Sources:</th>
<th>Time and Pages</th>
<th>Derived from:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Observations</strong></td>
<td>≥ 60 hours of observations together with ≥ 60 pages of written field notes.</td>
<td>Direct observation of call takers, ≥ 20 unstructured interviews in the lunch room or between calls as well as co-listening to ≥500 calls.</td>
</tr>
<tr>
<td><strong>In-depth interviews</strong></td>
<td>≥ 18 hours of interviews and ≥ 370 pages of transcriptions.</td>
<td>12 in-depth interviews with call takers.</td>
</tr>
<tr>
<td><strong>Web resources</strong></td>
<td>≥ 300 pages of educational material. ≥100 pages of website material</td>
<td>Password-protected educational material consisting of text files, audio files and video segments used in education of call takers. Derived from the organizational website, searches in databases and newspapers.</td>
</tr>
<tr>
<td><strong>Documents</strong></td>
<td>≥ 50 pages</td>
<td>Policy documents derived from the organization.</td>
</tr>
<tr>
<td><strong>Reports</strong></td>
<td>≥400 pages</td>
<td>Annual reports from the year 2005 (91 p), 2006 (76 p), 2007 (76 p) and 2008 (68 p) and 2009 (84 p). Activity report from 2008 (32p) and 2009 (38p). Quality report from 2008 (68p).</td>
</tr>
</tbody>
</table>
actions worked as a trust builder for interview sessions, which in turn aimed to capture perceptions of work. Second, there may be subconscious aspects affecting behavior—also making it difficult to talk about them—in turn making complementary approaches useful. Third, it may be hard to give retrospective accounts on the role of non-reason-based phenomena. Despite apparent difficulties of accounting for emotions, a number of researchers promote reflections on emotional events as bringing value to studies of emotion in social interactions—perhaps even more so than directly recording emotional events (Fineman, 2000). The interviews focused on themes of how to conduct call-taker work, call-taker competence and use of information technology (IT).

The field notes from the observations centered on what the call takers did, how they did it, how they characterized what was going on, what assumptions they did and what I saw as a researcher (cf. Silverman, 2006, p. 88-93). Information from the observation setting was continuously fed into the interview setting and vice versa. For instance, reciprocity between interviews and observations occurred as the interview guide was revised due to observations of work and vice versa. As call-taker work is time critical, questions that required considerable elaboration were fed into the interview session rather than into the observation setting. Different types of call takers (i.e. under training, newly employed as well as more experienced call takers) as well as the quality manager, the doctor for the center and the site manager, were all addressed either by an in-depth interview, questions during observation or in mini-interviews conducted in relation to breaks.
**Data Analysis**

The analysis encompassed three different stages; data reduction, data display and conclusion/verification (Miles & Huberman, 1994, p.10) with consequent iterations between the different steps.

**Stage 1 of the analysis.** Transcriptions of the different data sources were arranged in a standardized manner, using computer software (Atlas TI), to note themes (cf. Strauss & Corbin, 1990). The themes regarding differences of how call takers conducted their work in relation to their mission of prioritizing and use of the DSS were noted in each respective data source.

By coding the participants’ reason-based and non-reason-based aspects in relation to prioritizing calls, their use of decision support systems as well as call takers own perceptions of work, all contributed to that identification of typical work actions could be established. The transcripts were complemented with coding of organizational documentation in order to establish differences between employee and organizational views.

**Stage 2 of the analysis.** All data sources were coded and analyzed separately initially, but later sources were collapsed and analyzed jointly. Themes occurring at multiple places in multiple sources were considered for further analysis. Examples of how themes developed are seen in Table 3. While overarching themes of reason-based and non-reason based processes were identified as themes, it is the functional mechanism of these matters that are depicted in Table 3.

Furthermore, the use of different sources enabled an analysis that would not have been possible if using a single method. For instance, call
Table 3. *An Example of Data Analysis*

<table>
<thead>
<tr>
<th>Example of quotes</th>
<th>Coding</th>
<th>Coding</th>
<th>Coding</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT 1 “If I am going to pick down a call? How I want it to develop?”</td>
<td>Focus on details</td>
<td>(De)constructive Processing</td>
<td>Confirming Matching</td>
</tr>
<tr>
<td>CT 3 “if you can fill in all the markers it is the easiest.”</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT 4 “Then you use index [...] you sit and close read the index in order to see what is the closest symptom.”</td>
<td>Comparing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CT 3 “[…] then there is someone who says something deviant and then it sticks because there was something that differed from the usual.”</td>
<td>Focus on deviation</td>
<td></td>
<td>Uncertain or Ambiguity Framing of Problem</td>
</tr>
<tr>
<td>CT 2 […]I do not have anything directly qualifying it as an alarm, but there is something in the conversation that says we must go now … and most often we are right[…]</td>
<td>Pattern-recognised Symptom</td>
<td>Constructive Processing</td>
<td>Information Balance</td>
</tr>
<tr>
<td>“Internal Education Material” Often we have to use both facts and intuition. Intuition = A variety of evidence one cannot express, but know that you have + How the other sounds + Experience + Feeling.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

takers who were observed to yell at callers could have been labeled as giving inadequate service if only observation were used. However, when
comparing across sources the observation turned out to have a different meaning. Yelling at callers was a strategy that was used to increase attention in drowsy callers in order to obtain adequate information from them.

**Stage 3 of the analysis.** Aggregated themes were also compared with literature in the field of organizational theory and decision making. Thus, the empirical observations were grounded empirically, but also grounded theoretically (Goldkühl & Cronholm, 2010). Since research is considered to be cumulative, incorporation of constructs throughout the research process decreases the likeliness of re-inventing the wheel once more (Goldkühl & Cronholm, 2010). Such empirical and theoretical grounding was found when observations of organizationally prescribed ways of prioritizing and factual situation-based prioritizing showed differences. In turn, the mismatch in observations were supported by literature on how individuals’ process information in both rational (sequential) and intuitive and affective (holistic) ways. The following section focuses on how this process is carried out.

**FINDINGS**

The following section emphasizes how call takers derive priorities by concerting differences between prescribed and factual emergency decision making by use of reason-based and non-reason based procedures in order to derive priorities.

**Prescribed Reason-Based Prioritizing of Emergency Calls**

From an organizational perspective emergency call taking is highlighted as a rational and sequential activity, where certain decisions are made at certain stages. “Staff identify, sort and prioritize incoming emergency
alarms, such as medical, rescue or police errands. A call taker provides the necessary emergency medical advice while waiting for an ambulance by means of a decision support systems” (“SOS Alarm Archival Material”, 2009), but also provide assistance through questions that are asked in order to assess symptoms. No matter the perceived time for calls, call takers must distribute their time according to a sequence of; mission (background and preconditions, purpose), manual job (planning of details, gathering of information, summing up) and result (analysis and interpretation of results, conclusions and standpoints)—and in the worst case a few seconds need to be spent on conducting each of the different steps (“SOS Alarm Archival Material”, 2009).

Needless to say, it is common that the procedure is less linear than what is depicted in Figure 1. Instead, calls may enclose uncertainties; such as callers not knowing where they are and difficulties of combining symptoms into a diagnosis, but also in terms of contradicting verbal and non-verbal content. The complexity of assessing callers over the phone is to some extent acknowledged in both manuals and educational material in which it is made clear that the channel for communication is modal specific:

Medical staff is used to assess patients’ general conditions by breathing, color of the skin, facial expressions, and patterns of movement, verbal expressions, mental functions, posture, nutritional status, emaciation, dehydration or body temperature. Peers are not skilled to make such an assessment or be able to communicate such instances with accuracy over the phone [...] Someone who is calling the emergency center is uncertain, perhaps dejected or hysterical and sometimes angry. [...] There is a value for the caller to calm themselves down. They will be able to handle the situation better.
Not only does the channel provide difficulties for communication, but organizational writings advocate that callers express uncertainty rather than ambiguity, and that the callers’ communicates better if they are calm. There is also consensus that emotion needs to be managed in order not to influence decisions. However, these issues were typically not addressed in education or manuals in a more elaborated manner than what is expressed below.

[...] As a rule, it is better to reach a decision based on what you know rather than postponing the decision. [...] Often we have to use both facts and intuition. Intuition = A variety of evidence one cannot express, but know that you have + How the other sounds + Experience + Feeling. This means that intuition is often based on more knowledge than the facts one can enumerate. If one is panicking, intuition may be dangerous because you have not the feeling under control.

Call Takers’ Non-Reason-Based Decision Making
Although call takers claim the decision support system (DSS) to be a help it is by no means a map that matches reality perfectly. Call takers report difficulties of using the sequential route for the decision making and that the DSS provides for lock-in effects, making it difficult to reconsider decisions.

CT 6 (Male, Experienced): The old decision support system with the flip charts was better because [...] there were arrows next to what kind of replies you got. But the decision support system in the system today is based on that you have decided before the event if it is a rescue case or a healthcare case [...] So, basically you should have categorized the matter before you get the decision you need ... so it is located in the wrong order in some way.
It seems as if call takers need to categorize the call as a healthcare, rescue/fire or police-related matter before they receive instructions on how to prioritize. Such a procedure may complicate the prioritization since calls may migrate from being a police concern into being a healthcare concern or vice versa. Another call taker addresses similar difficulties, but also implies that it may cause call takers to make use of heuristics.

CT 2 (Male, Very Experienced): It is too much information [...] people get bored with us on the other end of the handset [...] there are important factors such as consciousness, how they look in their faces and if pain radiates out ... that kind of stuff we concentrate on ... breathing ... and so on ... then there are a lot of issues on the side [...] it's probably a combination of that it is bad with this the index ... I felt much safer to have it in physical form ... the red one as you may have seen [...] there are six-seven-eight questions that are important ...

Call takers are trained in using protocol procedures when making decisions, but it is not only the protocol that matters. They are also concerned with the maintaining of a functional dialogue with callers.

CT 8: Ask questions, ask questions ... you get an answer ... sending ... but where is humanity, the empathy skills. Thus, we lose many pieces [short pause] we have so many branches we should be good at and not lose any ... we should not slavishly use index because somewhere it's someone in the background with a need for a functioning dialogue.

The call taker (CT 2) indicates reduction of symptoms into actionable units, but also difficulties in following formal protocols causing call takers to deviate from protocols by making a selection of questions to ask.
The DSS provides a conceptual and sequential aid when categorizing symptoms. The call-taker action is somewhat different in terms of balancing formal and informal aspects. Such a principle surfaces when call-takers are asked about how they want calls to develop. They often refer to that they “pick down” (CT 1) calls. In other words it seems as if call-takers deconstruct calls, by breaking down content of the calls into bits of data. In turn, the fragments are matched towards the concepts of the DSS in order to derive the priority. The matching procedure as well as weighing of alternatives surface in the quotes below.

CT 4 (Male, Experienced): Do they really need to go by ambulance [...] or can they wait an hour or is it an emergency? It is really difficult because I have no medical training other than the one I have got from here [...] I think that is really hard many times. Then you use index [...] you sit and close read the index in order to see what is the closest symptom.

CT 3 (Male, Very Experienced): There are simple tasks [...] straight forward calls where the patient is kept within a specific template or framework and answers correctly and adequately on questions as well as meets the symptoms we somehow are looking for [...] and advice is very simple ... if you can fill in all the markers it is the easiest.

The call-takers imply deconstruction of calls by moving from wholes into parts in order to match the parts against the overall concepts of the DSS. Asking the sample questions from the system helps call-takers to identify fragments to be matched against the DSS—continuously accumulating knowledge which in turn reduces uncertainty. Besides, by asking questions call-takers were observed to reduce uncertainty by consulting colleagues, using complimentary technology (such as websites,
searching for symptoms associated with drug use or to find addresses when their internal system fails) and through post-rationalization (one call taker (CT 1) explains it as “one is clicking in and then you can think”). Occasionally call takers retype symptoms to match the DSS and sometimes they raise the priority when feeling uncertain. Finally, and more importantly, call takers also label information as uncertain information rather than ambiguous. A call taker (CT 4) describes it as “well you put it as either that one or that one or you ‘safe’. We have a category called uncertain information”.

While these strategies reduce uncertainty, the deconstruction of calls also involves being attentive to deviations from protocols. Call takers consciously attend to deviations from protocols in their own calls as well as by eavesdropping calls of colleagues. They refer to this skill as a “split-hearing” skill, a skill that resembles emergency doctors’ and nurses’ capability of making clinical assessments. One call taker (CT 3) explains that “one hears a little bit here and there and then there is someone who says something deviant and then it sticks because there was something that differed from the usual”.

These deviations serve as information—a caller could at any time be re-routed to another call taker and if deploying attention by listening to deviations the call taker has a possibility to prepare, in an overall time-pressured situation. Furthermore, the importance of being attentive to deviations is attenuated and highlighted by call takers writing down events of deviations in a book. A printout of a log was labeled “a miracle of medicine”. In the log one can follow a caller in labor. However, in highlighted and underlined text, the patient had a male name.
The attention to deviations regards resolving ambiguity rather than reducing uncertainty. Since deviations do not have an equivalent in the DSS, it does not help asking questions in order to improve judgment accuracy. A call taker referred to ambiguity in terms of a matter that does not have equivalence in the DSS:

CT 8 (Female, Very Experienced): Some time ago I had one of those windsurfers with one of those [pause and thinks] kites. It had flown up on the golf course and landed in a golf cart [giggles]. Well how do we classify? Is it an accident with vehicles or [laughs] what? […] How am I classifying this? He went so fast that he flew up on land and landed in a golf cart […] and we laughed […] It was such a thing. It was an accident, but it is still not a road accident on the road because it was on a golf course, but yeah how do we label it?

In calls where there are expressions of ambiguity rather than uncertainty, call takers tend to rely on non-reason-based processes.

Call taker 2 (Male, Very Experienced): There may be something in the voice or something they might find difficult to express. Even if I ask 50 questions, they find it hard to express or they are blocked so they cannot get it through, but there may be something in the conversation that makes me feel that this should go here and now. I do not have anything directly qualifying it as an alarm, but there is something in the conversation that says we must go now … and most often we are right … and if it is not right, yes, I can live with that. It is better than not following my intuition and I miss something...

Call takers address both intuitive and emotional aspects as they deploy attention to what is not said rather than what is said.
CT 4 (Male, Very Experienced): If it is a mobile call and you hear sounds of traffic in the background, then you can prepare yourself for a traffic accident. So, the background sound determines to a high degree how severe you think it is.

Another call taker (CT 5) overheard a caller sounding “bubbly” when speaking. The call taker quickly accessed the system checking the log in order to confirm that it was categorized as pulmonary edema. “This call could end up on my table and I will have to prioritize it”, the call taker said. Yet another call taker described an ambiguous incident where listening to sounds in the background improved the process of reaching a decision. The call taker received a call with a woman screaming hysterically without any possibility of finding out what had happened.

CT 2 (Male, Very Experienced): It took me a while to realize that it was a car that was sinking, one can hear how it bubbles around her [...] [The call taker changes voice illustrating hysterical] I am sitting in the car and it is sinking, ooh my mother [call taker explains] as she begins to talk about the mom's car [...] what is it about your mom's car? [Illustrates the woman again] it is sinking [...] [the call taker continues explaining] fortunately the electric windows worked so she was hanging around of one those posts with her cell phone in her hand and shouting.

The woman had driven over the edge at the docks and the call taker realized she was in a sinking car when he heard the water coming into the car. Furthermore, emotional expressions of callers have signal value in terms of triggering the call taker for emergencies. Call takers were observed to discriminate between different emotions such as fear, sadness,
and anger, but also mentioned that some emotions were easier to handle than others.

CT 4 (Male, Experienced): To respond we listen, to the caller, if it is serious. Fear, confusion, pitches how it is sounding in the background. If there is a fucking noise or extremely quiet it may be… oh well hold on [illustrates thinking]. When it is extremely quiet, it can be very difficult to get accurate data.

Fear was perceived as the most commonly expressed emotion followed by sadness and anger. However, the call takers report anger to be the most difficult emotion to deal with since it has a tendency to carry over to other domains.

CT 5 (Female/Very Experienced): Aggressiveness. It’s rarely that worry infects us. You must be professional. So, much we have in our training and our knowledge. We are not caught up in worry but aggression is difficult.

In order to manage angry callers, call takers were observed to re-route them to a larger extent than fearsome or sad callers. The strategy was used both as a way not catching on emotions, but also since call takers perceived they could not obtain adequate information from the caller when they were angry.

DISCUSSION

To conclude the findings and answer the research question, call takers use reason-based and non-reason-based skills in a complimentary manner. Call takers report the DSS as a valuable help in making decisions. At the same time the system complicates decisions since it lacks embodiment
(cf. the call taker referring to that it feels safer with a physical rather than an electronic system, and also that the sequential nature (cf. the call taker referring to difficulties of categorizing calls) contributes to a mechanic dialogue and use of shortcuts. Call takers (de)construct calls by “picking down” bits of data matching them to categories of the DSS. By asking questions about phone number, addresses and symptoms, call takers report that they are able “to fill in the markers” and thus accumulate information about the caller. When the call takers feel insecure they ask additional questions, consult colleagues, use complimentary technology such as searching the web, post-rationalize (cf. the call taker who claims that he ticks in and think afterwards) in order to bridge knowledge gaps. Call takers also raise priorities and label calls by stating information as being uncertain. However, the procedure of (de)construction—deploying attention to details to match to the DSS—also reveals some details as being more difficult to match than others. Since the deviations do not have an equivalent in the DSS, it does not help to obtain additional information in order to improve judgment accuracy. Therefore, call takers not only reduce uncertainty but also resolve ambiguity. In fact, it seems as if call takers actively seek this kind of information in order to make “better” decisions. When assessing ambiguity they use non-reason based skills such as listening to what is not said rather than what is said, noise in the background and non-verbal aspects (cf. the cases where call takers overheard bubbly speech of a caller with pulmonary edema, water rushing into a car that was sinking or pitches in the voice of the caller). They even manifest these deviances, using an informal learning route, by saving and posting logs of calls in a book placed on a table in the emergency room.
Call takers also listen for emotional expressions of callers, discriminating between angry, sad and fearsome callers in order to find routes to navigate the calls or re-route the callers. The emotional status of the caller sometimes determines how the call will be managed. For instance, angry callers are re-routed to a larger extent than callers expressing fear and sadness. The call takers also report some emotions to be easier to manage than others. Fear seems to be easier to manage than anger which is the emotion that affects the call takers the most in their work, since it is perceived to carry over, affecting other domains of work negatively. Furthermore, there is a tension view between an action and an analytic orientation in the organization. The urgency of work is emphasized since inertia ought to be avoided. At the same time as there is an analytical orientation of adhering to logical sequences (cf. how call takers should distribute time and make use of all available information). In addition, call takers described that the DSS contributes to that calls need to be typed before a decision can be reached—thus the action sequence of the DSS does not necessarily follow the sequence of the call-taker prioritization. The previous DSS (the physical one that was mentioned) used questions, building a logical sequence which finally derived a priority. The tension concerns an increase in use of intuitive and emotional components since few questions are asked in the prevailing system before a priority is made—call takers first categorize the call and then assign priority before they consult the medicinal index for additional questions (cf. step 7 in Figure 1). In other words, since the call has to be categorized in order to be able to open up questions, it seems as if non-reason-based processes frame how the call taker categorizes the call rather than the questions doing it.
In all, there seems to be a prevailing uncertainty prerogative in the organization. Call takers try to identify pre-known variables and their values in already existing models by matching symptoms (see Scenario 1 and 2 in Table 4). However, uncertainty reduction only partially describes their work. The call takers often make use of non-verbal information in order to narrow alternatives into actionable units. For instance, call takers make use of background sounds, emotional expressions of callers, and their own experienced emotions in order to determine the value of variables and establish functional relationships among variables (see Scenario 3 and 4 in Table 4). Thus, call takers use parallel processes of matching and constructing to derive priority. In turn, the framing of emergency calls has implications for research as well as practice.

Table 4. Problem Framing Matrix in Emergency Call Taking

<table>
<thead>
<tr>
<th>Uncertainty Low</th>
<th>Uncertainty High</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambiguity Low</td>
<td>Scenario 1</td>
</tr>
<tr>
<td></td>
<td>Matching</td>
</tr>
<tr>
<td>Ambiguity High</td>
<td>Scenario 3</td>
</tr>
<tr>
<td></td>
<td>Constructing</td>
</tr>
</tbody>
</table>

- Constructive and associative route.
- Recognition and deviation focus.
- Informal by nature since it relies on intuitive and emotional competence
- Deconstructive and sequential route.
- Matching and confirming focus.
- Formal by nature since it relies on the DSS.

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Implications for Research

First, being exposed to and affected by specific emotions (such as anger, fear or sadness) may affect cognitions in rather differentiated ways. On an interpersonal note, expressions of angry callers in a cooperative setting may prime reluctance to cooperation whereas expressions of sadness and distress in the same setting may prime willingness to cooperation (Van Kleef, DeDreu & Manstead, 2010).

Similarly, on an intrapersonal note, experienced emotions have been seen to affect attribution patterns as well as the processing of information. Anger is associated with a person-centered attribution pattern whereas sadness is associated with a situational one. Anger reveals a heuristic process pattern whereas sadness reveals a bottom-up and detailed focus pattern for processing information (Lerner & Tiedens, 2006). Thus, the exposure to angry or sad communication, or the experience of anger or sadness when communicating, in uncertain and ambiguous situations, creates schemas in qualitative different ways from those that occur when being in a happy situation. For instance, influence of anger may cause premature conclusions due to a heuristic process pattern and an escalated person-centered communication due to the attribution pattern (the call takers way of re-routing angry calls may be an attempt to avoid such communication). On the other side, sadness may cause careful and thorough evaluation of information (which may be both advantageous and disadvantageous in a high-velocity setting), but also a focus on the situation rather than on the individual according to its corresponding attribution pattern. Therefore, focusing on specific emotions, rather than general
moods, may advance decision making and help explain how call takers make their priorities.

Second, this study contributes to the literature of decision making in a conceptual manner. The concepts of rationality, intuition and emotion themselves may need to be viewed in relation rather than separation. For instance, call takers need to be analytical as well as intuitively and emotionally competent. Therefore, as Coget and Keller (2010) advocated, a more balanced view of emotions, intuitions and rationality is requested. Leaning towards a rational principle, trying to obtain information by asking questions sequentially and weighing alternatives may lead to reduction of uncertainty, but also to a mechanical dialogue which affects the perceived service. Leaning towards intuitive aspects may cause uninformed decisions due to preconceived ideas whereas the reliance and acting on emotions may lead to uninhibited action. However, the uses of intuitive and emotional aspects are also important considering the fact that they help resolve matters of ambiguity.

The model presented (see Table 4) also converges with dualistic assumptions of information processing. Scenario 1 and 2 converge with assumptions of deliberate processing—a reason-based system which is sequential, slow, effortful, rule-governed, flexible and neutral. Scenario 3 and 4 are associated with a non-reason-based system—fast, parallel, automatic, effortless, associative, slow-learning and emotional (cf. Sloman, 1996; Kahneman, 2003). Thus, the reliance on emotion (both experienced and perceived) will have a stronger influence in situations characterized by ambiguity since this process is a constructive process with less mental models available to guide thought. In turn, the framing of the problem
also reveals aspects about the learning situation and the development of expertise within the setting. For instance, Kahneman and Klein (2009) agreed on that a fundamental factor for development of intuitive expertise is the validity of the environment—as in which known functional relationships there exist among variables. In other words, the more ambiguous the framing of the problem, the less known are functional relationships among variables. Thus, while it may be quite simple to educate call takers in reducing uncertainties there are difficulties establishing true individual expertise since there are no standards for dealing with different emotional expressions.

Third, attending to studies of specific emotions in emergency and other call-center settings would nuance decision making. For instance, it is interesting to note that call takers perceive themselves to be less affected by sadness than by anger, while they from a quality perspective would benefit from being affected by sadness rather than anger. In particular since sadness primes a bottom-up approach (cf. Lerner & Keltner, 2000, 2001; Lerner & Tiedens, 2006) which also coincides with the call-taker approach of making decisions. In the same vein, it is interesting to note that anger is dealt with in a different way than other emotions. Anger is argued to more easily carry over, which is the reason why call takers to a larger extent re-route angry callers. Deploying attention to these matters could be helpful in order to further advance impact on negative emotions on decision making.

**Implications for Practice**

The standardized procedure that the DSS offers may have affected the use of non-reason-based processes in almost paradoxical way. Call takers
report difficulties of needing to categorize calls before they assess the caller. The previous flipchart successively and sequentially reduced uncertainty by accumulation of information. When information was saturated the call takers got suggestions on which priorities to make. With the current DSS they seem to base decisions on less information—since they have to categorize errands earlier than before—making intuitive and emotional aspects more likely to frame initial judgments. Yet the process is typically described as a rational process from an organizational point of view.

As described earlier, there are tradeoffs between the following of the sequential route for decision making (possibly causing a mechanical dialogue) and intuitive and emotional routes (possibly causing uninformed decisions and uninhibited actions). Being skilled in using non-reason-based aspects may increase efficiency in this high-velocity environment since call takers will reach decisions faster than when they rely on purely reason-based skills. The latter is important since being faster on an individual level may reduce speed in perhaps seconds while accumulated micro-decisions on an individual level may turn into minutes on an organizational level, due to the millions of calls call takers answer annually. However, there are considerable problems of using non-reason-based approaches since it takes time to acquire these skills. SOS Alarm faces a relatively high turnover rate (approximately 15%). In turn, such turnover may cause loss of staff with sufficient knowledge of non-reason-based skills.

Another important aspect is that individuals are assumed to act upon intuitions and emotions while they in fact may pass unnoticed. (cf.
Dane, 2011). One way to approach this problem is to proceed in the vein of mindfulness. Call takers would be able to better attend to emotions and intuitions that would be of value for the decision-making process, if they were aware of them. According to emotional researchers, it is important to consider that emotions differ in terms of content and process (Lerner & Keltner, 2000, 2001; Lerner & Tiedens, 2006) as well as having a signal value (Frijda, 2004). For instance, initial experiences of fear and disgust may cause avoidance motivation. Sadness, on the other side, accompanies deep and systematic processing (an example of this is the preference to disconnect, dispatch or even terminate angry callers rather than sad or scared callers). On the contrary, initial experiences of anger may cause approach motivation (which may spur further conflict) and shallow and heuristic processing (Lerner & Tiedens, 2006). However, though not addressed explicitly in this study, the expressing of positive emotions such as empathy may aid call takers in social dilemmas by relaxing callers. However, how it is done virtually remains unclear so far.

Finally, in the training of call takers in meta-skills contemporary technology is an enabler. The organization already has a Learning Management System that is used for competence development. However, the system could be further developed by merging movie and sound clips of call takers handling calls with logs, routines and procedures in a multi-modal manner. It would be possible to manifest examples of intuition and emotion-based decision making by use of multimedia, unveiling a procedure where actions deviate from intended protocols, yet contribute to successful outcomes. Examples of incidents could be gathered to show how call takers have made such decisions and these could then be staged ac-
Accordingly. Such procedures would be helpful in order to further learn in an increasingly communicative and globalized world where rationality, intuition and emotion intertwine.

REFERENCES


10. Conclusion: Returning to the Research Questions

To recapture, the research questions of this dissertation were:

**Research Question 1a:** Which emotions do call takers perceive callers to express in healthcare-related emergency calls?

**Research Question 1b:** Which relations are there among types of expressions, their intensity and perceived need of help?

**Research Question 2:** How do emergency call takers manage callers’ and their own emotions in the triage process?

By turning to Study 1 and 2 I will answer the first research question. Study 1 reveals that call takers perceive that callers more often express negative emotions such as fear, sadness and anger than happiness, anxiousness, disgust and surprise. Clear expressions coincided with perceptions of increasing intensity of expression, especially for fear and sadness (see Study 1, Figure 2, left panel). In addition, expressions of fear coincided with a high perceived need of help (see Study 1, Figure 2, right panel). Clear expressions of sadness coincided with moderate to high levels of help need whereas clear expressions of anger coincided with low levels of help need. Furthermore, the clarity of fear expressions shows a small, but rising trend across help need levels. Sadness shows considerable fluctuation of emotional expression in different levels of help need. Anger points in the opposite direction; clear expressions are perceived to
be in less need of help. The trend is falling towards intermediate levels of help need, but clarity of expression also rises weakly at higher levels of help need. Thus, there are relationships between expressions of different emotions and different levels of help need. However, the expressions of certain emotions cannot be claimed to cause the perceived need of help. In fact, since call takers did not account for verbal information in calls it may be that verbal symptoms are given primacy and that emotional expression is an attachment to the latter. However, partial correlations indicated that expressions of intensity moderate relationships among variables. In other words, it is not only the type of emotion (fear and sadness) that is important in relation to help need, but also with which intensity it is being expressed.

By turning to Study 2 it becomes clear that when controlling for verbal expressions (by applying a Hann-shaped filter to the stimulus pattern) the results from Study 1 and 2 converge. The raters managed to discriminate between fear and neutral expressions, based on intensity of expression, even though they were unaware that they were assessing different emotional expressions. Perceived intensity of expressions was also strongly correlated with perceived help need and results were indicative to that callers expressing fear were perceived to be in need of more help. It is also worth noting that the neutral expressions were obtained from a selection of calls which were judged to express overall fear. Thus, there is a possibility that the indicative results of perceiving fear expressions as expressing more help in fact would have been stronger if selection of neutral expression would have been made from a pool of neutral calls. Furthermore, even though the detected effect was small, filtering out the se-
mantic content while leaving the emotional voice cues intact, seemed to have been a successful approach since raters attended to acoustically measured intensity (mean) as was shown by partial correlations.

In summation, and as a response to the first research question, Study 1 and 2 show that the emotional landscape of emergency call taking is nuanced and differentiated, but shows primacy for negative emotions such as fear, sadness and anger. Calls containing different emotional expressions are perceived to differ in terms of perceived help needed. The results point to that intensity of expression is an important determinant when deriving priority and that it is a proxy for urgent situations. By focusing on several emotional expressions in Study 1 and 2 the findings point in the opposite direction as compared with previous findings within the emergency call-taking domain. For instance, Eisenberg et al., (1986) showed that cardiac-arrest calls only expressed moderate to low levels of hysterical expressions (1.4 in non-arrest calls as opposed to 2.1 in cardiac-arrest calls on a scale of 1-5 where 1 equaled normal conversation speech and 5 so distraught that information could be obtained only with great difficulty. Similarly, using the same scale, Clawson and Sinclair (2001) stated hysterical callers to be less prevalent than what is commonly anticipated by the public. In fact, in calls with indications of a cardiac-arrest, callers mean ratings ranged 1.22 to 1.44. While these studies may be accurate in terms of hysterical callers, this dissertation points to that a range of emotional expressions contribute to decisions made in the setting.

I now return to the second research question. Emotional expressions constitute important foundations of call taker work, but the expressions or events may not necessarily reciprocate, inducing an emotion in
the call taker. Therefore, Study 3 focused on specific coping strategies of call takers as well as discrepancies between organizational prescriptions and how call takers manage their work situation. As an extension, Study 4 focused on discrepancies between prescribed ways of how to make decisions and “actual” decision routes.

Study 3 revealed that the organization shows primacy for suppression of emotion while call takers themselves have developed a range of other strategies. The strategies are dependent on whether the call taker has an intrasubjective or intersubjective focus of communication. Examples of strategies when call takers have an interpersonal focus is that they are selective in what kind of calls they answer, they close down calls quickly in order not to catch emotional baggage and they re-route angry callers if they feel they are clinching with caller. They also pay attention to aspects of the call that they believe help them to cope better with the situation and they reappraise the emotional expression of callers into a more desirable expression. When call takers have an intrapersonal focus, they auralize, by mentally trying to create a semi-permeable filter between the caller and themselves, allowing only certain information to seep through the filter. They also tame their own emotional expressions by suppressing them. Only the latter is a procedure that is clearly consistent with organizational prescriptions. Thus, it seems as if call takers have developed individual routines to cope with work, complementing or possibly at variance with the ones that are prescribed by the organization. Since emotional management strategies are rather bluntly expressed by the organization call takers complement the strategies with a set of their own.
Study 4 revealed an organizationally prescribed decision route which is rooted in medical decision making. This reason-based route is aligned with the prevailing decision support system and functions mainly by reducing uncertainty. However, call takers are also using additional strategies to derive a decision. Since the decision support system is not a map that completely overlaps with reality, call takers make use of non reason-based strategies in terms of listening to what is not said (such a bubbly speech or background noise), emotional tone of voice as well as react on gut feelings. In other words, they actively search for “deviations”, emotions as social information in order to incorporate this information into prevailing models of decision making. However, while this kind of cues may be crucial in order to resolve ambiguity in difficult calls, there are no current standards that explicate values and functional relationships among such variables. Furthermore, call takers are lacking structured feedback regarding accuracy of priorities, which raises questions of whether it is possible to truly develop individual expertise. Furthermore, such working conditions prime parallel learning routes and further strengthen dissociation between formal and informal learning in the organization. Thus, in order to answer the second research question, Study 3 and 4 reveal differences between prescribed formal and informal strategies of how to manage emotions in the setting, but also how formal and informal strategies aid in reaching decisions. The range of management strategies that call takers use does not represent the organizationally provided recommendations on how to manage emotions. For instance, anger was perceived as the most difficult and crucial emotion to manage since it was argued to “spill over” to other calls or other work tasks. There
were several ways, besides suppressing the emotion, which aided call takers in managing anger.

It is important to emphasize that while descriptions of the working procedure may give the impression of being dualistic and excluding, they are rather procedures that are complementary. In other words, call takers make use of both the uncertainty-reducing and the ambiguity-resolving route within the same call, but one route is typically more weighted than the other. Thus, it is the balance and relationship between the procedures that is interesting rather than if one procedure outweighs the other.

Furthermore, the overlap between management strategies and decision routes are important to emphasize since emotions have come to influence decisions in a variety of ways and across domains (cf. Loewenstein & Lerner, 2003; Pham, 2007). For instance, the current organizational routine of trying to suppress one’s own emotions contradicts the prescription to make decisions analytically and rationally. Suppression (or surface acting) of emotion is associated with surveillance of one’s emotional state which also affects which cognitive resources that are made available to process and analyze calls. Thus, suppression could result in insufficient resources which would lead to insufficient decisions.
11. Implications and Contributions

In this chapter I will address theoretical implications since findings from this dissertation suggest amendments to current theories within communication, decision making and routine research. As a consequence of theories and methods in this dissertation I will account for methodical implications. I will also address practical implications for call takers and the organization, by using the methodical and theoretical implications as a point of departure. Finally, I will discuss extensions of the findings by moving beyond the call-taker domain.

11.1 Theoretical Implications

Given the conceptual framework, including multiple theories, there are several theoretical implications that emerge from this dissertation. The most important implications regard how perception of emotional episodes may help advance theory on mediated communication, decision making and routine research. I will start this section, by once more using Figure 4 from Chapter 3 for a discussion on matters that refer to emotions advancing communication theories. The part (see Figure 8) of the original figure that is discussed here refers to the communication process in terms of which signals that are sent and how these are dealt with in terms of communication theories.

11.1.1 Emotions in Mediated Communication

As was earlier mentioned, the plethora of previous communication theories can roughly be divided into media trait theories (cf. Daft & Lengel, 1984; Daft, Lengel & Trevino, 1987; Kock, 2004) and social influence theories (cf. Fulk, Schmitz & Steinfeld, 1993; Lee, 1994; Yoo & Alavi,
The different vantage points of these theories can be narrowed down to matters of whether cues are central to communication or not. Whereas media trait theories hold cues to be central for communication, social influence theories advocate the social construction of cues as central to communication.

These matters become increasingly important since call takers’ decisions depend on how they deal with uncertainty and ambiguity. Call takers typically do not have the possibility to calibrate or learn about the specific communication due to the emergency of the situation and lack of repeated interaction with the same caller. Thus, call taking involves reducing both uncertainty and resolving ambiguity, not either or, in a time-pressed situation. When consulting Study 4, it becomes obvious that these two processes may be quite different, yet complementing. Call takers refer to that they listen to specific emotions or the pitch of the caller when they think the situation is ambiguous, giving precedence to certain information. Conversely, they state that they do not give away emotions because they think it will have a negative impact on communication with the caller (cf. Study 3 and 4). Thus, it seems as if emotions have an in-
formative value that helps resolve ambiguity, but also, in a secondary manner, reduce uncertainty since it points to what questions call takers should focus on.

Numerous publications state that humans are able to discriminate vocal emotion at better than chance levels (whereas which cues to attend to infer emotions is still open for debate, cf. Spackman, Otto & Brown, 2008; Juslin & Laukka, 2001, 2003; Scherer, 1986, 2003). Anger and sadness are generally better communicated than fear and happiness, but also better communicated than tenderness (cf. Juslin and Laukka, 2003; Scherer 2003). Furthermore, theories about emotional/mood contagion suggest that individuals actively seek out and adopt their affective stance to a senders´ expression (cf. Salancik & Pfeffer, 1978; Gump & Kulik, 1997; Bartel & Saavedra, 2000). Not only is it possible to discriminate between different emotions, but emotions also carries value-affected information—signals which could be used as a proxies in judgments and decision making (Van Kleef, De Dreu & Manstead, 2010). For instance, in this dissertation it was shown that fear expressions was clearly expressed when assessing emergencies (Study 1, 2 and 4) while anger expressions were clear in non-emergency situations (cf. Study 1).

Media theory has also dealt with emotions, but has done so with passing reference. It becomes clear that media theories may benefit from adopting a more nuanced view of the role of emotion. The exposure to angry or sad communication, or the experience of anger or sadness when communicating, in uncertain and ambiguous situations, creates schemas for compensatory encoding in qualitatively different ways from those that occur when being in a happy situation. For instance, influence of anger
may cause premature conclusions due to a heuristic process pattern and an escalated person-centered communication due to the attribution pattern (the call takers way of re-routing angry calls in this dissertation may be a way of coping with this). On the other hand, sadness may cause careful and thorough evaluation of information (which may be both advantageous and disadvantageous in a time-pressed setting), but also a focus on the situation rather than on the individual. Therefore, an expansion of media choice theories, including a nuanced view of emotion, may advance understanding of under which conditions senders compose different types of messages. It would also give insight into how individuals are likely to be perceptive to a certain kind of communication as well as when it is time to change or synchronize with another media. For instance, a sad recipient (showing a more careful processing) would possibly benefit from receiving a letter or email to which they can return to, re-read and process information thoroughly in order to deal with the repair motives that arise when being sad. Angry communicators would possibly be likely to change medium to a larger extent, particularly since process patterns are heuristic and action tendencies show approach motivation, causing individuals to make premature conclusions and rush into action.

11.1.2 Emotional Expressions, Intensity and Priorities

This section mainly refers to theories within the sphere of individual capabilities (the solid circle) in Figure 9. The red dotted line refers to that individuals act within a set of contextual conditions such as when using routines. Implications of these conditions will be addressed in the next section.
It is important to emphasize that the findings do not support that unconscious emotional contagion occurs. In other words, it is not possible to claim that call takers experience full-blown emotions due to the expression of the caller. Nevertheless, the results of the studies reveal that call takers try to identify emotions in relation to calls, but also to some extent experience emotions, (as they report that they may catch on expressions of for instance angry callers, cf. Study 3). The findings may be explained when turning to literature on affective events as causes for emotions (Weiss & Cropanzano, 1996), experience of emotions (Lerner & Keltner, 2001; Lerner & Tiedens, 2006; Small & Lerner, 2008) and emotions as social information (Van Kleef, Dedreu & Manstead, 2010).

Firstly, Weiss and Cropanzano (1996) stated that evaluations of events may be seen as proximal causes of emotions. Thus, evaluating a call as fearsome may trigger processes in the call taker that are aligned with those of experiencing fear. Secondly, previous studies have stated that individuals experiencing fear make pessimistic risk estimates and
risk-averse choices while angry individuals make optimistic risk estimates and risk-seeking choices (Lerner & Keltner, 2001). Sad individuals have been claimed to be biased towards risk-seeking and high-reward alternatives (Raghunathan & Pham, 1999), but also to show less certainty in evaluations, making them seek additional information (Tiedens & Linton, 2001). Similarly, Small & Lerner (2008) showed that anger and sadness influenced decisions in a welfare policy case in differentiated ways. Sad participants devoted more help to help seekers than angry participants did. In other words, the different emotions are connected to different process patterns. For instance, anger is associated with a sense of having enough information to base judgments on, causing a heuristic process pattern (Lerner & Tiedens, 2006), whereas fear and sadness are associated with uncertainty which brings a process of more carefully examining information before making decisions. Finally, call takers purposely identify emotional expressions from the caller as a cue to help resolve ambiguities, much like what is described in social comparison theories (cf. Bartel & Saavedra, 2000; Van Kleef, De Dreu & Manstead, 2010).

Returning to the results of Study 1, fear was overall the clearest expression followed by sadness and anger (see Figure 1 in Study 1). Fear was also the overall most intensely expressed emotion. However, clarity of expressions differed among emotions across help need levels, but fear was most clear in relation to high levels of help need (a in Figure 10) whereas anger peaked at low levels of help need (b). Sadness was most clear at moderate to high levels of help need (c). Thus, when an expression is clear, it is likely that this expression is given a higher weight in communication and is used as a cue to solve ambiguities.
A response when being faced with a potentially threatening situation (fearful or distressed caller) in an overall cooperative setting would be to increase cooperativeness, perhaps by reducing the risk as much as possible. Such a strategy would be accomplished by upping the help priority. The contrary is seen in cases where callers are expressing anger. Individuals that are exposed to angering expressions in cooperative settings are less likely to cooperate (Van Kleef, De Dreu & Manstead, 2010). Furthermore, when one is feeling anger there is a tendency to seek risk (or not evaluate all premises properly due to heuristic process patterns). It is
also interesting to note that call takers experience anger to be difficult to manage (see Study 3 and Study 4) when it is present as well reappraise anger expressions into fear expressions (see Study 3). Thus, this relationship may be mirrored in how expressions of fear and anger almost intersect at low levels of help need (see b in Figure 10), but also that anger tends to be a prominent cue when it is present. The moderate to high help-need that sadness is associated with can be explained by that sadness expressed in a cooperative setting is likely to cause more cooperation than anger (Van Kleef, De Dreu & Manstead, 2010), but also by the opposing forces of appraisal tendencies of risk-seeking and the characteristic bottom up-based process pattern. Sadness implies risk-seeking behavior, but the process pattern that accompanies sadness allows for more carefully examined information than in the case of anger expression, explaining its moderate function.

In all, both the emotion as social information and self-experienced emotion literature add to explain the findings of this dissertation. If interpretations of these affective events affect decisions, in terms of that they affect decisions to drift dependent on what emotion that is expressed, the findings posit potential risks (see Table 9). For instance, if calls with fear expressions systematically lead to more help than when other expressions dominate, there is a potential risk of over-prioritizing those calls, causing unnecessary economic strain on the organization and society at large. Conversely, if expressions of anger are clearer at lower levels of help need, this emotion would be weighted more as a cue, potentially causing risk of under-prioritizing these types of calls, which in turn would lead to
faulty management of calls as well as increased risk for callers to be assessed in a faulty manner.

Table 9. Influence of Emotional Expression in the Prioritization Process

<table>
<thead>
<tr>
<th>Emotional Expression</th>
<th>CLEAR</th>
<th>UNCLEAR</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level of Priority</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HIGH</td>
<td>O (Risk to over-prioritize due to fear)</td>
<td>X</td>
</tr>
<tr>
<td>LOW</td>
<td>O (Risk to under-prioritize due to anger)</td>
<td>X</td>
</tr>
</tbody>
</table>

Based on the present studies, it is not possible to determine whether the emotions used as cues efficiently lead to correct prioritizations or actually result in biased prioritization. However, the analysis above points at a reasonable interpretation that would cause concern for potential bias and should lead to further evaluation of the efficient cue versus the biasing cue hypotheses.

11.1.3 Evolution of Routines Through Emotional Events

This section will address the under-emphasized role of emotion in routine research. I will therefore return to the discussion, initiated in the last section, that call takers act within a set of contextual conditions (the grey area framed by the dotted line in Figure 4 and Figure 9) by explicating how routines may evolve via interpretation of emotional events. It is im-
important to emphasize that I am focusing on the analysis of one routine—the decision routine—rather than analyzing a selection process among concurrent routines.

The routine concerns identification of symptoms and matching them towards different levels of prioritization. Thus, the routine also coincides with the goals and missions of that the most gravely ill individuals will get the most help regardless of their expression.

The decision routine is a fabric woven by multiple intertwined threads, constituting a common point of departure for the call takers. The routine is molded into artifacts such as the case management system which provides for cognitive economy making call takers able to focus on communication, continuously accumulating information about symptoms of the patient. The routine of prioritizing ought to be conducted in a standardized and protocol-based manner which provides for callers to be devoted equal help for equal expression of symptoms. The foundation of the routine rests on that decision is to be similar under similar conditions. Such a notion coincides with rationalism in terms of maximizing expected utility by choosing the best alternative of qualified options.

However, as was described in Chapter 3, a routine is not a static element, but rather a dynamic and developing matter. Feldman and Pentland’s (2003) differentiation of the routine into an understanding component (ostensive) and an action component (performance) constitute possibilities for variation to be introduced to the routine. In extension, this variation may cause the routine to drift from its original and organizational intention.
First, the routine may serve in a guiding manner. In the case of emergency call management the routine does not specify all possible details about managing calls. Thus, call takers may be guided by the decision routine to act in a comforting, calming manner by virtually holding the hand of the caller, even though the routine does not specifically state that they should do so. Second, the routine allows call takers to account for their actions in terms of what should be reported or even concealed—a form of retrospective sensemaking (Weick, 1995). An example of this is seen when call takers rewrite ambiguously expressed symptoms in order to make them match the categories of the decision support system and a higher priority (see Study 4). Third, the routine structures thought in terms of that call takers can refer to the routine. In other words, less skilled call takers or new recruits may be able to make sense of emergency calls by referring to the routine without understanding the entire process of making a priority.

The types of inferences above also hinge on interpretation of the emotional expression of the caller. Maintenance and modification of routines becomes highly interesting when emotional events are introduced. Repeated exposure to intense emotional expressions may over time contribute to shortcut evaluations of calls since emotional expressions are fast and easy to decode (cf. Simon-Thomas, 2009) as well as provide information in ambiguous settings (Bartel & Saavedra, 2000; Van Kleef, DeDreu & Manstead, 2010). Events are also likely to be summarized according to the peak of intensity of the event (Fredrickson, 2000), causing intense emotional expressions to be a prominent factor that cannot be overlooked in terms of influencing decisions.
The theoretical implication addressed earlier referred to that repeated exposure to emotional events (calls) may cause call takers to develop perceptual lenses to filter information, which eventually may cause the routine to drift from its original intention. Thus, as was described earlier in the section of decision making, calls (events) that are perceived as fearsome would over time be susceptible to be over-prioritized while events perceived to contain anger would be under-prioritized. This is a matter which stands in contrast with the intention since it specifies that callers should receive equal help regardless of their non-verbal expressions.

Since there is somewhat of a mismatch between the prescribed routine and the performance of call takers it may lead to discovery of intuitions among call takers. In turn, the intuitions may point to incongruence between the routine and the performance of the same. These intuitions may be ventilated, verbalized and negotiated in for instance debriefing sessions (similar to what was described in the section of establishing routines in Chapter 3) on how to solve discrepancies. However, considering the rational mode of the organization where knowledge is bound to individual expertise or encoded in routines (cf. Lam, 2000), these descriptions are not likely to be incorporated into existing routines. Call takers would therefore be likely to remain in a situation characterized by espoused theories that do not completely match theories in use (Argyris & Schön, 1974).

In summary, the previous sections have dealt with theoretical implications of communication theories (media choice), judgment and decision making as well as evolution of routines. Regarding communication
theories it was argued that emotional influence per se was nothing new to these theories. However, a nuanced view of emotions within this set of theories is lacking. A more nuanced view of emotion would help explain effects of message construction, switching rate of media, but also how compensatory encoding in media with little visibility may progress.

As regards judgment and decision making, it was not possible to determine that emotional cues led directly to either correct or biased priorities. However, the findings point in the direction of that emotional expression of the caller is something which is difficult to overlook when making assessments. Particularly, since the clarity of different emotional expressions coincide with different levels of help need. At the same time, the findings harmonize with literature on affective events, experience of emotion as well as emotion as social information. Consequently, if emotional expressions are difficult to overlook and may affect priorities there is also an evident risk that prevailing routines over time drift due to that some expressions are over-prioritized and others under-prioritized.

11.2 Methodical Implications

The methods that were used in this dissertation provided opportunities to thoroughly investigate the setting, but they also set restrictions for what kind of findings that could be found. From a research point of view, the methods for collecting data are not new themselves. Rather, it is the combination of them that open up for the discussion about methodical implications.

Use of multiple methods allowed for investigation of emotions and routines in an epistemologically congruent manner. Hitherto, there has been no concise definition of emotion, but rather a number of proxies that
indicate presence of emotion. Thus, emotion is a multilayer phenomenon which is best researched using several different vantage points. Emotions concern thoughts, expressions and actions which all may be important for work, but difficult to capture using a single method. Thus, the different sources allowed me to switch between expression (of caller and call takers), interpretation of experiences and actions taken. Similarly, the concept of routines is at least a dual layer phenomenon. The ostensive and performance aspects are parts of the same concept, but best assessed by means of different methods (Pentland & Feldman, 2005). The use of archival records, non-invasive\textsuperscript{31} measurement, observations and interviews tap into the different worlds as well as levels of analysis. For instance, archival records functioned as organizational prescriptions on how to make decisions as well as how to display emotion. This source also described the routine in an artifact manner. Thus, the source constituted a collective level against which individual level data could be mapped. However, individual level sources could also be compared across different individuals moving towards a collective level of analysis, but also capture different aspects of the routine being carried out. For instance, field studies offered individual perceptions of callers’ expressions to be z-transformed and compared across call takers’ ratings. Interpretation of interviews (connected to the ostensive aspect of the routine) and observations (connected to the performance aspect of the routine) were compared across individuals (see Table 10).

\textsuperscript{31} Non-invasive refers to a procedure which is not intrusive on the individual’s integrity. In medicine a non-invasive procedure refers to when there is no breech of skin or investigation of internal body cavities. Similarly, in this setting objective measure of emotional voice cues could be obtained without interfering with callers’ integrity.
Furthermore, the set of sources allowed me to capture the sequence of emergency call taking rather than merely the outcome of decisions (and interpretation of the result). There were discrepancies between feeling, thinking and doing throughout the process of managing calls.

Table 10. *Methodical Implications of Triangulation*

<table>
<thead>
<tr>
<th>Methods</th>
<th>Purpose of Method</th>
<th>Level of Analysis</th>
<th>Relation to the routine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Archival Records</td>
<td>To describe boundary conditions of conducting work.</td>
<td>Collective</td>
<td>Artifact/Performance</td>
</tr>
<tr>
<td>Non-invasive measurement</td>
<td>Ratings to capture call takers’ perceptions of recurrent stimulus.</td>
<td>Collective/Individual</td>
<td>Performance</td>
</tr>
<tr>
<td></td>
<td>Measurement of systematically selected voice cues in authentic calls.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observation</td>
<td>To capture an action component of emotional influence.</td>
<td>Individual/Collective</td>
<td>Performance/Ostensive</td>
</tr>
<tr>
<td>Interviews</td>
<td>To capture perceptions of work</td>
<td>Individual/Collective</td>
<td>Ostensive</td>
</tr>
</tbody>
</table>

Without the combination of methods it would be difficult to account for whether it was the prescribed routine that affected the outcome or whether it was the individual routine that was the main driver behind the outcome of the decision. For instance, archival records strictly specified within which time-span a call should be answered as well as how callers should open up the call and conduct the interview. Comparing archival records
with observations revealed that call takers modify this sequence as they, re-routed emotional (angry) callers when they clinched with them, close down calls quickly or even dwell upon answering in order not to get caught up in specific calls.

Furthermore, if using merely observations call takers would possibly have come across as rather cold-beat as they focus and ask short questions. However, when complementing with interviews the rationale for such an appearance was intimately connected to the sequence of conducting emergency call taking in terms of managing one’s own and callers’ emotions in order not to let emotion interfere with the decision process. In turn, the range of emotional management strategies of call takers was quite different from what was described in the archival records. Call takers were observed to yell at callers. If using a single method this would have come across as an example of poor service. However, when further nuanced in interviews it became clear that call takers deploy such a strategy to take charge of the situation and heighten attention in drowsy callers.

Another major issue was how to balance ethical concerns in terms of being close to data at the same time as unidentifiable data from the authentic setting could be presented to individuals in an experiment. Here, contemporary technology served as an enabler. Verbal expression could be masked, using a Hann-shaped filter, while nonverbal aspects of speech were left intact. By such a procedure, callers maintained their integrity. The material could be used in a setting which did not involve call takers at the same time as listeners were able to focus solely on nonverbal content. Furthermore, such a procedure strengthened the ecological validity
regarding assessment of vocal emotion since authentic rather than posed sound files were presented to the assessors.

11.3 Implications for Practice

As with the theoretical implications, the practical implications of the dissertation are multifold. I will account for practical implications on two different levels: the individual and the organizational level. Implications for individual call takers regard strategies for managing and coping with ones work, but also in terms of decision expertise. Organizational implications regard improvements of the decision and communication structure and development of organizational competence in the light of turnover rates and recruitment strategies.

First of all, it is inevitable not to discuss the successfulness of SOS Alarm. The organization faces a complicated mission which has to be conducted in a high-velocity environment using technology (telephone)—a medium which may complicate communication and thereby also affect the possibilities to obtain organizational goals. Yet, call takers manage to fulfill these goals to a large extent. Call takers are burdened by that patients may die due to communication mistakes. This is a circumstance which is different from other work settings using a similar set up (i.e. customer-based call center or helpline work).

It is also important to emphasize that while ailments of the caller population may be perceived as few and manageable from an organizational perspective, the same ailments bring dramatic life-changes, feelings of discomfort or even perceptions of injustices on an individual level. Thus, successfulness may not solely be captured by means of statistics since the view of successfulness is dependent on one’s vantage point.
However, when considering the large number of calls that are made to SOS Alarm on an annual basis together with the relatively few complaints that are filed, the organization can be recognized as successful. This is despite the fact that the number of reports have been increasing the past years. For instance, a study on complaints to the Medical Responsibility Board, the Swedish Board of Health and Welfare and the Patient Advisory Committees between 1991 and 2000 revealed 54 complaints. In total, 37 out of 54 complaints regarded the decision-making procedure (Wahlberg, Cedersund & Wredling 2003). Another evaluation conducted by the National Board of Health and Welfare, of 52 complaints (45 from the public and 7 Lex Maria\textsuperscript{32} reports) from the middle of 2010 and onwards, revealed criticism towards SOS Alarm. Typical criticism regarded communication difficulties, the procedure for the emergency interview as well as technical matters such as not finding the location on the map (Socialstyrelsen, 2011).

Most likely, there are unrecorded cases that do not surface in these statistics, but at least the numbers give an indication of the distribution of extremely severe and rare cases that are considered as a failure by the public. Following the reasoning above, the ratio of severe mistakes tends to be approximately 1 in 14 000\textsuperscript{33}. Such ratios strengthen the argument that SOS Alarm has to be considered as a successful organization. How-

\textsuperscript{32} Lex Maria refers to that healthcare providers have an obligation to report to the Swedish Board of Health and Welfare if there is a suspicion of malpractice, if patients are exposed to increased risk that would cause illness or injuries or otherwise improper or abusive treatment.

\textsuperscript{33} Dividing the total number of healthcare calls in 2010 by the number of complaints filed in 2010 the ratio is approximately 1 in 14000.
ever, the large base rates of calls hold a potential for improved organizational management. With such a large body of calls, even small changes in management at the call level may render great implications on an organizational or societal level.

11.3.1 Individual Strategies for Emotional Management

Following statistics on types of calls, it seems as if the number of calls is relatively constant over the years (see Table 3). It does not necessarily mean that the emotional content of these calls is constant over the years. However, it seems natural to claim that negative emotional events are common in the emergency call taker context. Following the same logic, from a call taker perspective it is difficult or even impossible to affect the number and type of incoming calls. Call takers continuously have to assess calls which may cause contagion or contain emotions that raise unpleasantness. Thus, in order to cope with work, call takers need to find suitable management strategies.

Call takers have developed a range of coping strategies in order to facilitate complicated aspects of work. A more thorough review of coping strategies is found in Study 3, which is why I just account for a selection of strategies here. Call takers may benefit from turning their attention towards the intrapersonal (self-coping) and interpersonal (focus on the interaction, see Figure 11). This would also be likely to be affected by what kind of emotion that is in focus or if it is a call taker who experiences the emotion or if a caller expresses it. When doing so, it is important to emphasize that some strategies affect well-being while others affect performance, which in turn raises trade-offs of whether to facilitate work performance or maintain well being of the call taker. A limited set
of emotions: anger, fear and sadness, serve as an example for advice on managing strategies, since these emotions are reported to be the most common as both expressions of callers and experiences among call takers (see Study 1-3). Among call takers, self-experienced anger is reported to be the most difficult emotion to manage. Anger is also believed to be the most contagious emotion between caller and call taker.

Given that anger influences decision making in a heuristic manner, it may be unwise to try to intrasubjectively change one’s stance if angry, particularly since one’s ability to process information becomes rather narrow as a consequence of being angry. It may be better to change condi-

Direction of focus in double-faced management

<table>
<thead>
<tr>
<th>Types of regulation</th>
<th>Intersubjective</th>
<th>Intrasubjective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antecedent</td>
<td>HIVE</td>
<td>ELABORATE</td>
</tr>
<tr>
<td>Response</td>
<td>AURALIZE</td>
<td>TAME</td>
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</table>

*Figure 11.* The HEAT-Model of Emergency Call takers’ Emotional Management Strategies


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tions of the situation. When call takers experience anger they should, just as they do, preferably re-route calls to other call takers. In turn, this would reduce the possibility that anger bias their judgment or let anger reciprocate, affecting perceived service on the caller end.

In contrast, when callers express anger there is reason to re-appraise the situation (such as the call taker did in Study 3) in order to prevent catching on anger expressions of the caller. Since the cycles of interaction in call management are rather short, there may be difficulties re-framing content and expression of the caller in order to function optimally, but when there is time to do so, it is preferable.

Turning to management strategies of another emotion, other strategies may facilitate work. In cases where call takers experience fear, emotions may be tamed or call takers may auralize. Both of the strategies are better used when complexity in calls is low since monitoring one’s expression may cause interference with decision-making capabilities (see the call taker who broke down due to increased complexity in an urgent call in Study 3). As was described earlier, fear expressions risk over-prioritizing (see Study 1 and 2), but this has to be weighed against benefits of a speedy management. It is also important to emphasize that from a well-being perspective response-based strategies may result in emotional exhaustion.

As regards call takers experiencing sadness there may be less reason to use a management strategy, particularly since a secondary effect of sadness is an increased focus on details which ought to provide for careful assessment as well as a processing strategy that coincides with organizational requirements of being analytical. However, from a service perspec-
tive and a well-being perspective the story may be different. Call takers leaking sadness would most likely affect the perception of service since the expectation from the caller is to be helped. Thus, reappraisal strategies are probably best suited for managing sadness in this context.

11.3.2 Individual Decision Expertise

The special circumstances surrounding emergency call taking has implications for individual decision skills as well as how expertise may be developed. The setting is characterized by flooding as well as lack of information which is likely to contribute to ambiguous communication. Furthermore, information is to be managed under time-pressure, which in turn prompts a desire for rational decisions while the actual decision route is likely to be influenced by intuitive and emotional skills. Therefore, this section will address under which conditions and in what tasks intuitive and emotional aspects can be successfully integrated as well as how it may be difficult for call takers to acquire such competence.

Leprohon and Patel’s (1995) study of triage work found that moderate and low urgency calls undergo a different kind of processing than highly urgent calls. The results partly coincide with results in Study 1 and 2 in this dissertation. When there is an urgent help need, it coincides with expression of intense negative emotion (fear). Taken together, in urgent situations there seems to be a reliance on immediate response without much deliberate processing, where type of emotion as well as intensity of expression are believed to facilitate prioritization. Emotional expression may therefore be devoted a more prominent role in order to derive highly urgent assessments.
Returning to the initiated discussion about expertise, it seems as if true expertise resides not in telling when there is a need to set high priorities as much as it does in telling when not to set high priorities. Acquiring intuitive expertise is dependent on individual capabilities, contextual and institutional influences. First, individual expertise hinges on assumptions of predictable variables, functional relationships among them as well as possibilities of obtaining feedback regarding their function (Kahneman & Klein, 2009). In order to find out to what extent emotional expressions serve to establish functional relationships a feedback loop needs to be established. Currently no such structured initiative is available, which in turn causes a lack of knowledge regarding how accurate call takers are in their assessments. From a service and decision quality perspective, emotional expression of the caller provides important feedback parameters, particularly since some emotions are more common than others (fear, sadness, anger as opposed to happiness and disgust), but also since there is a discrepancy within the set of typically expressed emotions. For instance, fear was perceived to be the most typical emotion. However, despite that anger expressions where less typical they were perceived as more difficult to manage. Anger expressions were also likely to be underprioritized, potentially causing the caller not getting the help they are entitled to. Thus, paying attention to (and giving feedback) on how call takers manage angry callers would be beneficial in order to avoid biased decisions.

There were no structured occasions were call takers received feedback on how well their priorities matched the priorities determined by ambulance services, unless the case was a matter of debate. Thus, assess-
ments made by ambulance personnel were a kind of feedback that was only available sporadically. In other words, feedback is structurally provided by means of an in-house model while external feedback is sporadically sought. This is a matter that has attracted attention. Currently there is an ongoing project in Västra Götlands län\textsuperscript{34} evaluating systematic and structured feedback. Furthermore, the focus of the in-house feedback to call takers typically concerns uncertainty-reducing activities (which questions that were asked as well as which priorities that were set during the call) while matters of how call takers actually derive the priority gains sparse attention.

Looking at wider system delimitations, there is a lack of coordination and standardization not only among different authorities, but also between countries (cf. Emergency Data Project, 2003; Castrén et al., 2008) which in turn prevents possibilities to create a baseline for comparisons. Furthermore, the focus of standardization has been on “core data”, measuring the interval from when an accident occurs to when the call is received and managed, which at its best provides glimpses of how call takers actually derive priority. Thus, a structured initiative, to obtain feedback from additional channels, even if it is on the level of a single emergency center in a specific geographic region is needed in order to not only maintain, but also to improve competence.

A legendary rule for emergency call takers is “when in doubt send ‘em out” a rule which has been further defined as “to err in the direction of the patient” (Clawson et al., 2007). However, such an imperative regarding doubt implicitly points to that call takers know when they are in

\textsuperscript{34} See http://www.lindholmen.se/sv/node/18770
doubt. In order for intuitive and emotional assessments to have impact on decisions, they need to be acted upon when they arise—a notion which is taken for granted—while gut feelings actually may pass without much attendance (Dane, 2011). One vein to proceed in is to develop intuitive competence by attending to mindfulness. Mindfulness regards balancing influence of internal and external stimuli in terms of that individuals attend to stimuli and events associated with the present moment, disregarding the past and the future (cf. Epstein, 1995; Herndon, 2008). Mindfulness may not only derive from deliberate achievements, but may also develop among individuals as they acquire job experience. Dane (2008) claimed that trial lawyers’ attentional resources were freed due to that skill becomes increasingly automatic with experience, leading to a reduced stress level. In other words, with increasing experience one becomes more apt to have a wider focus of the present moment. By focusing on unconsciously-driven processes, there is also reason to believe that individuals attend to intuitions and emotions as they pass by. In all, balancing rational, intuitive and emotional principles is preferable. Tilting towards a rational principle, trying to obtain information by asking questions sequentially and analyzing responses, may lead to reduction of uncertainty, but also to a mechanical dialogue which takes time and eventually affects perceived service. Tilting towards intuitive aspects may cause uninformed decisions due to preconceived ideas, whereas reliance on emotions may lead to uninhibited action. A wider perspective, as has been described by Coget and Keller (2010), where rationality, intuitions and emotions all play a part, would possibly improve both service and decision accuracy.
11.3.3 Decisions and Communicative Structures

Emergency services need to balance the domains of knowledge that govern the working process. Reducing uncertainties and resolving ambiguities do not typically rest on the same assumptions. Ambiguous matters are typically not mirrored in the decision support structure since the system is a perceiver-weighted system assuming an inherent competence level, to discriminate and solve these matters, at the perceiver end (call taker). For instance, there is little or no systematization for how to deal with answers from callers (such as finding out when yes means yes or actually indicate a no or maybe) rather than what to ask the callers. Even though improvements, such as the start card (see Study 4), have been implemented, it does not solve the problem of making correct and accurate decisions since it does not address how ambiguities are resolved.

One way to increase the possibility of resolving ambiguous matters, and thereby further increase decision accuracy, would be by implementing multimodal calls. In other words, contemporary technology would be an enabler in terms of grounding communication. Providing call takers with real-time photos or videos in conjunction to verbal communication would increase situation awareness, reducing uncertainties as well as resolve ambiguities by increasing richness. For instance, project Reach involved 3000 users who had possibilities to use a sign language interpreter when making a 112 call. There have been 20 calls (to one center in 2011) of this kind. SOS Alarm has also stated the outcome of communication to be much better than when using regular text-based phone calls (Activity report, 2011). This type of improvement, moving from single
modal to multimodal, is a resource-based issue rather than lack of technical know-how.

On an international scene, there are initiatives regarding next generation 911 (NG911). The project focuses on changing emergency centers’ equipment from a circuit-switched system to an IP-based technology, allowing for transfer of SMS and MMS to PSAPs. The rationale behind the project concerns: (a) improved access for individuals who are disabled, (b) that information about an emergency could be obtained by sending photos or video which is believed to facilitate efficiency and speed of assessments and (c) that there is an increased flexibility and resilience of IP-based technology as opposed to circuit-switch systems (cf. Genachowski, 2011). Following this initiative, SOS Alarm has taken steps towards multimodal technologies by monitoring and planning implementation of IP-based technologies (SOS Alarm annual report, 2010). The capacity of SOS Alarms infrastructure, to handle these kinds of calls, is expected to increase during 2011-2014 (Activity report, 2011).

However, implementing the possibility to multimodal calls in the emergency setting is not free from complications. Call takers would be likely to be affected by unwanted as well as wanted emotions due to the increase in richness of communication. Increasing multimodality may also complicate the mission of providing equal help to callers regardless of expressions. Currently, there are some groups that face a complicated situation when they are making emergency calls. Deaf individuals may have to rely on a text-based medium—which provides for a different

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35 911 is the emergency number in the United States
36 SMS refers to Short Message Service; MMS refers to Multi Media Service and PSAPs to public safety answering points.
communication process than using a regular phone. Just as in Project Reach SOS Alarm, groups would be helped by implementing possibilities of multimodality. On the other hand, there are differences in dissemination of technologies supporting multimodality which, if richer communication leads to better resolution, would cause some groups in society to receive a better emergency service than others. For instance, in a survey (N=4000; response rate 55%) by the Post and Telecom Authority (PTS; 2010) 33% claimed they never send MMS. The same survey states that 42% are not willing to substitute their landline for a mobile solution. The age group 61-75 years of age was overrepresented (33%) preferring landlines over mobile solutions. This implies that there would be differences in terms of access to the increased range of communication alternatives that PSAPs could handle.

11.3.4 Designing the Workplace and Work Processes

The balanced perspective of uncertainty-reduction and ambiguity-resolution procedures that was sought in the previous section, also branches off to how call takers develop competence. Organizational development of competence is closely related to matters of workplace design. It is important to remember that the studied organization is successful in terms of goal fulfillment. However, even minor adjustments of the workplace and its work processes may render large changes on an organizational level due to the large number of calls that are managed annually.

Furthermore, there are not only implications regarding physical characteristics of the workplace that could be modified, but also matters that concern the work processes as well as the prevailing mindset that currently governs the setting. First, I will address matters of how
workplace design can facilitate management of emergency calls. Second, I will elaborate on that the organization is rooted in a rational tradition, giving precedence to a certain kind of knowledge—which in turn has consequences for how the organization preserves knowledge as well as learns new knowledge. Third, as an extension to the latter, I will turn to how the work process is structured. Finally, I will address competence development in the light of turnover and recruitment strategies.

Since there is a potential carry-over effect of different emotions it becomes important to adjust working times to increase the possibility to let emotions wear off between calls. Call takers report that emotional events accumulate and sometimes carry across to unrelated calls (cf. Study 3). Therefore it is important to have a sufficient number of breaks and to use this opportunity since there may be a risk of exhaustion otherwise. Somewhat contrary to other customer-based work settings call takers would not typically gain an advantage from “serving with a smile” since happiness is associated with a mindset that shows primacy for top-down processing (Clore et al., 1994). In fact, following the emotional literature, call takers would benefit by restoring a mindset into a neutral or sad state, in particular since these states are better aligned with the type of detail-focused and bottom up-orientated work that call takers conduct. However, this mindset, from an employee perspective, would be less socially sustainable over time since it coincides with improved work performance rather than wellbeing.

The findings in Study 3 illuminate how call takers cope with management of emotions in their work situation. If call takers create awareness regarding in-call management of emotions, the organization would
be able to put emphasis on between-call management. First there may be a reason to structure the process in terms of an emotional tagging system. The emotional tagging system could be a help for call takers when they try to re-route callers to other call takers. Since the ICT-structure allows call takers to re-route callers between themselves, calls could also be labeled according to what emotional status the caller expresses. The action was identified in Study 3 as an action that would create a sense of preparation for the other call taker in a situation with overall few possibilities to prepare. Furthermore, since this dissertation shows that the emotional expression of callers is an important matter to consider in terms of communication and assessment, the emotional tagging system could be further used for tracking complicated calls to be used for educational purposes.

In order to develop expertise and tacit knowledge it would be possible to build a sample data base where call takers have followed the routine in a successful way. However, there would also be possibilities to obtain cases where call takers have deviated from protocol-based procedures, yet derived successful outcomes. In these terms, ICT is an enabler for learning tacit knowledge. In order to obtain expertise of how to differentiate symptoms, one needs to develop schemes with numerous exemplars. This is done through experience and exposure over time which can be obtained by creating multimodal exemplars. Audio files of caller-call taker interaction, transcriptions of the interaction paired with protocols of decisions could be matched with feedback on the medical status of the caller, but also video segments of call takers in action. In turn, this would highlight the role of emotional expression by the caller, perception and
experience by the call taker. Newcomers could be exposed to successful as well as unsuccessful cases prior to being exposed in the actual setting. This sample data base could be implemented in the already existing Learning Management System—a system which is already used by call takers and promoted by the management, but does not support the coherent multimodal view suggested here.

11.3.4.1 The Organizational View of Knowledge Primes Learning

The prevailing mindset of SOS Alarm rests on a formal and explicit knowledge-base, rooted in medicine. There is a considerable degree of specialization, standardization and control that governs work within SOS Alarm. Call takers need to account for decisions and make them explicit by verbalizing them (such as categorizing and writing symptoms of callers into the case management system). The knowledge base is typically mediated via standardization of procedures associated with the medical profession (for example, call takers undergo medical training during their internal education. The organization also preferably recruits staff which is already medically skilled). This causes knowledge to be manifested in individuals in a specialist manner, as nurses, not doctors.

To support the staff, the organization promotes knowledge that is encoded and transferable, which in turn makes knowledge into a collective commodity among call takers. Operating procedures are formalized into information systems. Standardization is the coordination mechanism of work and call takers typically learn by correction or performance monitoring (as in how the medical index is followed). Thus, it seems as if SOS Alarm could be labeled as both a professional bureaucracy and a machine bureaucracy (Lam, 2000). However, it also seems as if there is awareness
and to some degree acknowledgement of tacit knowledge. For instance, educational material supports that decisions need to be based on all possible information, even information that cannot be verbalized (see Study 4). This notion is mostly accepted among call takers rather than between call takers and management. Thus, a first hurdle is passed when it comes to creating awareness about these matters, but it also seems as if the organization does not know how to make tacit aspects into a strategic matter.

The communication process between caller and call taker occurs in a setting which would benefit by a complementary perspective—different from both the medical perspective and the encoding perspective. If the organization maintains and further opens up for influences of tacit knowledge, they would also be better at developing sustainable routines. Informal routine development starts out by individuals who intuitively discover deviations (cf. Crossan, Lane & White, 2000) from prevailing routines. An emotional climate categorized by deterrence emotions (such as fear) may reduce exploration (Scherer & Tran, 2001) and therefore also the possibility of discovering deviations. Routines specify which matters to reveal and which matters to conceal (cf. Feldman & Pentland, 2003). In turn, if the prevailing perspective of knowledge contributes to that certain elements of work are concealed or that elements are not fully explored it will also prevent newcomers from learning work efficiently. Thus, the assumption of the rational model together with an emotional climate, where fear is commonplace, asphyxiates tacit components in work. SOS Alarm would clearly benefit by widening the knowledge base—putting stronger emphasis on systematically assessing competencies of call takers.
in order to capture tacit aspects of work that would be possible to implement in routines and education of call takers.

When changing routines, the suggestion is to initiate the change from the bottom moving upwards, in particular since call takers already are using such strategies. Increasing level of detail (or decreasing level of aggregation) in routines may not necessarily increase efficiency since routines often need to cover guidance for large action fields. Instead of providing aggregation from the top down in organizations, the recommendation is to have a starting point from the bottom, moving upwards. Considering that individuals tend to strive for alignment with routines, the starting point for changing routines ought to be what employees already feel, think and do. Aligning emotions, cognitions and actions would be easier achieved since employees more easily recognize bottom-up-grounded routines as they partially mirror what individuals already feel, think and do.

The bottom-up initiative also needs to be negotiated with a top-down view since there may be situations where employee’s actions do not match overarching goals of the organization or the routines may become too rich due to nuanced individual differences. The role of the top-down stream in such a case is therefore to streamline alternatives, rather than suggesting the actual revision process. Thus, a route for learning, which is congruent with that presented in Figure 6 is encouraged.

Yet another aspect that compromises competence development is that the organization has suffered from high turnover rates. The average turnover rate in 2007-2009 has been 15.6% and was expected to rise even more between 2010 and 2012. Numbers are not directly comparable with
other professions, but comparing with work that has a similar setup gives an indication of the pace of turnover\textsuperscript{37}. The turnover rates have not passed unnoticed. SOS Alarm has initiated a strategic program to deal with these matters which will be completed in 2015 (Annual report, 2010). However, in the meantime, the turnover rate has implications for developing and sustaining competence. The process of becoming a call taker is lengthy, expensive and a matter of socialization. Recruits are provided formal knowledge, but also continuously tutored by more experienced call takers, possibly leading to transfer of tacit aspects of work. The socialization process brings consequences. First, recruits tend to adapt prevailing methods which in turn emphasize on a need of fit between formal and informal systems. For instance, management promotes a protocol-based method which aims to reduce uncertainty while there are informal methods resolving ambiguity from the call taker end. The methods may complement each other and function in parallel, but they also originate from different ways of learning. The uncertainty-reducing scheme originates from a formal medical education, the ambiguity scheme comes from experience and practitioner-based learning. Second, when the rate of employee turnover is fast-paced, the organization loses knowledge which can be hard to regain. Thus, competence issues are not automatically solved by recruitment of medical staff. Their professional role needs to be broa-

\textsuperscript{37} Regular call centers show similar numbers. Internationally the average in general call centers reaches approximately 20\% but in Sweden the average is 7\%-15\%. Such numbers are based on statistics from internal, showing a turnover rate of 8-14\%, as well as external call centers, showing a turnover rate of 19-20\% (Callcenter branschen, 2008/2009)
dened to emphasize and acknowledge the use of tacit knowledge specific for the emergency call taking domain.

11.4 Implications Beyond the Emergency Call Taker Domain

The findings in this dissertation also have implications beyond the emergency call taker domain. As stated earlier, emotions may arise both in terms of interpretation of events and in direct contact between communicators. Furthermore, emotions may be seen as social information which aids decision making in ambiguous settings. Thus, emotions are likely to influence both synchronous and asynchronous communication. Emotions in ICT-based environments are in themselves nothing new. However, as was explained in the section of theoretical implications, studies suffer from a rather blunt definition of emotion, not taking into account the different action tendencies or process patterns that specific emotions bring. For instance, angry perceivers show different action tendencies and process patterns in comparison to sad perceivers even though the emotions have been argued to show the same negative valence. Furthermore, the more ambiguous the setting, the more constructive processing of information that is required and the more time-pressure there is in communication, the more reason there is to believe that emotions exert influence on the communication process. In turn, this brings consequences, both for message construction, being a sender, and message perception when being a perceiver, regardless of which medium that is used.

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38 Synchronous communication refers to communication where communicators are exchanging messages in real-time as opposed to asynchronous communication such as emails and bulletin boards where there can be a time-lag in communication.
In addition, contemporary ICTs are fast-paced and revisable, but also show permanency—things on the web rarely die. Thus, communication of emotions in ICT-settings regards a range of fields. For instance, it is interesting to notice the importance of social media\(^{39}\) (multimodal as well as text-based media) during the Arabic Spring. Social media was used to organize, communicate and raise awareness about repression and censorship, bringing highly emotional hordes together for action.

However, besides such macro-level consequences, emotions in and through ICTs have implications for other fields as well. For instance, bullying on the web is a domain where mediated emotion has a place. How are messages constructed to inflict negative emotions such as sadness, fear, disgust and guilt? How do exposed individuals develop regulation strategies to cope with a medium which is fast, easy to distribute information widely with, and permanent? The management strategies found in this dissertation applies to a setting which is synchronous and emotion-based and thus needs to be further developed in order to apply to settings where affective episodes are prolonged (moods) such as in bullying via social media.

Emotion is not only an individual-level phenomenon, but may also be seen in terms of emotional climate of a work setting. Again, since emotions arise in connection to events it has implications for not only emergency call takers, but also for work in adjacent domains. Thus, typi-

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\(^{39}\)Social media refers to the range of possible solutions of web-based and mobile technologies for communication and interactive dialogue in (potentially very large) networks of people.
cal work tasks may be a good starting point for finding out about the emotional climate of a work setting. This can be important, since differences of emotional expressions between settings may exert influence on how decisions may drift from organizationally provided routines. For instance, just as managing sadness is important for funeral directors, pity and sympathy is important for nurses. Thus, a special set of emotions may be important in the call center domain. Hypothetically, customer-based call centers share the characteristics of being routine-based with narrow-time frames, but perhaps less of the ambiguity aspect the emergency call takers are facing. Call takers within helpline settings\textsuperscript{40} are also governed by routines and they face ambiguity, but probably have less narrow time-frames to commit to. However, the settings are also likely to pose different kinds of emotions. While frustration or anger would be likely to be a dominant emotion in the customer-based call taker setting (perhaps not expressed by call takers, but by callers), anxiety, guilt and shame would be more likely to be expressed in the helpline setting. Even though there may be emotional blends, rather than one single dominating emotion, such a vantage point would offer a baseline for how emotions may exert influence on decisions in these kinds of settings. Therefore, the emotional climate of organizations needs to be further acknowledged.

11.4.1 Suggestions for Future Research

Conducting research is like opening a window in the house of knowledge. It is inevitable and ultimately a matter to accept that results once accepted

\textsuperscript{40} Sweden offers a range of helpline services such as 1177, which is a helpline regarding medical queries without a direct emergency, or BRIS (Children’s Right in Society) which supports children in distress and functions as a link between children, adults and the community.
will be refuted in the future. In other words, curtains will be changed, new plants will be put in the window or the window will be sealed and opened up elsewhere on the facade. The façade of emergency call taking provides for numerous windows. However, by consulting findings from this dissertation I will make a suggestion on color of the curtains, types of plants and when and where to open one or a few of these many windows.

First, from a learning and routine point of view, a crucial vein to proceed in is the matter of performance feedback. Even though there have been initiatives regarding these matters (cf. Lindström et al., 2010), they would need to be structured, large-scale and involve multiple authorities in the future. This is important, since emergency call taking many times is the point of access to health care and the following treatment is dependent on how the patient is dealt with initially. Currently, the situation prevents call takers from obtaining structured feedback other than what they try to obtain themselves or to what extent they have followed protocols. A large-scale evaluation of assessment accuracy of emergency call takers in comparison to assessments of other blue-light organizations involved in the cases would be helpful in order to develop individual expertise in the setting. By comparing assessments between organizations it would be possible to establish to what degree call takers are accurate in their judgments. Such an investigation would also be further helpful in terms of finding out how individual call takers assign weight to non protocol-based procedures and whether these procedures represent variables in high-validity environments (where functional relationships can be established between variables) or not.
Second, contemporary technology is an enabler in order to investigate a range of research questions regarding emotional influence on priorities. Communication between caller and call takers is typically saved and stored for a minimum length of three months. Thus, it would be possible to establish conclusions based on multi-method comparisons. In other words, call takers’ perceptions of calls and their priorities could be matched with objective measures of eye tracking, vocal analysis or even computerized semantic analysis of calls. Such procedures would be able to shed further light on both emotional contagion and on how emotions influence decisions, not only in the emergency context, but also in mediated communication settings in general.

Third, to date, little is known about how mixed emotions influence decision making at the interpersonal level. Changing between different emotions during a short process (dealing with the individual case) may raise different effects than experiencing one of the emotions. Thus, future research is needed to shed light on mechanisms of such configurations.

Furthermore, it would be important to further investigate aspects of neutrality. Many professions have a primacy for neutral displays in terms of that they are supposed to act in an emotionally “peeled off” manner. However, whether neutrality could be viewed as a discrete category or as more or less of another emotion is still an unsettled question. Yet it is an important one, in particular since neutrality may have a distinct profile of characteristics such as appraisal tendencies and action tendencies which may exert influence on decisions and in the long run also influence the outcome of tasks associated with these professions.
However, as a wrapping to the suggested veins of future research, further investigation of how individual micro-level functions affect organization level attributes and performance would be important. I would especially like to proceed by further investigating micro-level functions in terms of how different kinds of affective phenomena (such as moods, emotions and traits) rather than cold cognition logic, affect macro-level assumptions of firm fit. The investigation of the micro-level in isolation can teach us something about how individuals function, but from an organizational perspective, the connections between the micro level and the organizational level are the more interesting.

11.5 Chapter Summary

This chapter was set out to discuss implications and contributions of the dissertation. Starting with the theoretical implications, it can be concluded that by using an emotional lens, media choice and communication theories could be more nuanced. The nuanced view would offer new explanations regarding the outcomes of communication as well as switching rate of media.

Furthermore, perception of emotional events/expressions is related to decisions. In the case of the call takers, perceived negative emotions coincided with different degrees of perceived need for help. This connection may be explained by intrapersonal effects of emotion, but also by viewing emotional expressions as social information. Thus, while the processes for reaching decisions within this context hinges on somewhat different assumptions, the outcome (the decisions made in the setting) may be explained by both streams. In turn, these implications suggest that routines may start to drift from original intentions, dependent on the call
takers interpretation of the caller’s emotional expression. Fear expressions are likely to be over-prioritized while anger expressions are likely to be under-prioritized—a situation which may cause depletion of economic resources as well as trust from the public.

The section for method implications stated that no new methods were developed. However, the combination of methods provided for different kinds of inferences than what would have been possible using a single method. For example, it was possible to find differences regarding which kinds of emotions that typically were expressed in the setting and which emotions that were believed to be important to manage in order to conduct one’s work. The used methods also contributed, through the use of the concept of emotion and routines, which comparisons could be made on different levels of analysis. Furthermore, contemporary technology was discussed as a means to maintain integrity of callers when using authentic calls as stimuli in experiments.

Turning to findings which have practical relevance, this dissertation suggests a range of different implications. First, in order to cope with work as an emergency call taker, there is a need to develop understanding of individual strategies for managing emotions. The use of different management strategies of both caller and call taker has implications for decision quality as well as for well-being.

Second, the findings have bearing on individual decision expertise. Without possibilities of obtaining structured feedback, there is a difficulty to truly develop individual expertise. Since call takers act in both an uncertainty-reducing and ambiguity-resolving manner, where the ambiguity route does not directly correspond to routines of the organization,
it is difficult to find out whether this route has established functional relationships between expression in calls and symptoms.

Third, decision and communicative structures were discussed in terms of possibilities of developing an emotional tagging system—a system which would prepare call takers in a situation with overall few possibilities to prepare themselves. Furthermore, the pros and cons of implementing multimodal calls were discussed.

Next, the importance of workplace design was addressed in terms of providing “breathing space” in the schedule as well as how contemporary technology may function as an enabler in developing expertise. The organizational view of knowledge and employee turnover rates was also argued to lead to narrow learning and depletion of resources to cope with the mission. However, implications may be extended beyond the call taker domain, such as in ICT-based communication in general and in ICT-based environments which are routine-based in particular. Future research was suggested in the veins of finding sufficient standards for performance feedback, how multimodal technology may facilitate tacit knowledge, and how emotional blends and neutrality may play a role in performance. Finally, and as a wrapping to the previous matters, connections between different kinds of affective phenomena and micro-foundations of routines was argued to be an important area of study in order to further understand the consequences of emotions in organizational settings.
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Appendices

1. Email Request Regarding Participation in the Studies

Hello,

I received your e-mail address from XXXX and I therefore briefly wanted to inform you about the project on emotional markers, but also ask about an appropriate time for the interview. In order to plan the interviews so they interfere as little as possible with your work situation, I am grateful if you can email me three dates. Hopefully it would fit to do the interview in connection to a regular working session?

The interview is estimated to take approximately 90 minutes. The interview will be performed during the spring. The questions concerns aspects of your work situation. During the interview it is important that you tell me about your experiences of being SOS operator. There is no right or wrong in this situation, rather I am interested in your experience of what it means to be SOS operator.

Look forward to seeing you.

Best regards
2. Example of Informed Consent of Call Takers

Informed Consent for the Project on ”Emotional Markers”:

Hi,

Below is a request for participation in a research project regarding the relationship between emotions, judgments and decisions in your work situation as an emergency call taker. The project is approved by XXXX and XXXX.

The Research Project

Emotions exist in all occupations, but emotions may be more common at SOS Alarm than in other work settings. To work as a call taker concern being exposed to complicated situations where your ability to empathize and focus affects the outcome for patients. When conducting your work you must manage distance yourself not to make irrational decisions outside the routines SOS Alarm provides. At the same time the situation may bring difficulties to distinguish nuances of emotional expressions of callers. These interactions are interesting from a researchers point of view since it can be hard to obtain “common understanding” of the situation at the same time as the time for emotions to wear off between calls is short. The purpose of the project is to study emotional expressions in this communication setting in order to obtain nuanced knowledge on how emotions may aid the process of prioritization.

My name is XXXX and I am a PhD-candidate at Linköping University/Blekinge Tekniska Högskola. I have a background in psychology, but I am currently working with managerial and IT-based matters. Within my research project I study how expressions of emotions relate to decision making, and foremost how this process develops in situations where communicators are not meeting face-to-face. The research project will be conducted under scientific supervision by researchers from Blekinge Tekniska Högskola, Linköpings Universitet and the research school of Management and IT.
How will this matter be researched?
I would like to ask you to rate emotional expressions of callers in emergency calls in conjunction to your regular working sessions (a total of 50 ratings). Recordings of these calls will later constitute a material where I will try to trace acoustic emotional markers. The sample will be selected in conjunction to your regular working hours and is therefore not expected to impose any extra time. The ratings for each call will take approximately 15-20 seconds.

It is important to emphasize that the project aims to develop understanding of the communication and decision process as a whole and does not focus on you as an individual. In other words, I am not interested in whether you have made the right or wrong decision, but rather to increase my knowledge regarding how the process of prioritizing can be improved.

The study rests on foundations of voluntarily participation. This means that I need you approval in order to include your material in the study. This means that you may withdraw from the study at any time, without an explicit explanation, by notifying me. Due to research ethical reasons your responses will be anonymized. No details about you as an individual will be reported in the final material.

Potential Advantages of Participation
The reason I contacted you is because without you there will be no research project. My hope is that in a long term perspective my project will have effects on your work situation, for SOS Alarm as an organization, but also for the surrounding society. Therefore it is important, if you choose to participate, that you carefully follow instructions you are given. Since this is a research project I cannot guarantee explicit advantages of participation, but the aim is to:

- Improve your working climate by improving detection and management of emotional calls and thereby also more easily manage callers who are emotionally expressive, but also to create understanding regarding your own emotions in relation to making priorities.
- Inform the public regarding the complexity in your work.
- Improve and establish safer routines in order to better discriminate between Type A (over-prioritize) and Type B (under-prioritize)
• Improve procedures of recruitment by emphasizing more clearly on emotional matters. A scientific validation of SOS Alarms work.
• Scientific contributions regarding emotions relation to judgment and decision making in time critical environments.

If you have any additional questions regarding the project, please ask me by using the contact details below.

Regards

I have read and understood the information above and give my consent to participate in the study

..............................................................
Name
3. Example of Informed Consent Sent to Callers

Hi,

Emotions exist in all occupations, but emotions may be more common at SOS Alarm than in other work settings. Being a call taker concerns being exposed to complicated situations where your ability to empathize and focus affects the outcome for patients. When conducting your work you must distance yourself not to make irrational decisions outside the routines SOS Alarm provides. At the same time the situation may bring difficulties to distinguish nuances of emotional expressions of callers. These interactions are interesting from a researchers point of view since it can be hard to obtain “common understanding” of the situation at the same time as the time for emotions to wear off between calls is short. The purpose of the project is to study emotional expressions in this communication setting in order to obtain nuanced knowledge on how emotions may aid the process of prioritization.

The text below is a request about participation in a research project regarding emotions relation to judgment and decision making. I am contacting you because we would like to take part of recording where you made a phone call to SOS Alarm. If you are interested allowing us to analyze the recording I guarantee your integrity. Your identity will not be revealed for external parts. It is only researchers within the project that will know about you. Below follows more information about the project.

I am a PhD-candidate at Linköping University/Blekinge Tekniska Högskola. I have a background in psychology, but I am currently working with managerial and IT-based matters. Within my research project I study how expressions of emotions relate to decision making, and foremost how this process develops in situations where communicators are not meeting face-to-face. The research project will be conducted under scientific supervision by researchers from Blekinge Tekniska Högskola, Linköpings Universitet and the research school of Management and IT and is approved by the Central Ethics Committee in Sweden.
If you grant permission for the voice material to be used you can send me an email (paste the reference number from side 2) or cut and sign the coupon and return it by mail to the address at the end of the letter by means of the attached and stamped envelope.

**Purpose and Procedure for the Study**
The purpose of the study is to investigate emotions, positive as well as negative, and their relation to priorities made in emergency calls. In other words, it is the call taker who is in focus, but since caller and call taker is a part of the same situation it requires an informed consent from you in order for you voice to be included in the study. Focus will be on how you sound rather than what you say.

**Information About the Procedure and Result of the Study**
The result of the studies can be published in scientific journals. You can read about them by reading the dissertation or finding the articles themselves in the journal. You can, of course at any time, contact me to ask questions or take part of the results.

**Benefit and Risk Associated by Being a Part of the Study**
In order to establish an informed consent you should have been informed about benefits and risks in a non-biased manner.

The potential benefits from being a part of the study may be:
- Individual and societal effects, by improved routines that may raise decision accuracy, in situations where property, health and life are at stake.
- Positive effects in terms of working climate at SOS Alarm.
- Improved recruitment strategies that may be applied when recruiting new call takers.
- Scientific contributions in terms of improved knowledge regarding the intersection of emotions and decision making.

**Risk Assessment Regarding Participation:**
- Negative aspects in terms of worry that personal details will be mismanaged or exposed.
- Uncomfortable feelings about having the informed consent sheet sent to you.
The Use of Data
Your answer and result will be stored, protected from unauthorized individuals. Confidentially will be maintained by that the records are made unidentifiable and stored in a bank deposit while the original material will be kept at SOS Alarm. All data will be saved in order to create transparency and improve the scientific standard. If the results are questioned there should be possibilities for external reviewers to take part of the material.

Voluntarily Participation
The study is based on voluntarily participation. This means that you may withdraw from the study at any time, without an explicit explanation, by notifying me.

Regards

Martin Svensson

Informed Consent
I have read and understood the information above and allow recordings of emergency calls, where my voice is present, to be used in the study.

Date/Namn
4. Sample Questions for Interviews of Call Takers

1) Tell me about the last time you worked?
   a. Was it a typical day at work?
   b. How is a unique day at work?
2) Tell me about simple tasks in your job?
   a. Tell me about difficult tasks in your job?
3) Tell me about your current perception of how the job differs from your view when you started?
4) Tell me about your ideal image of a call taker?
   a. How is an operator acting who is not good at his/her work?
   b. What individual differences exist in the way you work?
5) Tell me how you would like a call to develop?
   a. How do you do to achieve it?
   b. What in the call makes you react to it as it was serious?
   c. What makes you react to it is a routine matter.
   d. How/when can calls go awry?
6) Tell me about training to become an operator?
   a. What in your training prepared you for difficult conversations?
   b. Do you experience an overlap between your education and your work situation?
   c. Do you have suggestions on how to bridge any gaps?
7) Can you tell me about any situation that has been especially emotional for you?
   a. What made that particular call emotional?
   b. What makes you angry or frustrated?
8) Tell me about the expression of emotions in the calls?
   a. How do callers express their emotional status?
   b. Can you hear that? What are the terms? Keywords/phrases/frequency/duration?
   c. What type of call contains emotion?
   d. When in the calls are these expressions expressed?
   e. How does an emotion change during the call?
   f. How do you do to maintain neutrality?
   g. Are there conversations where you feel, but do not express feelings?
   h. What type of conversation is that?
9) Can you tell me more about how emotions affect your job situation?
   a. Management of emotion?
b. How do you manage emotions when you know that the person died or will die?
c. Physical reactions, sweating, goose bumps, etc?
d. Are emotions contagious? Ask for the previous call/caller/colleagues. How?

10) Tell me about a time where it felt like you were performing on an optimal level?
   b. Do you prepare yourself in a special way when you are working/responding to calls?
   c. What time aspect are we talking about? Before the call, /before work/global strategy?
   d. Can you feel differently when you are performing well?
   e. Who do you tell you when you are performing well?

11) Which are the technical tools you use to do your job?

12) Can you tell me about situations where the technology has helped/not helped you?
   a. What features are important? Ranking / Rating of the technical aspects.
   b. Are there any features missing?

13) How do you reach the decision on what type of priority to make?
   a. What are your support systems in terms of analysis of the case?
   b. Tell me about your experiences of decision support system?
   c. Is there any support for your feelings in the system? Is it functional?
   d. Has it always looked like this or has it changed over time, how are decisions made?
   e. Is this the way to a decision or are there other ways?

14) Are there any "recovery periods" where you can relax and "reset" yourself?
   a. How do you deal with emotional conversations after the event?
   b. What kind of "recovery periods" are there outside of work? What do you do to not think about the job?
   c. If someone gets upset by a question, how is it handled?
   d. How are "special" experiences and events shared between operators?

15) May there be others who have different views on these questions?
   a. Have I missed something you think I should ask for?
5. **Instruction for Selection of Emergency Calls**

**Instruction Regarding Selection of Calls**

In the research project on emotional markers I wish to make a selection of authentic emergency calls. This selection regards health care related calls, where you make a priority. In other words, calls made by mistake, fire/rescue or police related calls should be excluded. I would like to ask you to help me making such a selection. I would like you to make the selection during your regular working hours by rating the callers’ emotions during the first minute of the call.

I want to interfere as little as possible in your work situation. Therefore, you will not rate all calls, but rather a selection of calls. Even though the following instruction may be perceived as long the actual rating procedure per call will last no more than 20 seconds. Continuously check the time! Rate the first healthcare related 112-call closest to every half hour (2 per hour) during your working hours. Such a procedure gives us the possibility of getting ratings that spans different hours of the day as well as different days. Please familiarize yourself with the material before using it in your work situation.

**Instruction for Rating Calls**

- Fill in background data on the first page (This is done once).

- Directly after closing the call, mark the reference number of the call at the top left corner of your sheet. **This is very important!** Note if you tutor a call taker or is a call taker under education.

- Rate the emotional expressions of the caller (which emotion or emotions) you perceive the call taker to express during the first minute of the call. There is no right or wrong in your ratings. You decide what should be marked!

- If you experience the caller to express an emotion **very clear** (for instance anger) you will note the rating 10. If you on the contrary experience the caller **not to express** the emotion you **note 0**.

- It is important that you rate on all scales. If you perceive the caller to express several different emotions you should rate correspondingly on the scales. That is, if the caller does not sound angry or happy but afraid you mark 0 for anger and happiness while you mark 10 for fear.
- You can use the scale of "different emotion" if you perceive the caller not to express any of the other stated emotions. In that case, note which emotion and rate it according to the procedure above.

- You should also rate emotional intensity (how strong you think the expression is) during the first minute of the call. If you perceive the caller to express the emotion very intense you mark 10 on emotional intensity. If you perceive the expression to lack intensity you mark 0 on emotional intensity.

- Also rate, the expressed help need during the first minute (corresponding to your degree of prioritization).

- If there are special notes regarding the call, such as if the caller was unclear or whether it was easy to make the priority, these can also be stated at the bottom of the rating sheet.
6. Sample Sheet Used for Ratings

Circle The Callers’ Emotional Expression During the First Minute of the Call:

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Very Clear</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
<th>Not at all</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anger</td>
<td></td>
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<td>Fear</td>
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<tr>
<td>Disgust</td>
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<tr>
<td>Surprise</td>
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<td>Different Emotion:</td>
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<tr>
<td>Emotional Intensity for the First Minute of the Call:</td>
<td></td>
<td>10</td>
<td>9</td>
<td>8</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>Not at all</td>
</tr>
<tr>
<td>Which need of help did the caller express during the first minute of the call?</td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td>Very much</td>
</tr>
<tr>
<td>Special notes regarding the call:</td>
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354
### 7. List of Archival Records used for Analysis

#### List of archival records

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<thead>
<tr>
<th>Nr.</th>
<th>Year</th>
<th>Type of archival record</th>
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<tbody>
<tr>
<td>1</td>
<td>2005</td>
<td>Annual report</td>
<td>91</td>
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<td>2</td>
<td>2006</td>
<td>Annual report</td>
<td>76</td>
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<td>6</td>
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<td>7</td>
<td>2008</td>
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<td>8</td>
<td>2009</td>
<td>Sustainability report</td>
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<td>Sustainability report</td>
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<tr>
<td>10</td>
<td>2008</td>
<td>Activity report</td>
<td>32</td>
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<td>11</td>
<td>2009</td>
<td>Activity report</td>
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<td>12</td>
<td>2010</td>
<td>Activity report</td>
<td>36</td>
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<tr>
<td>13</td>
<td>2011</td>
<td>Activity report</td>
<td>44</td>
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<tr>
<td>14</td>
<td>2008-2010</td>
<td>Policy documentation (from for instance Socialstyrelsen).</td>
<td>≈ 50</td>
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<tr>
<td>15</td>
<td>2008-2010</td>
<td>Password protected educational material; text, audio and video segments used in education of call takers.</td>
<td>≈ 400</td>
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<tr>
<td>16</td>
<td>2008-2010</td>
<td>Website material (<a href="http://www.sosalarm.se">www.sosalarm.se</a>)</td>
<td>≈ 100</td>
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<td>17</td>
<td>2006-2012</td>
<td>A separate memo-file describing the overall procedure of conducting a PhD which help aid contextualizing interpretations of call taker work</td>
<td>≈175</td>
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</table>

**Total:** ≈ 1458
The Swedish Research School of Management and Information Technology

The Swedish Research School of Management and Information Technology (MIT) is one of 16 national research schools supported by the Swedish Government. MIT is jointly operated by the following institutions: Blekinge Institute of Technology, Gotland University College, IT University of Göteborg, Jönköping International Business School, Karlstad University, Linköping University, Linnaeus University Växjö, Lund University, Mälardalen University College, Stockholm University, Umeå University, Örebro University, and Uppsala University, host to the research school. At the Swedish Research School of Management and Information Technology (MIT), research is conducted, and doctoral education provided, in three fields: management information systems, business administration, and informatics.


7. Sonesson, Olle (2007), *Tjänsteutveckling med personal medverkan: En studie av banktjänster*. Företagsekonomi, Fakulteten för ekonomi,


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Contact person: Professor Pär Ågerfalk, Director of MIT, Uppsala University  
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Address: The Swedish Research School of Management and Information Technology, Department of Business Studies, Uppsala University, Box 513, 751 20 Uppsala  
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ABSTRACT

Emergency call takers listen to callers describing mundane errands, but also to callers describing severe accidents, agony and deaths. The emergency setting is further complicated by having to perform triage quickly, but without the possibility of seeing the patient. The setting rests on an imperative of speedy management—there is little possibility of postponing or reconsidering a decision. At the same time, the mode of communication (telephone) may cause an overflow or lack of information, resulting in an uncertain and ambiguous decision-making setting. A focal point for the organization is therefore the individual capability of conducting triage. The organization thus seeks to help call takers by providing organizational routines, which are manifested in decision-support systems, to help them navigate this uncertain and ambiguous setting.

Considering the above, the emergency setting brings a problem to the fore—how do workers in this emotional setting, with features of vivid and interruptive experiences that possibly detour normative decisions, interact with routines that are supposed to provide the stability and support that recurrent decisions can be made under similar conditions? Drawing on the fields of decision making, organization theory and communication theory, the problem is investigated by a series of four studies.

The first study is a field study of the emotional landscape of emergency call taking. Emergency call takers rated callers' emotional expressions, the level of intensity and need for help. The second study is an experiment, using a speech sample from authentic emergency calls to find out whether expressed emotion and intensity contribute to the perceived need for help.

The third study focuses on the management strategies of call takers. More specifically, how do emergency call takers manage a double-faced set of emotions—i.e. their own and the caller's emotions—simultaneously? The fourth study focuses on how call takers make decisions, more specifically, how call takers use intuitive and emotional capabilities to complement or challenge rational aspects of the decision-support systems.

The studies reveal that certain emotions occur more often than others and that the level of intensity of expression contributes to the perceived help needed. Call takers have also developed specific emotional management strategies in order to cope with both callers' and their own emotions. Finally, call takers were found to use rational and formal routines as well as non-formal, intuitive and emotionally based, individual routines in order to derive their decisions. These findings are put into an organizational context in terms of implications for emergency call taking. Limitations to the development of situation-specific expertise and obstacles for organizational learning are identified. Also, emergency call taking would benefit from drawing on knowledge found outside the medical domain. Moreover, the most important finding is that the interpretation of emotional expressions in callers' voices can trigger modifications of the triage routine being used.