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Integration, differentiation and ambiguity in safety cultures

Anne Richter ^{*}, Christian Koch

*Construction Management, Department of Civil Engineering, Technical University of Denmark,
Building 115, 1, 2800 Lyngby, Denmark*

Abstract

This article discusses safety cultures, drawing on the differentiation, integration and ambiguity—scheme introduced by scholars of organizational culture. An ethnographic approach has been applied in the study of meaning and symbols relating to work, hazards, occupational accidents and prevention. The application of this approach is demonstrated through a multifaceted analysis of safety cultures. Case studies in Danish manufacturing show that it usually is necessary to differentiate between several safety cultures dispersed throughout the shop floor and other parts of the manufacturing organization. Although some common elements are present across cultures, they are indeed a multiple configuration of cultures. The article illustrates this by providing one case showing a configuration of three cultures, metaphorically labelled Production, Welfare and Master. For example, the former views risk as acceptable, whereas the other two view it as unacceptable. The former contends that skilful workers are not at risk, the second is proactively oriented, and the third contains a reactive approach. Although integrative elements across the three cultures exist, differentiation is relatively strong, albeit tainted by ambiguity.

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‘Einar had all of his trunk inside, in order to correct some material in the in-feeder. If you don’t correct it, everything goes haywire. The accident happened because of the safety device, he was squeezed between the opened safety cover and the post. He was lucky, one minute more, and we wouldn’t have needed to call an ambulance. Normally you never make corrections here, this has never happened before. He wasn’t thinking, that must be the explanation.—Two men

^{*} Corresponding author. Tel.: +45-4525-1642; fax: +45-4588-5582.

E-mail address: ari@byg.dtu.dk (A. Richter).

had to hold back the hydraulics, it's very powerful, it doesn't stop even when meeting resistance. Hydraulics is shit, electricity's better. The ideal solution would be a new in-feeder, but it's too expensive. We have the same hydraulic devices elsewhere.—What about that? I don't think we learn enough about accidents'. (Shop steward, Greenberg Packing)

1. Introduction

Studies and conceptualisations of safety culture continue to draw on the organizational culture paradigms. The present article is no exception. The impact of possible differentiation between safety cultures within a company is typically not the focus of the majority of safety culture research (Cox and Flin, 1998; Pidgeon, 1998a; Guldenmund, 2000). Along with dominant positions in the discourse on culture in organizations (Peters and Waterman, 1982; Schein, 1992; Hofstede, 1991), many safety culture scholars maintain a unitary, integrative and monolithic approach to culture. In contrast, there has been a growing understanding and conceptualisation of differentiation and ambiguity within the field of organizational culture (Frost et al., 1991; Martin, 1992, 2001; Parker, 2000; Alvesson, 1993, 2001). These studies present analyses and empirical results demonstrating the patterns of several cultures and cultural integration in organizations. Martin applies the three perspectives of integration, differentiation and ambiguity. Alvesson has labelled his approach multiple cultural configurations.

In recent years, we have worked on developing a concept of safety culture, drawing on the perspectives of organizational culture research of Martin, Alvesson and others. This has been applied in studies of safety culture in Danish manufacturing enterprises (Engberg, 2000; Richter, 2001). The approach has been analytical in an effort to understand how companies handle accidents and how prevention could be organised. We now feel, we have sufficient empirical grounding for presenting some results of this endeavour. The studies include change projects aiming at developing safety cultures oriented towards prevention.

This article is structured as follows. The relation between organizational culture and safety culture is initially reviewed. Each of the following three perspectives—integration, differentiation and ambiguity—are discussed, and a conceptualisation of safety culture is offered. In addition, case material from a Danish enterprise is presented, which illuminates a multiple configuration of three safety cultures. Finally, the discussion juxtaposes the presented case with further case results from other companies.

2. Organizational culture and safety culture

Organizational culture studies have been dominated by two main paradigms: functionalism (Schein, 1992, a.o.) and interpretivism (including symbolism, Geertz, 1993, a.o.) (see also Parker, 2000; Alvesson, 2001; Schultz, 1990; Martin, 2001, for

reviews). The approach adopted below represents a modified version of symbolism, perceiving the social world, in case organizations, “as constructed by people and reproduced by the networks of symbols and meanings that people share and make shared action possible” (Burrell and Morgan, 1979 in Alvesson, 2001, p. 25). Focus is on symbols, which can be expressed verbally, physically and by actions. However, along with other observers, we would be cautious in not describing these paradigms as too distinct (Martin, 2001; Parker, 2000). Our position is similar to Alvesson (2001) and Guldenmund (2000), who both observe that culture studies have to be related to the specific setting, production tasks and organizational context.

Safety culture is viewed as a focussed aspect of the organizational culture. We define safety culture as the shared and learned meanings, experiences and interpretations of work and safety—expressed partially symbolically—which guide peoples’ actions towards risks, accidents and prevention. Safety culture is shaped by people in the structures and social relations within and outside the organization.

In our seminal work on accident prevention and safety culture we found a resonance between empirical experiences from Danish manufacturing, especially regarding Alvessons argument for culture differentiation within organizations (Dyrberg et al., 1999). In the development of organizational culture theory, as in safety culture, there continues to be controversies on the way to conceptualise and analyse culture (Martin and Frost, 1996). Rather than too easily taking a one-sided position in these debates, we found Meyerson and Martin’s (1987) suggestion of a three perspective analysis promising, especially with the extension Alvesson offers by synthesising the perspectives into the concept of multiple configuration. This allows the scholar to handle quite complex cultural patterns. This article thus sets out to explore, whether and how differentiation, integration and ambiguity can be handled from the perspective of safety culture in manufacturing enterprises.

2.1. Integration

Within the integration perspective, culture is the shared understandings in a given organization. There is a consistency across cultural manifestations (Meyerson and Martin, 1987). Schein is probably the most significant scholar within this perspective, for as he notes, “one finds little variation within a cultural unit” (Schein, 1992, p. 22). Culture is thus an integrative mechanism, labelled as the social glue between its members (Schein, 1992; Alvesson, 1993, 2001). In Schein’s version, the common basic assumptions is the consistent shared element.

Some representatives of the integration perspective clearly link it with managerial prerogatives, and attempts of top-down control and change of the culture (Peters and Waterman, 1982; Deal and Kennedy, 1982; Hofstede, 1991).

Within this position it is rarely recognised that several cultures are in play. If so, it is interpreted as a signal of weakness (Gregory, 1983; Peters and Waterman, 1982; Deal and Kennedy, 1982), or one culture is assigned the role as dominant, whereas others are represented as subcultures. As Parker argues, it is often a matter of perspective as to what is subordinated and what is superior.

The International Atomic Energy Commission (IAEA, 1991), the confederation of British industry (CBI, 1990) and others have developed similar integrative perceptions of safety culture. Thus CBI defines safety culture as “the ideas and beliefs that all members of the organization share about risk, accidents and ill health”.

Guldenmund (2000), having reviewed studies on safety culture and climate during the past two decades, concludes on the need of clarifying conceptions and definitions, by suggesting a “Schein-ian” conceptualisation of safety culture. Shared basic assumptions on safety are a direct reflection of Schein’s categories. The shared basic assumptions cover, among other things, “what is safe and what is not”. Referring to Schein, the basic assumptions are assumed to permeate the whole organization (ibid: pp. 250–252). The integrative perspective on culture is in line with many scholars of safety climate or safety culture (for example, Zohar, 1980; DeDobbeleer and Béland, 1991; Williamson et al., 1997).

2.2. *Differentiation*

This perspective focuses on the lack of consensus between interpretations, experiences and assignments of meaning in organizations. Researchers within this perspective have often paid considerable attention towards non-leader-centred sources of culture (Parker, 2000; Louis, 1985; Von Zugbach, 1988; Meyerson and Martin, 1987). These researchers differ, however, in their analyses of units of differentiation, by which to characterize the field. Several authors’ analyses see culture as a product of social structures like countries, enterprises, departments, professions and groups (Guldenmund, 2000, p. 223 with reference to De Cock). These different groups and cultures coexist in the organization studied. Moreover, it is often argued that some cultures are superior to others, the “others” being seen as subcultures (Von Zugbach, 1988). In a study of three organizational cultures, Parker (2000, p. 188) presents three types of overlapping divisions:

- spatial/functional (different buildings and departments),
- generational,
- occupational/professional.

Other studies, like Alvesson’s, focus on the everyday work practice producing local cultures. These can cut across social structures. He advocates for a more cautious approach in the interpretation of differentiation in cultural manifestations, and argues for an analysis, discriminating social structural differences from cultural.

Some quantitative studies on safety culture/climate have, additionally developed a conception of co-existing subcultures (Hofmann and Stetzer, 1996; Cheyne et al., 1998), where differentiation is along the lines of plants in multinationals or hierarchical levels within an organization. The overall challenge in these studies was to identify a unifying, superior safety culture, among other things, measured by commitment of management, safety behaviour among the workforce and accident rates. Hofmann and Stetzer, conducting cross-level analyses, observed no differentiation in results connected to differing work characteristics. A qualitative study on safety

culture (Gherardi et al., 1998) found, however, ambiguity and differentiation along the lines of professional background and work tasks, when analysing meaning given to accident causes and preventive issues among engineers', and site managers' communities of practice at a construction firm. Cheyne et al. observed differentiation between plants within a multinational corporation, and suggest further studies at the macro-level; for example between capital intensive versus labour intensive industries. Mearns et al. (1998, p. 22), having measured safety climate at offshore installations, found evidence of a range of fragmented subcultures, differentiating according to seniority, occupation, age, etc. On this ground they suggest research involving "more detailed qualitative techniques on how groups form and interact to share their own view of risk and safety, rather than relying on quantitative survey-type instruments." Furthermore, Pidgeon (1998a, 2000) emphasizes the need of being sensitive to existing subcultures. As he notes, being aware of the tacit understandings of everyday practice and various interpretations of hazards, can be valuable in dealing with otherwise unnoticed risks. Such analyses may reveal a diversity of perspectives and interpretations of safety problems. Differentiation, from his viewpoint, is primarily related to social structure and to power relations, which may influence processes of sense-making and construct different versions of reality.

2.3. *Ambiguity*

Seen from the differentiation perspective, cultural manifestations may seem ambiguous. There is a lack of clarity. Potentially, there are differences in meanings, interpretations of symbols etc., which are incommensurable and irreconcilable (Meyerson and Martin, 1987, p. 636ff; Frost et al., 1991; Alvesson, 1993). Moreover, in the continual process of creating and recreating meaning, members of different cultures might orient themselves differently at different times (Parker, 2000, p. 89; Pidgeon and O'Leary, 2000). This perspective acknowledges the uncontrollable uncertainties that provide the texture of contemporary life (Martin in Frost et al., 1991).

Alvesson (and Parker), however, warns against too easily assigning cultural phenomena to ambiguity. Thus pointing out that ambiguity might originate from social structures or social practises (Alvesson, 1993). Drawing on Bourdieu, Alvesson (ibid) introduces social fields to represent a professional grouping with a distinct field of activity and qualifications, with its own rules for success and recognition, and its own structure of positions and economic and symbolic rewards. He thereby seeks to create an analytical dimension, recognising, that social structures interact with and co-produce culture. Feldman (1991), drawing on March, operates with the following ambiguities: ambiguity of intentions, understandings, history and organization.

In our study of safety culture, we focus on ambiguity of intentions, using an appropriated version of the framework of Ullmark et al. (1986), pointing at three types of governing rationalities, which can be labelled:

- producers' perspective;
- wage workers' perspective; and,
- safety perspective.

The producers' perspective points at the possibilities of a member of the organization being able to produce a product of quality, that is in resonance with her values. Some degree of autonomy in the mobilisation of one's skills is a central element in this perspective. The wage workers' perspective relates foremost to a decent pay, codetermination, and job security. The safety perspective relates to the lifelong preservation of one's own ability to work and to cope with emotional aspects of risk taking in a short term, as well as in a long-term perspective. Tension between these three rationales creates ambiguity of intentions.

Although ambiguity is an important aspect of culture, Alvesson (2001) and others point out that despite this, groups and organizations must develop at least some degree of mutual understanding of how to deal with problems, in order to make cooperation possible. He talks about bounded ambiguity. Even if culture does not produce clarity and consensus throughout an organization, it can offer guidelines for coping with ambiguous meanings, and give clues as to how one deal with tricky issues. Bounded ambiguity may also be seen in quick switches between different social circumstances, legitimising various sets of ideas and meanings.

2.4. Multiple configuration

Whereas the dominant view among culture study scholars is integrationist, few are differentiating, and even fewer attempt to synthesise these approaches (Martin and Frost, 1996). Parker and Alvesson both try to offer a way of at least juxtaposing the three perspectives. Alvesson stresses level differences, that is, whether cultures are macro-cultures, such as national or local. He suggests that cultures potentially overlap and interact. Parker suggests overlapping, subordinating, subordinated cultures (Parker, 2000, p. 224) when analysing his fieldwork. Alvesson is on the same line, as he introduces the multiple cultural configuration view (Alvesson, 1993, p. 118): it assumes that organizations can be understood as shaping local versions of broader societal and locally developed cultural manifestations in a multitude of ways. People are to different degrees connected with an organization, suborganizational unit, profession, gender, class, ethnic group, nation, etc. This explains his observations of cultural overlap in an organizational setting, which rarely is tightly connected to the social structures of the organization.

The central argument by Alvesson for introducing the multiple configuration is to combine insights of the above mentioned approaches. He thus recognises the role of macro-cultures, local cultures and possible integration and unity. But the mixture and overlapping character is a central observation.

Pidgeon and O'Leary (2000) have, in line with Alvesson, observed, that different people and organizations are only able to hold a partial, and often different and changing interpretation of a situation. Orders may be ambiguous, responsibilities only vaguely defined, goals may shift and subsequently, draw attention away from existing risks. Furthermore, according to Pidgeon (*ibid*), processes of defining risks or reporting errors can be undermined, if the possibility of differentiated understandings is not recognised. These meaning-giving processes are socially negotiated.

Inspired by various conceptions of culture theory, we have adopted an interpretive approach to organizational culture, being sensitive to a possible existence of a multiple configuration of safety cultures. So, we pursue to shed a clearer light on how, why or why not, hazards and safety measures are thought and handled by different actors. When the challenge, as in this study, has been to improve accident prevention, we have found it promising to seek to understand the barriers and possibilities embedded in safety cultures, as conceptualised here.

3. Method

The study predominantly referred to in this article is documented in Richter (2001). This study combined ethnography on safety culture with a study of the organization. We then proceeded doing action research in an attempt to improve accident prevention through participative learning processes, which could develop learning safety cultures, oriented towards prevention. The study was carried out in three Danish medium to large size companies, and was funded by the Danish Working Environment Authority.

The (symbolic) ethnographic approach is characterized by an open set of concepts used by the ethnographer in the fieldwork (Geertz, 1993; Deetz Stanley et al., 2000). We were looking for and listening to primarily verbal symbols such as metaphors, myths and narratives, as well as meaning and interpretations, regarding central aspects of safety. Secondly, we observed actions expressed in a ritual form at, for example, safety meetings. The approach was, on the one hand, to exercise empathy with the field, and on the other, to create sufficient distance to it (Alvesson, 1993). In this way, we sought to capture and question elements of everyday understandings and practices, which had been normalized or had become routines. The study of organization encompassed organizational structures, history, occupations, safety procedures, skills and other aspects of the organization (Clegg et al., 1996). The action research encompassed meetings with project groups, supporting change processes—all in the Scandinavian tradition of industrial action research (Gustavsson, 1992; Greenwood and Levin, 1998; Denzin and Lincoln, 2000).

The fieldwork comprised semistructured interviews (Heyl, 2001), presence in production areas, participation at safety committee meetings, retrospective analysis of a sample of accidents, and participant observation (Emerson et al., 2001) of accident analyses processes, carried out by local actors. This was supplemented by written documentation such as accident reports, accident statistics, and referendums and communications with the Working Environment Authority.

About 25 persons in each company were initially interviewed. These included chief executives, technical directors, safety and quality managers, maintenance technicians, first line managers, and workers at the main production areas—among whom were also members of the safety organization, and shop stewards. The interviews were transcribed in full text. Throughout the project, diaries from the researchers' participation at meetings, investigations and informal talks were recorded. All in all,

we were present for about 30 full working days in each enterprise, and were in contact with approximately half of the employees.

The safety culture analysis was an iterative process, consisting of two main steps. The empirical data was analysed, applying a method inspired by Alvesson (1993), who suggests that culture analysis must be context specific and related to central issues of the organizational life, which is of interest in the specific study. In our case, it was safety issues, and the analysis of the shared systems of meaning took outset in each interviewees/actors assignment of meaning of the following selected objects (Henderson, 1998; Bucciarelli Louis, 1994):

- Risks and risk handling; in own and others' job tasks.
- Causes of accidents; and reasons behind them.
- Preventive measures; implemented and/or necessary.
- Safety work; activities, problem- and conflict-solving, participation.
- Own job and tasks; mission, satisfaction issues.

This was supplemented by the actors' symbolic expressions, which deepened our understanding and interpretation of the object in focus. In cases of ambiguity on culturally related issues, the context or the rationale to which the interviewee related, was noted. In the first step of the analysis, we sought differentiation along social structures and job content lines (Alvesson, 2001, p. 146). The data was organised according to organizational structures: top management, middle management, teams of workers in different departments/production lines, shop stewards and members of the safety organization. This revealed differentiations, within and partly between, the social groupings. We thus agree with Alvesson's and Parker's precautions about too easily adopting social categories, such as work groups, as units. Subsequently, the next step of the analysis was cross-level, where the analysis was adopted to a new unit: the data was organised according to cognitively coherent and consistent systems of meaning. For example, were meanings and symbols, which pointed at proactive conceptualisations of prevention (see Merkel, 1996, p. 163; Pidgeon, 1998a, p. 206) categorized to one system of meaning, acceptance or denial of risks to another, and so forth.

Since culture expresses *shared* understanding and meaning, the pragmatic criteria has been, that at least six people must express corresponding meaning regarding the objects within one system of meaning. The construction of a system of meaning (Alvesson, 1993) represents a culture and, therefore, the unit of the step two analysis *is* the culture, which, of course, cannot be defined beforehand. The cross-cutting and ambiguous nature of organizational, or in this case, safety culture, depicts the multiple configuration. In the analysis we found impacts of cultures, which we interpret as macro-cultures. However, the enterprise focus implicates that we have not conducted culture analysis of macro-cultures. Rather, we maintain a cautious interpretation, drawing on the actors' expressions regarding relations to external networks, representing macro-cultures, and combined this with our knowledge of industrial relations and work environment expressions within the societal structure in question.

In the representation of the differentiated cultures we use an organizing theory metaphor (Alvesson, 1993). This is instrumental for representing the safety cultures. The theory metaphors characterize the culture, as the researcher conceives them theoretically. And the theory metaphor differs from metaphors of the field. Whereas the former are constructed by the researchers, the latter are registrations “from” the field.

The initial results were analytically developed through iteration as the project progressed, and more nuances were illuminated during our further encounters in the enterprises. Two researchers, involved in the empirical work, practised inter-subjective control regarding interpretation of data and analyses. A third, “external” researcher questioned the two researchers’ interpretations. Furthermore, results of the analyses were presented to the actors in the enterprises. Dialogue among participants, concerning the multiple configuration of safety cultures, supported critical reflection about issues, hitherto taken for granted, and served to open up for imagination. This occurred at the onset of the action research part. These themes are, however, not the issue of the present article.

The limits of a purely qualitative approach can of course be discussed. However, Shannon et al. (1999) and Guldenmund (2000) and others point at the limits of quantitative approaches to safety culture, if the issue is prevention work. It should be noted that we did not attempt to link accident rates to the safety cultures discussed. We would agree with Cooper (2000) that the accident rate is a non-simple indicator of safety culture. We contend that a number of qualitative indicators, such as the shared systems of meaning on safety within the multiple configuration, could be a strong and practical measure of the capacity to improve accident rates.

4. Approaching the field

The three participating companies were quite different, but also had common characteristics. Similar to general industrial trends, they had undergone comprehensive changes during the past decade. This concerned replacing management and a reduction in the number of line managers, new management styles, changes in ownership, more or less comprehensive automation and IT implementation, order based production and greater priority given to quality. These changes resulted in new demands on the workforce, such as flexibility and new qualifications. Formally, the health and safety work was organised as laid down in the legislation. One of the three cases is presented below.

5. The case of Greenberg Packing

This is an enterprise within the packaging industry with 150 employees, situated on the outskirts of one of the country’s largest industrial cities. Ninety of the employees are blue-collar workers.

5.1. *Tasks, social structures and relations*

The production task is printing and forming a great variety of high quality packing material. The production process consists of automated and IT-integrated machinery. The workers in these areas are skilled printers and mechanics, who belong to different unions. The agenda of the new management was rationalization combined with a collaborative style of leadership, contrary to that of the former management. Today, the organization is non-hierarchical, and the vertical and horizontal division of labour has been markedly reduced. The workers have influence as well as responsibilities regarding planning and production related problems. This has come about through cooperation between management and workers on developing the organization and jobs. The workers conceived this as a way of improving the psychosocial conditions of work. The main area of conflict today arises in the wake of ongoing rationalization, which is normally handled via negotiation, where the unions are also involved. Work environment activities are of a fairly high standard and also given priority by management. The company policy states, “health and safety of the workers must not be impaired at the workplace”. Nevertheless, 25% of the workers have been injured by occupational accidents over a 5-year period. A few of the accidents almost resulted in fatal injuries. As is typical for automated production, risks mainly occurred as the workers’ carried out maintenance tasks or handled production disturbances, caused by the material flow or by technical failures. Participation in this study was supported by management and the safety committee, because it was conceived as a mean to reduce accident rates, and because they had noted “difficulties in finding a pattern connected to accidents”.

5.2. *Safety work and signs of safety culture*

Meaning, given to risks and perceptions of adequate actions to counteract risky situations varied and, in some cases, a chain of adverse events could lead to an accident. This was a common understanding throughout the company. Often, interpretations of the triggering event were connected to workers’ risk taking. But a wide variety of meanings on the reasons behind this were given—spanning from mishaps during risk taking, to quality problems, efforts on stress control, dysfunctional technical design, to outdated knowledge. Two rationales can explain risk taking. First of all, there was a great deal of focus on economy and productivity. The cost of raw material and the production-increase in value was rather high. Poor quality and product waste were conceived as expenditures or, as work in vain. Machining times and wastage rates were registered in IT-systems and reported company-wide. Secondly, the workers’ ability and qualifications to prevent production problems were much valued by themselves and by management.

Accident prevention was marked by and, in some cases, hindered by, the different interpretations of risks and accident causes. Accident investigations and initiatives regarding preventive measures were mainly dealt with by the safety groups. Reasons behind accidents, such as broader issues of the work situation, were recognised by some actors, but subdued or not recognised by others. Therefore, it had been difficult

to tackle prevention. Another preventive task for safety groups and production engineers was checking on possible risky design, prior to implementing new technology. In doing so, confidence in the EU Machine Directive's capability of foreseeing risks had been highly relied on. Later on, in the wake of accidents, some actors deemed this to be a myth. Although action was demanded by the Working Environment Authority, the greatest difficulties in accident prevention concerned analysing and coming up with effective safety measures. In spite of resources in this enterprise, barriers embedded in safety culture set their limits.

This situation is summarized in Fig. 1 and elaborated in the following analysis of culture patterns. But first, an excursion on theory metaphors is presented.

5.3. Theory metaphors of safety cultures at Greenberg

Three safety cultures emerged in this company. Each safety culture was given a name, a theory metaphor, which was constructed by the researchers. In doing so, we chose metaphors, which on the one hand gave a picture of each culture and, on the other hand could be both recognisable and surprising to the participants in the enterprise. But let us define the theory metaphors of safety culture of the present case.

The theory metaphor, *Production*, refers to a combined version of Ullmark's (1986) perspectives of producer and wage worker, setting focus on the mission and meaning of jobs and functions, which promotes job satisfaction (Karasek and Theorell, 1990). The metaphors, *Welfare* and *Master*, both refer to Ullmark's safety perspective. Further, welfare, as theory metaphor, is referring to a definition of the welfare state (Esping-Andersen, 1990), expecting responsibilities as well as providing care of its citizens, which also has an egalitarian orientation. Master, as a theory metaphor, refers to the competent teacher/master/craftsman, who passes on the skills of a trade by being a good example in practice (Lave and Wenger, 1991). The main difference between the two latter theory metaphors concerns a proactive versus a reactive conception. From this theoretical frame, the definitions below are inspired by the safety cultures we have met.

Production: This is a metaphor of safety culture, intertwined with work related aspects of producing. Work and production processes have priority over safety. Satisfaction of producing a good quality product, mastering the machinery effectively and securing a company's market position is up front. This is valued and respected among members of the culture. Risks are a condition of work, and are possible to minimise by skilful workers. Safety measures are counterproductive, hindering work or hindering autonomy. Accidents are atypical and unforeseeable variations of the normal situation.

Welfare: This metaphor relates to work, seen in the long perspective of working life. You must be able to contribute as a productive member of society throughout life. Thus, risks are unacceptable, and accidents are counterproductive, both at the individual, company and societal level. Prevention primarily focuses on structures of work, such as technology and work situation, as well as on social practices. Prevention is handled by participation and cooperation.

Safety culture metaphors	Production	Welfare	Master
Systems of meaning			
Risks:	Risks are acceptable	Risks are unacceptable	Risk taking is unacceptable
Accidents and their causes:	Accidents might happen to anyone, if unlucky. Unforeseeable and atypical.	Accidents are caused by technical faults and stress. Witnessing accidents is an emotional strain.	Confusable technology. Risky habits.
Preventive measures:	Skilful workers are normally not at risk. Technical safety devices restrict work.	Safety demands on new equipment. Checks for risks in all areas of the plant. Develop safe compromises. Solving problems in groups. Meetings involving all staff.	Updating safety knowledge on new technology. Safe actions of work when making corrections. Meetings involving all staff. (Warnings.)
Metaphors of the field:			
On safety issues:	“It’s like in traffic, people drive too fast.” “It was a slip, he’d deposited his head outside.” “The red line in accidents is that they want to save material from crushing in the infeeders.”	“They are not to take the best out of us.” “Machines can be substituted, fingers can’t.” “All the things we do on prevention ought to contaminate our accident rates.”	“Playing out of tune is learned from others.” “Knocked in: no watches and long hair, when working by rotating machinery.”
On job related issues:	“They are kings of the machines.” “Call a spade for a spade.” “The material is alive.”	“We want to become old here.” “Don’t forget where you come from.”	“A kind of father, teaching his children to swim.”
Meaning and interpretation of job and tasks	Mastery of machinery and the production process. – Satisfaction of doing a good job. – Job security. – Career. – Mastering competition on the market.		

Fig. 1. Three systems of meaning, which sum up the safety cultures. Supplemented by job satisfaction issues, which cut across the safety cultures.

Master: This metaphor of safety culture aligns to historically based experiences of the master or the good colleague, who sets an example on safe mastery of a trade. Risk taking is unacceptable. The preventive focus is on integrating non-risky habits in actions of work. New technology demands updating safe work practices. Development of acceptable work integrated rules and procedures, and good introduction and learning situations for new or young employees prevents accidents. These issues are a common concern.

The theory metaphors of safety culture picture the systems of meaning regarding the objects in focus of the analysis, as expressed by the actors in this enterprise, and are summarized (Fig. 1).

The safety cultures are further described below, through the perspectives of integration, differentiation, ambiguity and multiple configuration.

5.4. The integration perspective

Quite clearly, it is not possible to detect a consistent, unifying culture, which unite the members of the organization on safety related questions. Within the safety

cultures of Welfare and Master, we do, however, find an integrative element connected to non-acceptance of risks. But interpretations on accident causes and appropriate actions differ. Furthermore, a cross-cutting integrative element relates to mastery, on the job dimensions. Meaning and value were assigned to pride of profession, on mastering machines and work situation, individually and collectively. This saturated all levels of the organization. This was the main rationale of the safety culture, Production. But it had counterparts in the two other safety cultures. Within the Welfare culture the perspective on solving safety problems was based on cooperation, and there was much concern about finding popular preventive measures. Furthermore, competence in understanding machinery and work organization from a point of view of mastering safety, was valued. Within the Master culture emphasis was laid on integrating safety procedures, understood as part of mastering machines and work tasks. In other words, emphasis was on learning this formally in order to transform it into tacit knowledge at a higher level of mastery. Warnings and punishment were primarily a ritual, which no one wanted to practice.

Two rationales, related to social structure and practices, had an integrative impact on safety cultures in this company: first of all, the more or less common concern about living up to corporate expectations of improving payoff, which gave promise of career and prestige for some, and job security for others. Secondly, the non-hierarchical organizational structure, implicated demands on workers' participation and qualifications—a situation negotiated via reasonably balanced powers of relation.

The integrative aspects, related to issues of mastery and participation, pointed out the direction of new preventive strategies.

5.5. The differentiation perspective

The “step one” safety culture analysis clearly showed a differentiated set of three distinct cultures. But the differentiation was not tightly connected to the social structures. This was manifested internally among groups, and to some extent externally between groups.

All the safety cultures were present within each shop floor group. But there was some distinction between the department, occupying printers, and the department, occupying mechanics. In the former department, the cultures labelled Master and Welfare were more heavily present than in the latter department, which was more dominated by the safety culture Production. In a broad view, the job functions and demands on qualifications were similar in the two departments. It appears, that profession could have an impact on differentiation. Furthermore, distance could explain the existing differences. These two groups worked in different production halls, and had limited interaction in their daily work. Also among first line managers all the cultures were found. But one manager, the oldest, could primarily be related to the culture Production. He stressed the importance of workers control in the daily production, meaning, in this case, non-interference in risk taking. As he stated:

‘They know most about the machinery. These quick, and perhaps dangerous, corrections, I don’t notice. They know about faults and mistakes. I don’t interfere’.

The other manager related foremost to the cultures, Welfare and Master. This was in line with his safety viewpoints and a pedagogical concept of leadership. In this, he referred to the rationale of delegating responsibility and upgrading the workers. So, in these cases the differentiation could primarily be explained as generational and as differences in the conception of leadership. In top management the culture Production was dominating, but elements of the two other cultures were clearly also present, primarily in specific contexts. The line of division between this and other levels may be explained by differences concerning expectancies of the job mission. Internal differences in top management appeared to be due to variety of tasks and external contacts.

Among members of the safety organization there was less differentiation than within other social structures. The safety cultures Welfare and Master were dominating. Among some members it was in a combined version, among others it was one or the other of these two cultures. Even though the members represented workers and managers from different departments and professions, a greater degree of integration was found here, than within the social structures, where they worked. This could be explained as ideational, mission related, and due to more frequent contacts to external networks regarding work environment. However, the safety culture Production was also present within the safety organization.

This indeed gives a “messy” picture. The differentiated cultures could explain difficulties of members of the safety organization and others to implement effective preventive measures, and to live up to company goals of reducing accident rates. So, in the social practice of accident prevention at Greenberg, differentiation was a marked barrier.

5.6. *Ambiguity*

From the point of view of accident prevention ambiguity of intentions prevailed. Messages from management were ambiguous, stressing in one context machining time and wastage rates, and in another, safety perspectives. As described by a safety representative:

‘The technical director emphasized the other day that Carl is a very skilful worker. His machining time was always above average. But the director doesn’t know Carl is taking many risks when adjusting machinery while it’s running full speed. At other times the director puts out warnings to stop machinery, when any risk at all occurs’.

In practice, the interpretation of risks and how to act was up to the workers. But in the wake of an accident, management issued warnings if workers did not comply with a rule of stopping machines in risky situations, which the accident proved had

been present. Also from another point of view, warnings were ambiguous. They were contradictory to company policy and practice of a non-authoritarian style, delegating responsibility, which nourished the autonomy of the workers. Therefore, management was also rather reluctant regarding sanctions.

The quotation at the introduction of this article, illustrates ambiguity in interpreting risks and preventive measures, which sums up an explanation of a recently occurred serious accident, expressed by a shop steward. In this case, elements of the three safety cultures came into play in the interpretation by one single actor. Causes were designated to unsafe behaviour of the worker, production rationales, unsafe machinery, as well as to lack of learning. This illustrates the multitude of conditions and rationales, which one had to relate to. Via dialogue later on, it turned up that corrections often were done at this point in the production process. It had hitherto been part of the tacit understanding of how to manage the tasks.

In spite of ambiguity in the safety cultures, the organization, nevertheless, acted on risks. Bounded ambiguity, as suggested by Alvesson, could be a clarifying term. Some common understanding of the need for reducing accidents was present. Willingness in management to supply resources, followed up by engaged safety groups, had an impact, but this cannot sufficiently explain the preventive activities in the enterprise.

Guidelines in the Work Environment Act, combined with demands put forth by the Working Environment Authority in case of accidents, supported bounding the ambiguity of perceptions of the need to act on hazards. Societal intentions, expressed by the Authority, were received among local actors relating to the safety cultures labelled Welfare and Master. Intentions were, on the other hand, confronted with more or less silent resistance from actors relating to the safety culture Production. This led to solutions, which reduced risks, but they were not sufficient. An example of this: one type of measure had been to mount safeguards on machinery but later on, some of them were dismantled by operators, since they “hindered work”.

The ambiguity of intentions may result in limiting good preventive measures, and is thus, a barrier.

5.7. A multiple configuration

It is characteristic, that corresponding systems of meaning were found among top management, first line managers and the shop floor. We observed similar, different and ambiguous interpretations of safety matters vertically, but also horizontally in the organization. The overlaps of safety culture thus draw attention to Alvesson's conception, the multiple configuration. This recognises that culture is continually shaped and reshaped as members of the organization interact across the social structures and with external macro-cultures.

Top management allocated resources, for example financial, to accident prevention, and encouraged local development of safety specifications prior to implementing new machinery. The rationale was having a good image in the community, and reducing costs connected to accidents. Another rationale was being on good terms with the employees. This position was nourished through membership of an

external management networks, exchanging viewpoints on modern leadership oriented towards alternative ways of securing success. However, management had also contact to the external corporation network, setting goals on improvement of productivity and turnover. Success was primarily measured by this yardstick.

Depending on the situation, the first line managers reflected one or the other safety culture. On the one side, they were loyal to company goals regarding turnover, and on the other side, they had relatively close contact to the shop floor from where they originally came. Therefore they sometimes demonstrated ambiguous understandings or actions on safety matters. At the shop floor, the relation to a specific safety culture was less situational than in management. Besides the differentiation lines between shop floor groups in different departments, described above, different affiliations to external cultures played a role. The workers were members of different unions. The Printers' union is much concerned about health and safety matters, whereas the Mechanics' union is primarily concerned about production related matters.

The main impact of macro-cultures stemmed from management networks, trade unions, professional groups and societal structures of work environment. These macro-cultures were locally developed by company history of job enlargement, resulting in non-hierarchical structures and workers' participation.

6. Discussion

A qualitative approach to safety culture, inspired by interpretive theories of organizational culture, can deepen the understanding on how companies interpret and handle risks and accidents, and the barriers and promises of enacting prevention. We see this as a prerequisite of change, which is not merely superficial. Since this study aimed at introducing strategies of improved accident prevention, the challenge has been to mediate reflections on the different systems of meaning regarding safety matters within the company. A premise has been that success depends on whether such new strategies are meaningful to the local actors.

It has not been possible to detect a unified safety culture, as the case illustrates. Hence, we cannot recognise the observations of Schein (1992) about little variation within a unit, neither when the level is the enterprise, department nor group. In the two other companies not described here, we met four, respectively three safety cultures. The cultures in these companies were not replicas of the cultures at Greenberg Packing. Although there were certain similarities, the differences were more conspicuous. This is in line with Cheyne et al. (1998), who found different results on safety climate between four production sites. The distinguishing factor was, according to Cheyne, differences in the strength of employees' attitudes to safety management and individual responsibility, which suggested a key role of managers' actions and commitment, whereas differentiations between companies in our study were otherwise. Here, cross-company variations of safety culture could be explained by differences in job content, social relations and structures, combined with different impacts of macro-cultures.

The manifestations of safety culture at Greenberg Packing were obviously differentiated, but not following the organizational structures, neither between nor within organizational levels. This is contrary to observations of, for example, De Cock (in Guldenmund, 2000), and Hofmann and Stetzer (1996). The former assumes that divisions, departments, units, etc. develop their own culture. The latter found homogenous perceptions of group processes within teams, and group variances were significantly related to safety behaviour, thus suggesting that teams developed upon an agreed set of standards.

Our findings show, that cross-level interaction and impacts of macro-cultures play a role in “breaking up” unified cultures within and between groups, and a multiple configuration of safety cultures has been identified. This underlines that culture is not “frozen”. Safety cultures are continually being created and recreated in confrontation with the social reality, as people interact with (cultures of) internal and external actors. As we have not met a unified safety culture, it seems rather unrealistic to imagine a culture change brought about by safety management measures from above, as Pidgeon (1998a,b) has also warned against. This study has experienced how culture is embedded in contextual meaning-giving processes. Therefore, the outset of culture change could be dialogue among actors from various parts of a company adhering to different safety cultures. However, this calls for awareness of power relations, since issues of guilt, blame and victimizing may hinder a creative process of critical reflection on risks and prevention. Such a process, however cultural in nature, also has structural and material implications such as new safety procedures, changes in the work organization or technology design.

A question, which we have barely touched upon here, is the influence of power on interpretations of reality, stemming from power structures in a company. We agree with Pidgeon (*ibid*), stating that this is of ultimate importance in the process of reporting, and being able to learn from the sources of breakdowns in case of accidents. In the case of Greenberg Packing, we have noted limited subordination between the three safety cultures. This could be ascribed to relatively balanced powers of relations. In the two other enterprises the situation was different. One company, for example, had until recently been owned by a manager, exercising an authoritarian style of leadership, in a work organization marked by division of labour. The employees either complied or chose to leave the enterprise. In this company, a new progressive top manager, wanting to reform and modernize production as well as work environment, had great difficulty in mobilizing the workers in safety matters. They had long been subdued in silence. A newer, more preventive orientated safety culture was still rather weak, confronted with a behaviour control oriented safety culture. This was a residual of the “old” culture. In this company, it was evident that behaviour control strategies obstructed acquiring knowledge of errors and near misses, crucial to accident prevention. This strategy reinforced a long-term workers’ counterstrategy of seeking some autonomy by keeping silent about experiences on how to manage their jobs. So, in this company we met a multiple configuration of cultures historically marked by company-internal power relations, and impacts of macro-cultures, which were different from the case of Greenberg Packing.

7. Conclusion

In the ongoing debate about safety culture, many scholars, concerned about health and safety at the workplace, primarily have been oriented towards a functionalist, quantitative approach. Along with Gherardi et al. (1998) and Mearns et al. (1998) we propose an alternative. This has, at least, been promising in action research directed towards the development of new preventive strategies. Our endeavour has primarily been an ethnographic approach to understand the multiple configuration of safety cultures, developing and changing as people relate to cultures and material conditions within and outside the enterprises. Our point is, that safety culture should be understood in a specific context, and that culture may change, as the material conditions and the social relations develop.

In our empirical work we have demonstrated how the three perspectives of integration, differentiation and ambiguity, supplemented with the notion of multiple configuration, are useful tools, when pursuing to understand the complex social reality, which shapes safety cultures in companies of modern society. A central result, not only from the case presented, but also from the two other cases in Richter (2001) and in Engberg (2000), is that integration in these enterprises is a rather weak element in the safety cultures, whereas differentiation and ambiguity are much stronger.

The other cases differentiate along other lines than the presented case. This implies that the multiple configuration of safety culture is indeed unique for the single enterprise, although macro-cultures, for example, related to management networks, unions, professional identity and societal regulation, tend to have an impact across enterprises. Furthermore, drawing on the cases studied, where a similar degree of management commitment to safety was observed, it appeared that this had less impact on safety cultures and the quality of safety activities, than observed by others (for example, Mearns et al., 1998). Our cases suggest that structures and social relations such as the degree of division of labour, work content, power relations, traditions of participation and broad commitment to safety, as well as macro-cultures have an impact on the quality of safety work. Similarities on along these lines may reveal elements of common safety cultures across companies. But these hypotheses need further studies.

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