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Chapter 3
Understanding Safety Culture Through Models and Metaphors

Frank W. Guldenmund

Abstract "*Few things are so sought after and yet so little understood.*" With this pithy statement, psychologist James Reason expressed the potential value but also the elusiveness of this complex social-scientific concept twenty years ago (Reason, Managing the risks of organizational accidents. Ashgate, Aldershot, 1997). Culture had been on the mind of safety scientists since Turner's book *Man-made disasters* from 1978, but the term 'safety culture' was only coined nine years later, right after the Chernobyl nuclear disaster in 1986. Since then, safety culture has been alluring as a cause—for both occupational accidents and process related events—and as a thing to strive for, although possibly unattainable (Guldenmund, Understanding and exploring safety culture. BOXPress, Oisterwijk, 2010). In this chapter, I will look at various perspectives on (safety) culture, using the metaphor as an illuminative principle, to identify (what seems to be) the essence of some dominating perspectives. Firstly, however, a common understanding of what culture 'is', needs to be established. I will then touch upon the assessment of culture. Afterwards, I will present four metaphors for safety culture, which represent the dominant perspectives on this concept. The chapter ends with suggestions on how safety culture might be influenced.

Keywords Safety culture · Culture model · Culture development
Culture assessment · Culture metaphors

1   Understanding Culture: A Brief Introduction

What *is* culture? Culture emerges at places where people live and work together. Living and working together requires a certain degree of shared understanding—e.g. about daily reality, about work and its context, and so on—and it is this

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(shared) understanding that a culture provides. Culture exists *between* people[1] and is activated when they meet, see symbols from, or perform rituals pertaining to a culture they have adopted. Different people and different contexts evoke different cultures and people usually carry several different cultures. The actual essence of culture is notoriously hard to define, but it embodies values, norms, meanings, convictions, beliefs, assumptions, and so on, that enable people to make sense of their world and perform in it as well as to make sense of other people's behaviors. Their behavior could be words or deeds, but could also consist of strong feelings or opinions that are either articulated or expressed more implicitly.

Culture plays a crucial role in society and, consequently, in organizations. Culture influences, but is also influenced by, the structure and formal part of an organization as well as the daily execution of its processes. The latter occurs as interactions between people and between people and the primary process. If safety is an integral part of this primary process, the resulting culture is called 'safety culture'.

1.1 Definitions

There are many definitions of culture and they often overlap considerably (Antonsen, 2009). Three definitions express the description of culture given above well. Culture is

> the collective programming of the mind which distinguishes the members of one group or category of people from another. (Hofstede, 1991, p. 5)

Hofstede's definition highlights that culture is acquired, as 'mental software', as well as the distinctive nature of cultures, between groups or categories of people.

> Culture is a fuzzy set of basic assumptions and values, orientations to life, beliefs, policies, procedures and behavioural conventions that are shared by a group of people, and that influence (but do not determine) each member's behaviour and his/her interpretations of the 'meaning' of other people's behaviour. (Spencer-Oatey, 2000, p. 3)

Spencer-Oatey emphasizes the influence culture has on people's behavior as well as its interpretative aspect, through which people are able to understand each other's behaviors. Based on this understanding people can make attributions as to why people do the things they do.[2]

Finally, the Norwegian Bang defines (organizational) culture as

> the set of common norms, values and world views that develop in an organization when its members interact with each other and its context. (Bang, 1995, cited in Martinussen & Hunter, 2018)

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[1]Although, of course, it is ultimately coded in their brains.

[2]Which might, nevertheless, turn out to be false, as one group's behaviors or symbols might have a different meaning than another group's.

Bang's definition describes the interactive and context-dependent nature of culture. Culture emerges spontaneously, unintentionally even, whether a group likes it or not. On the one hand, this highlights a certain arbitrariness of its content and the fact that it might have turned out differently with a different group interacting under different circumstances. However, when a culture has established itself within a group, its members are cautious and often even unwilling to adapt it, unless the group becomes ineffective or dysfunctional (Schein, 2010). On the other hand, it is difficult to say who decides what becomes part of culture and what not. Again, this is entirely dependent on the composition of the group, its context and the task(s) at hand.

1.2 The Nature of Culture

It is hard not to write about culture as 'something' that a group 'possesses', as if culture is an instrument used by a group. Hofstede's allusion to the term 'software' might be particularly useful. Software as an operating system, provides the rules and procedures for the computer to 'behave', i.e. to compute. Software is not a thing as such, which can be manipulated by the computer to its own liking or benefit. Software can be updated or changed indefinitely, and the same goes for culture.[3] However, this is also where the comparison stops, as software can be changed and updated by command, whereas culture cannot. Comparable discussions on the nature of organizational culture were carried out in the 1980s when scholars queried whether organizations basically 'have' or 'are' a culture (e.g. Smircich, 1983), resulting in functional and interpretive paradigms (e.g. Guldenmund, 2016).

1.3 Schein's Culture Model

Schein's model of culture perhaps provides some grip on a culture's elusiveness and is, moreover, especially relevant for safety. Schein defines culture as a core consisting of implicit and covert basic assumptions (strongly held beliefs, values, norms, and so on) surrounded by two overt and, hence, empirically tangible, layers (Fig. 1). 'Artifacts', the outer layer, are clearly visible but not directly convertible to an underlying culture although they might be an expression of it (or not). Artifacts are most easily acquired and can function as a façade rather than a cultural expression. The same goes for 'espoused values', the second layer which, again, are tangible but do not need to translate directly into underlying basic assumptions. Espoused values are the values people express when asked about something.

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[3]But through entirely different mechanisms and time scales.

Fig. 1 Schein's model of culture
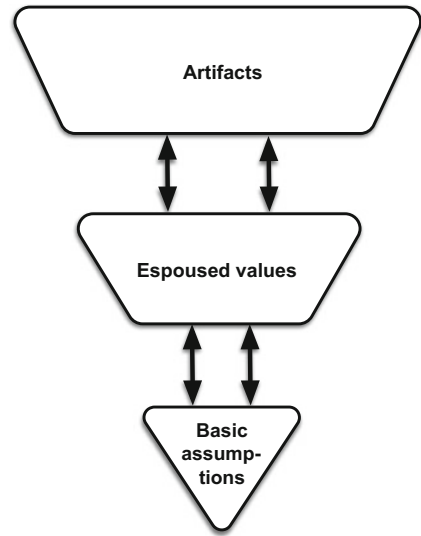
However, they might not reveal the actual culture lying underneath, as they may rather be (good) intentions, (future) ambitions, social desirable notions or politically correct answers (Banaji & Greenwald, 2013). Indeed, no organization will publicly espouse that they do not care about safety. While 'zero accidents' or 'safety is our first priority' might be their maxim, daily reality might nevertheless prove otherwise.

Schein's model typically provides an outsider's view on culture, and he warns this outsider not to take his (or her) observations at face value. (S)he needs to reach beyond the artifacts and espoused values to truly understand the underlying culture. This is a process of observation, interpretation and confirmation; a course of investigation defined by Schein as 'deciphering' (2010).

1.4 Culture Development Model

A further hold on culture can be provided by describing the process through which culture develops and is maintained within a group. The first step, called 'understanding' (Fig. 2), is an essential and individual activity people have to carry out in order to survive in the world, which does not speak for itself. People need to interpret what they see and make attributions based on these interpretations. This goes for objects and behaviors but especially for concepts—like hazard, safety and risk—which are, by definition, abstract. Of course, understanding does not start
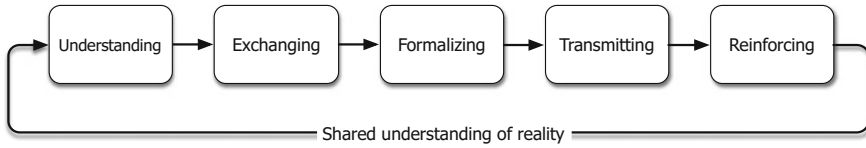
Fig. 2   The development of culture

from scratch. People bring an assembly of cultural assumptions and mental models to different (cultural) contexts. These contexts themselves are subject to cultural influences, notably regional or national, but also influences handed down through education, that is, professional cultures. Moreover, the cultural inputs received early in life reside deeper in one's cultural core than the inputs received later on (Hofstede, 1991). And what is deep in terms of culture, is less susceptible to change and is able to evoke strong emotional reactions when challenged or threatened (Ibid.).

So, a person's understanding of a particular situation at work is colored by assumptions coming from different cultural sources, all of which reside within the boundaries set by the deepest, most basic cultural notions acquired mostly in childhood. Nevertheless, an infinite number of meanings are still ambiguous and open to multiple interpretations; for instance, Weick refers to such instances as 'equivocality' (1969, 1979). Again, the topic of safety is relevant here, as safety is not self-evident and needs to be elaborated to make sense locally (Hollnagel, 2014). Such ambiguity is often resolved through the second step in the process, exchanging.

This exchange between people is preferably based on dialectics (dialogue), which builds on an open exchange of the participants' viewpoints and ideas. Ideally, this results in a common understanding of the situation as well as an action to make further progress possible. This selection of an interpretation plus action is then taken as the right way to think and work if it indeed resolves equivocality and enables progress of work. As this understanding proves itself in practice, it is retained, perhaps fine-tuned further and, subsequently, formalized. However, the exchange is more often *not* based on dialectics. Bringing their own assumptions and convictions to the workplace, people will try to convince others of their viewpoint and be unwilling to exchange it for the others'. This results in opposition and even conflict. This could be resolved with agreement, "Let's agree to disagree", but it depends on the importance of the issue, the coherence of the group and how this conflict will impact on the group and its work. Either an agreement or a conflict might be part of a culture. Conflict ultimately marks the boundaries of what is acceptable for the group, whereas agreement binds the group. Although some disagreement or conflict within a culture is desirable for 'requisite variety'—the variety necessary to cope with a constantly changing environment (Ashby, 1958) —, too much conflict is unwelcome (Alvesson, 2012) since it will threaten the group's coherence and might lead to fragmentation and, ultimately, its collapse.

The process of culture development implies that both formal and informal structures or standards follow from interaction and subsequent agreement. Formalization and standardization ultimately lead to institutionalization, implying that norms and standards are enforced upon the (working) environment where they can be put into practice and complied with. In this way, the (working) environment is both a source for and a reflection of a culture's underlying assumptions and meanings.

Furthermore, what is institutionalized will be transmitted and disseminated. Newcomers need to learn the rules, whether explicitly, through education and training, or implicitly through interaction with current group members, a process called enculturation. As the classic experiments of Asch show, people indeed conform to group behaviors easily, even when they disagree or think they are downright silly (Zimbardo, Johnson, & McCann, 2012). When cultural meanings are stressed again and again, through interaction, through reinforcement, through working in a context that consistently expresses and confirms those meanings, they will gradually become part of the individual's cultural core, unless (s)he opposes to them. Armed with these cultural meanings, large parts of the world appear unambiguous whereas in reality, they are not.

1.5   Culture Integration

Cultures are neither homogeneous nor fully integrated. On the one hand, because disagreement and even conflict will always arise. On the other hand, because people within a culture adopt its core with mixed intensity. What is a guiding principle for one, might be a hollow cliché for another. A large group therefore always displays differentiation and consists of various subcultures.

1.6   Elaborating the Development Model

While the development model above describes a rather cumbersome process, it is not always initiated in full. When business is 'as usual', the local culture provides interpretations and courses for actions for those involved. This basically means that the arrow coming out of the first box (Understanding) in Fig. 2 immediately inputs into the fifth box (Reinforcing). In other words, when somebody acts in line with the local culture, their assumptions are, hence, reinforced. However, when workers are confronted with equivocality, i.e. when something in the present cannot be understood with current (cultural) assumptions, or otherwise, a process Weick calls 'sensemaking' is initiated, an exploration seeking to answer the question 'What is going on here?' (Weick, 1995). This is when the full process of Fig. 2 starts. While equivocality might always be present in the (working) environment, people also

have a tendency to ignore or not even notice this and look for confirmation for what they already assume; a phenomenon called 'confirmation bias' (Nickerson, 1998).

Newcomers at times, will have trouble understanding their new (working) environment. They will be either informed locally, or educated or trained, which, in the latter case, means they start at Step 4 in Fig. 2 and are exposed to more formal transmissions (education, training).

2 Safety Culture Revisited: Images of Culture

Currently, people interested in safety culture do not always adhere to a single view. Instead views range from quite abstract (conceptual) to concrete (instrumental), from straightforward to complex, from (richly) descriptive to analytical. Theoretical developments that complement each of these particular views on organizational safety culture differ, as do the accompanying research methods. What follows is a brief overview of these perspectives using several images. They are not mutually exclusive and may overlap. Some images are more popular than others, however, clinging to a single perspective is neither recommended nor considered fruitful.

2.1 Safety Culture as a Convenient Truth

There are convenient and inconvenient truths. An inconvenient truth can be a cause for embarrassment, a convenient one a cause for relief.

There is still keen interest in safety culture, especially with safety professionals and high-risk organizations. Often, for convenience's sake, safety culture is equated with (un)safe behaviors, or daily practices. But whose culture is implied here, and whose behaviors? It depends, of course, on who is talking. When it is management, the culture and behaviors of front-line workers are insinuated, as in "*They* don't do what they've been told, *they* make up their own rules". When it is the workers, a them-or-us mentality might be in place, as in "*They* don't know what work is really like at the front end". These are insider or first-person perspectives, provided from either 'above' or 'below' and are used to shift misunderstanding, from one end to the other.

An outsider or third-person perspective is offered by people in various roles:

- evaluators: inspectors, regulators, auditors, insurance companies;
- investigators: investigation boards or committees, accident investigators;
- advisors: consultants, change agents;
- other stakeholders, like investors.

When outsiders refer to culture they imply the (dominant) organizational culture, as something the organization reflects, or even 'is'. This culture is for them the

cause of what is currently happening or has recently happened, like an incident or accident, in the organization. And it is the outsider perspective that might use the safety culture label as a convenient truth, perhaps to appoint no blame at all.

Talking about the (safety) culture of organizations in this way is convenient and easy but not necessarily truthful or helpful. Understanding how an organization understands (and sustains) its daily reality and the role of safety, and how this might influence the behavior of its employees is less easy and convenient, but perhaps more truthful.

2.2 Safety Culture as a Grading System

Probably the most dominant reason for assessing safety culture is to grade it. Keywords in this metaphor are measurement, benchmark and, if possible, improvement.

So, what is measurement, exactly? Measurement is

assigning numbers to the values of a natural variable in such a way that relationships between those values turn into similar relationships between the numbers assigned. (Swanborn, 1987)

Measurement scales satisfy one or more properties of measurement.

1. Each value on the scale has a unique **identity** or meaning.
2. Values on the scale have some **magnitude** and an ordered relationship to each other, i.e. some values are smaller and some are larger.
3. The **intervals** or units of the scale are all equal to one another.
4. The scale has an **absolute zero point** below which no true values (can) exist.

The nominal measurement scale satisfies the identity property only, the ordinal scale satisfies both the identity and magnitude properties whereas the interval scale also has equal intervals. There are no culture measurement approaches satisfying all four properties, the so-called ratio (or cardinal) scale is not common in the social sciences at all (unless frequencies are used). All three measurements scales are represented in the safety culture assessment toolbox, but grading only starts at the ordinal level.

The 'natural variable' referred to above is safety culture. When using a nominal scale for this purpose, it would simply mean putting different labels on different types of safety cultures. For instance, Cameron and Quinn put forward four (organizational) culture types—clan, adhocracy, hierarchy, market—which group particular characteristics typically found in organizations (Cameron & Quinn, 2011). However, such culture types are not usually ordered, with one 'better' than the other. But that is precisely what a *grading* system needs to establish, what is sufficiently good as well as opportunities for improvement. Moreover, a grading system in theory makes comparisons possible. And benchmarking is attractive from

a management point of view. Hence, grading systems at the ordinal level of measurement or higher are called for.

Safety culture assessment techniques at the ordinal level of measurement are usually represented by ladders; i.e., stairways leading to a desirable level of safety performance. Progression on the ladder is established by growth in maturity in dealing with the safety issues addressed by the method.

The general appeal of these culture ladders is high in some circles, yet they still lack proper scientific underpinning. However, what is the use of 'scientifically sound' methods when dealing with something as elusive as '(safety) culture'? Moreover, these methods are not meant to measure safety culture in the first place but to carry out a meaningful dialogue amongst employees about safety. The grading system only serves as a means to challenge people, to reflect on and take position on various safety issues. The grading system used in the Hearts and Minds toolbox, indeed uses some provocative labels. It runs from pathological, reactive, calculative, proactive to generative (Energy Institute, 2016). Because of their dis-approving undertone, the first three labels might stimulate discussion amongst a group of people, if they are willing to challenge each other. Used by a third party in order to grade companies, the method loses much of its initial appeal and it becomes just another way to say you are 'good', or 'bad' (or 'adequate').

Safety culture assessments have also climbed up the measurement hierarchy,[4] which brings us to the interval level of measurement. In the social sciences, they are usually carried out with standardized questionnaires. What is measured here is more accurately referred to as 'safety climate', considered by Zohar (and many others) as 'the measurable aspect of safety culture' (Zohar, 2014). Indeed, a safety climate survey enables researchers to put exact numbers on (aspects of) the safety climate, reported sometimes with an accuracy of two or even three decimals. However, such numbers are mostly used as descriptors rather than grades.

2.3 Safety Culture as a Liaison

Keywords in this metaphor are operationalization and standardization. Operationalizing is the act of making an abstract concept empirically tangible, often by breaking it down into manageable, i.e. tangible or measurable, parts. The con-cept here is safety culture; the liaison is the connections between the constituting parts. The parts are usually concepts themselves, but these have been derived empirically, again with the use of standardized, self-administered questionnaires. Responses to these questionnaires go through an analysis process aimed at uncovering (or confirming) an underlying structure. This structure consists of the

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[4]Safety culture assessment approaches can be ordered on a measurement continuum as well; that is, there is a nominal, an ordinal and an interval-level approach. The latter two are *etic* approaches, the first one can be considered *emic* (see Sect. 3.1).

measurable parts mentioned above. For instance, the concept of safety culture is regularly broken down into parts that measure the workforce's perceptions of the ways the organization deals with safety.

Note that this way of describing safety culture has been labelled safety climate above. Safety climate, as opposed to safety culture, is a 'psychological variable', describing attitudes and perceptions typically assessed at the level of an individual employee. These scores are aggregated to some group level (team, department, organization), and their homogeneity is determined to see whether the group's perceptions are unanimous, or not, on the various safety climate aspects. As opposed to the grading system, the measurements obtained here are used descriptively and statistical tests are carried out to examine any differences between existing groups.

Standardization is part of the metaphor as well. Safety climate is considered to be a widespread phenomenon that can be tapped by using the same questionnaire everywhere. This notion is also called 'nomothetic', implying that the underlying structure of the safety climate questionnaire is relevant to working people all around the globe. From another perspective, however, this approach could be perceived as forcing respondents into the researcher's theoretical framework. Moreover, as questionnaires are devoid of context, the desktop researcher does not have a clue why the respondents answered the way they did.

2.4 Safety Culture as a Mirror

The image of the mirror evokes the act of measuring up and scrutinizing oneself. There are different mirrors for different purposes and the mirror can be held by various people for different reasons. In the context of safety however, this act should be (but frequently is not) carried out critically and not admiringly. Organizations often want to know where they stand, whether there is room for improvement and what has to be done to succeed. Looking into a (cultural) mirror can provide some answers.

The mirror held up by an outsider can be any of a range of safety culture studies, either ideographic (say, a tailor-made, qualitative field study) or nomothetic (using standardized methods). Let us focus on the introspective study of organizations looking into the cultural mirror themselves. The organization thus describes its own culture, preferably using multiple methods, as no method alone can provide a full mirror image. Ideally, it works with an assessment team, composed from members selected from all layers of the organization. It is supported by top-management, which keeps itself updated about the progress of the team. Through the application of various methods, the team gradually peels off the cultural layers of the organization and works towards the core, the shared understandings, yet it does not ignore

conflict or differentiation within the organization. Steadily working towards a mirror image, the organization starts to know itself, its shared beliefs and assumptions, its behavioral patterns and what sustains them. Such insight may also yield opportunities to influence, the final topic of this chapter.

3 Assessing and Influencing Culture

3.1 Assessing Culture

Cultures are described or assessed in most cases to influence it.[5] There are basically two perspectives on describing (or assessing) cultures, denoted by the terms *emic* and *etic*. Taking an *etic* perspective means applying a theory-driven, top-down approach using a standardized instrument, often developed through the application of the empirical cycle of positivism; i.e. observation, induction, deduction or prediction, testing and evaluation (De Groot, 1961). This standardized instrument is most often a questionnaire, an operationalization of the underlying theory. It contains dimensions (factors, aspects, facets) on each of which the culture under study is evaluated. Questionnaires appeared also in descriptions of the metaphors above, especially in the grading system and the liaison.

Using an *emic*-approach, a culture is evaluated on its own merits. The purpose is a description of what truly matters in this particular culture, how members understand their reality. Working from the bottom up using members' perspectives and words, the researcher comes to understand what the culture is about and why. This is a demanding process which requires the researcher to remain descriptive, not evaluative. Given the fact that all people come equipped with their own cultural cores, researchers using an emic-approach are well-advised to make explicit any second thoughts or misgivings they have about their enterprise before they embark on their study. In this way, they show their biases and how they might have slipped into their study and descriptions.

Emic-studies are often considered 'subjective' whereas etic ones are believed to yield 'objective' results. In the end, all studies are 'subjective'; however, standardization of an approach enables replication to the extent that another researcher using the same instrument will produce comparable results. Replication is not the objective of emic-studies and neither is objectivity. As long as the researcher carefully registers her or his data, another researcher can draw his (or her) own conclusions about these data.

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[5]This is not true for anthropologists and some sociologists, who describe cultures for their own sake.

In the case of safety culture, an interesting clash occurs. Whereas the concept of culture is value-free (there are basically no 'good' or 'bad' cultures), the concept of safety is not: situations can be 'unsafe' and this is considered 'bad'. Of course, to establish that a situation is unsafe one needs some kind of norm and there are many of these available. As already seen, this clash of concepts has been resolved in different ways, resulting in different metaphors.

3.2   Influencing Culture

As culture development is a constant and continuous process, any culture is subject to ongoing change or adaptation, especially when the very existence of the group is threatened (Schein, 2010). Because culture is the result of a rather time-consuming process, opting to influence it implies another demanding effort (Ibid.). So, a first consideration should be to use the particular strengths of a culture to achieve desired (safety) objectives. Nevertheless, tweaking parts of a culture might turn out to be more opportune.

Influencing culture starts with influencing the way employees understand their working reality and the place of safety therein ('Understanding', see Fig. 2). The type of risk communication employing rhetoric, sometimes also referred to as 'care communication', is concerned with influencing people's understandings of and attitudes towards risk (Lundgren & McMakin, 2013). Moving to the second step of the culture development process, 'Exchanging', it is not individual employees that need to be influenced here, but the way they interact and communicate about safety. In this step, the dialogue is a key mechanism. It is a way of obtaining consensus, of reaching a shared understanding of daily working reality, that works in practice too.

Other methods can be applied to influence the model's further steps. For each step, it is important that the result adds to a shared understanding (of daily reality), rather than providing a particular viewpoint that is not recognized by the group at large.

4   Conclusion

The popularity of safety culture has led to a labyrinth of papers and approaches on what it is and is not and how to assess it, mimicking a similar boom in the 80s on the topic of organizational culture. Unfortunately, this lack of consensus also reflects negatively on the safety culture concept itself, as it has become a true 'God-of-the gaps', to explain missing links in our understanding of safe and unsafe behavior.

Current safety culture approaches can be described using four metaphors; i.e. a convenient truth, a grading system, a liaison and a mirror. Apart from the first metaphor, these approaches are mainly concerned with the assessment of safety culture. Next to these, a development model has been put forward, which is less concerned with an outcome (what safety culture should be) but rather with how culture originates, i.e. how a group comes to understand its context and how to act (safely) in it. Each step in the model can be used to develop interventions to steer its outcome towards a more desirable, safer direction.

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