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Setting culture apart: Distinguishing culture from behavior and social structure in safety and injury research

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ABSTRACT

The concept of culture is now widely used by those who conduct research on safety and work-related injury outcomes. We argue that as the term has been applied by an increasingly diverse set of disciplines, its scope has broadened beyond how it was defined and intended for use by sociologists and anthropologists. As a result, this more inclusive concept has lost some of its precision and analytic power. We suggest that the utility of this "new" understanding of culture could be improved if researchers more clearly delineated the ideological – the socially constructed abstract systems of meaning, norms, beliefs and values (which we refer to as culture) – from concrete behaviors, social relations and other properties of workplaces (e.g., organizational structures) and of society itself. This may help researchers investigate how culture and social structures can affect safety and injury outcomes with increased analytic rigor. In addition, maintaining an analytical distinction between culture and other social factors can help intervention efforts better understand the target of the intervention and therefore may improve chances of both scientific and instrumental success.

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1. Introduction

The concept of culture has become widely used in studies of safety and work-related injury (Wiegmann et al., 2002; Ferguson and Fakelmann, 2005; Hopkins, 2006; Mearns and Yule, 2009; Hale et al., 2010). As part of considering the wider "system" surrounding the production of both safety and risk in workplaces, culture is seen by many as having an enormously important role to play. Many disciplines engaging in these areas of research have adopted the concept, sometimes using it to explain and predict safety and injury outcomes, other times targeting it as something to change in order to improve these outcomes (Weick, 1987; Marx, 2001; Norbjerg, 2003; Dejoy, 2005; Thaden et al., 2006). As it has been applied in a variety of safety research disciplines, we suggest the concept of culture has been amended such that it has gone astray from how it was conceptualized in its "home" disciplines of sociology and anthropology. In particular, we argue that, as its definition has been broadened, its conceptual clarity has lessened to the point where its utility as an analytical tool has been much diminished. We suggest that a reconsideration of how culture is conceived in

sociology and anthropology may return some conceptual clarity to what we mean by culture which then can improve its usefulness in safety and injury research. Even when the topic or context may be entirely appropriate, narrowing of the scope of culture to that pertaining to safety exclusively (i.e., "safety culture") risks losing the analytic rigor the concept can offer investigators (Guldenmund, 2000; Antonsen, 2009a; Silbey, 2009). Thus, greater precision of the concept of culture could be beneficial both for research and practice.

Perhaps the most important and most commonly made error in defining culture is that it often includes, in addition to culture, any combination or number of behaviors, relationships, and organizational and social structures. It is important to note that the social sciences have spent at least the last century and a half attempting to delineate what relationships all of these elements of the social world have to each other (Durkheim, 1901; Weber et al., 1978). The reduction of culture as, for example, "the way we do things around here" (Deal and Kennedy, 1982; Schein, 1992) oversimplifies and risks leading researchers astray, i.e., away from perhaps a more informed analysis of just what they wish to study and understand. Such a definition of culture might include properties of the workplace including its hierarchical form(s); its division of labor by organizational locations, departments, units, etc.; the sets of roles and jobs, job tasks and even technologies used. In short, such a view is so broad that it seems hard to understand what might be

considered *not* culture. Therefore, we suggest that the utility of this "new" understanding of culture could be improved if researchers more clearly delineated the ideological – the socially constructed abstract systems of meaning, norms, beliefs and values (which we refer to as culture) – from concrete behaviors, social relations and other properties of workplaces (e.g., organizational structures) and of society itself. The second issue is a reification of culture which links the term directly to forms of causality.

This expansion of the concept has likely diminished its usefulness in safety research (Antonsen, 2009b). The result has been that it has become difficult to distinguish culture as an independent variable from the outcomes it is believed to cause. If, for example, hierarchical relations are a problem for safety (Lauber, 1993; Helmreich, 2000a; Hutchins et al., 2002; Walton, 2006), it would be beneficial to examine their independent effects. Mixing social or organizational structures and behaviors into a definition of culture impedes not only the study of culture but of these other factors as well (Vaughan, 1996). In addition, the often very complex manners in which culture and organizational or social structures interact to produce conditions that may affect safety and injury (and many other outcomes) cannot be identified when these two very different elements of the social world are combined into a single definition (Goh et al., 2010). And regardless of how culture has been treated in the safety literature, it is not self-evident that culture can be linked to cause in any direct way or ways (Rochlin, 1999; Guldenmund, 2000). The reasons for this have much to do with best practice definitions of culture which suggest causality and culture exist in separate analytic realms altogether. In short, one risks much without the chance of any direct payoff when one confuses the empirical or analytic realms culture and causality belong to. In this paper, we explore the conflation of culture and other aspects of social and organizational structures and how their separation can benefit analysis of safety in the workplace. Then we take up the problem of seeing culture as a mechanism; as cause or effect.

1.1. Separating culture from social and organizational structures and behaviors

A challenge to safety researchers is to understand how social and organizational structures may interact with culture in a given organizational (or societal) setting (Weick, 1987; Feldman, 2004). To do this, there must be an analytical separation between culture and these other features of the organization, e.g., the organization's structures. An "analytical separation" is of course an artificial distinction – culture and social structures always coexist and intermingle. But understanding culture and social structures as fundamentally different analytic things (Parsons and Shils, 1951; White, 1975; Kane, 1991) is not only useful but necessary in order to understand how, in social life, they might interact. That is, to analyze how cultural issues such as belief and meaning systems might interact with other aspects of social life (e.g., hierarchical relationships, the division of labor, size and composition of work teams, technology, etc.), this conceptual analytic distinction must be made first. While culture may point to all of social reality, there are other factors – structural features of organizations – which also have considerable influence on social life and need to be studied as such. Still, culture in the safety literature is often reduced to an organization, to what the organization "is" or to what is characteristic of it (Starbuck and Farjoun, 2005; Weick and Sutcliffe, 2007).

For example, the existence of designated safety officials in an organization may be informed by cultural beliefs held by the organizational leaders who initiated these positions. However, this may also be due to structural issues. That is, safety officers may be an organization's attempt to reduce costs, a means of managing relations with regulatory agencies or an effort to improve working conditions in order to improve employee retention or increase the number of applicants, etc. Perhaps more importantly, we view the existence of designated safety officials as an aspect of the division of labor in the organization (a structural feature of the organization) rather than as any direct aspect of culture itself. The belief systems such officials might use to understand safety (personal responsibility, a blame-free culture, etc.) must be recognized as separate analytic categories so that the cultural and structural realities can be examined as independent factors which may also interact with one another to affect safety.

1.2. Confusing culture and structure

The conflation of culture with organizational structures and behaviors has appeared in several studies conducted in a variety of industries such as nuclear power (ACSNI, 1993; Lee and Harrison, 2000), the offshore oil industry (Cox and Cheyne, 2000), construction (Fang and Wu, 2013), aviation (Helmreich, 2000a), and healthcare (Pronovost and Sexton, 2005) and sometimes across multiple industries in a single study (Fernandez-Muniz et al., 2007; Frazier et al., 2013). To give but one example, this section provides an instance from healthcare where structure and culture can be confused.

In order to improve communication among surgical team members, with the goal of improving patient safety, some hospitals are implementing programs which attempt to "level the playing field" among surgical team members (Helmreich and Foushee, 1993; Helmreich, 2000b). The goal is to make all members of team (in particular those lower in the hierarchy) feel safe to question the activities of the attending surgeon and to convince these surgeons that such questioning is acceptable behavior (Sexton et al., 2000; Flin and Mitchell, 2009; Guimond et al., 2009; Pronovost and Vohr, 2010). Such interventions intend to educate and instruct individuals "to talk truth to power". However, in these programs the structure (and role) of power and authority have not been altered, challenged nor changed. Surgical residents, for example, still have to ask for letters of recommendation from senior surgeons to move up or anywhere through the system. This and other taken for granted behavior, can actually reinforce rather than diminish the role that hierarchy and elites play in such "restorative" enterprises. Any attempt to change hierarchical relations via training, teaching, and encouraging different behaviors often ignores role inequality and power plays in such workplace environments (Dekker, 2008). Assuming, for example, that changes in communication necessarily can lead to re-structurization, i.e., new relationships of power and control, is at best naïve. If assertiveness from below is a constant theme in this literature, what it has taken for granted in these seemingly emancipatory strategies is who defines "below" and "above" and who sets up the game and establishes its rules as well as who largely "wins". Consultancy on "just cultures" in hospitals (e.g. Marx, 2001) has been seen as a restoration of management control over staff after precisely such emancipatory practices and policies that tended to blame the system, not the worker, for failures and adverse performance outcomes have been established (Reason, 1997; Dekker, 2009). No questions have been asked in the safety literature about the considerable resources elites have to co-opt or derail these empowerment initiatives. This is because most work in this area tends to mystify where power and authority reside in culture and society and ignores how it provides, for those who live within these structures and meanings, the "natural order of things". To "mute" the analysis of central social mechanisms like power and social differentiation in the workplace weakens the kinds of analysis one can carry out in such workplaces (Antonsen, 2009a). It also limits the effectiveness of one's attempt to change and intervene in these workplaces.

Does culture differ between groups, or with a different group leader? The issue here is not simply one of "size" but a confusion

or conflation of structure (especially hierarchy) and context and micro-culture and climate (perhaps two better terms for what safety researchers often mean when they write about culture) (Guldenmund, 2000). For example, some researchers have reported that culture varies across work units, such as surgical teams (Thaden et al., 2006; Bognar et al., 2008). This is often seen as stemming in some direct way from team leaders (Schein, 1992; Westrum, 2004; Grint, 2005). While the ways, for example, one surgeon prefers to conduct certain procedures may indeed vary from that of another, these "quasi-norms", as Bosk (2003) labeled them, rely on the group's structure and the group itself for expression. It is true that the attending surgeons are granted authority over the group and that their wishes need to be followed while working with them. The result for offenders is that a surgeon may levy sanctions on the spot, or the organization may levy sanctions on behalf of the surgeon later if their expectations are not followed (Bosk, 2003). Still, little changes, for example, when a circulator nurse or junior resident has different ideas about how things ought to be done as their positions do not enable them to enforce or promote their ideas. In short, how hierarchy and power can "work together" can become easy to ignore when one reduces all social interaction and mechanism to "culture".

In addition, following a leader's wishes does not necessarily mean the belief systems of the remaining team members have changed. The cultural beliefs the other team members had the day before, while working with another attending surgeon, may remain intact despite the arrival of a different surgeon with different expectations. In fact this consistency – that exists even when attending surgeons seem to disagree – actually lends legitimacy and intelligibility to all the attending surgeons' authority (Bosk, 2003). To suggest that a culture can be "completely different" between, for example, occupational groups often weakens the scientific analysis of these groups and their context(s).

1.3. Culture and behavior

Another concern about defining culture as "the way we do things around here" is that this not only includes, but also appears to link culture directly to behavior. This is quite different from saying something like "the ways we understand things are and ought to be done around here" can help shape behavior. This distinction can easily get lost. In sociology and anthropology, culture is, in effect, an ideological enterprise (Parsons and Shils, 1951; Geertz, 1973; White and Dillingham, 1973; Wuthnow, 1987) and its relationship to actual behavior cannot be treated in any direct way as a causal one. If behaviors are the target of change, and the cultural forces behind behaviors are the topic of investigation, then behaviors must be understood as something informed by but separate from culture.

There is an additional problem: to what extent is culture something shared or contested, even within a given group or occupation? To distinguish culture from individual perceptions or attitudes, researchers often speak of culture as consisting of beliefs or values that are "shared" (Schein, 1992; Hofstede, 1997). Culture here is reduced to simply agreement among individuals. However, culture does more than simply provide the means to agree. It can equally provide individuals with the means to understand and handle disagreement. The legitimacy of the parties involved in a conflict, the value placed on the perspectives and knowledge they argue from, the possible and acceptable manners in which resolution might reasonably occur, in fact the notions of "fairness" invoked to resolve a conflict, all entail different kinds of cultural interpretations. Similarity and difference are things that culture "handles," whatever is at stake. In addition, culture is something that is not merely the sum of individual attitudes. Rather it is something that is as much a property of social institutions as it is of individual actors (Friedland

and Alford, 1991). Culture then needs to be understood as systems of interconnected meanings, beliefs and values whose "site" is something neither easy to "fix" nor to link directly to particular individuals.

1.4. Culture, individuals and institutions

It is common for safety researchers to view culture as a determinant of individual behavior. However there is another way in which culture may enter into the analysis of the social order. Culture may affect health and safety by how it shapes individual existence, the behavior of institutions and what counts for "reality" and common sense. What kinds of institutions are produced and reproduced within this ideological framework? Consider the study of how some beliefs in African nations with high HIV prevalence can affect sexual behaviors, including condom use (Schoepf, 1992; Airhihenbuwa and Webster, 2004; Smith, 2004; Agha et al., 2006). It is less often that one asks how might the Roman Catholic Church's beliefs concerning procreation and birth control inform HIV prevention projects, apart from the Church's impact on individuals' behaviors, in these same countries. The institutional structure(s) and stricture(s) of society can greatly affect the conditions in which individuals experience safety and health outcomes. To understand why this is the case means acknowledging the institutional structures beyond the individual and investigating how the patterns of beliefs, the ideological framework often called culture, is reinforced and disseminated by these structures so as to affect the well-being of individuals in a community.

1.5. Culture, society and causality

Separating what is culture and what is not is one step toward improving (or returning) some clarity to a concept. This takes us back to the issue of whether we can impute causality to culture. Put simply, there are two possible stances. The first is that causality is theoretically possible to ascertain but that it occurs in multiple ways and in ways difficult to trace out. This suggests too that attributing primary or independent effect or variables to culture is no easy task, especially if we mean this by giving culture place and "force" in any kind of causal explanation(s). The alternative is to argue that no kind of social Newtonism is ever possible when it comes to the place culture has in the social world. Social-scientific opinion splits on this issue, but none of the recent literature seeking to bring culture into safety research seems to have paid much attention to these kinds of questions that have emerged over time regarding the status of culture in its home disciplines. This is replaced in the safety literature by a kind of instrumentalism and pragmatism instead. These reduce culture to (1) something that "explains" and (2) something seemingly neither societal nor individual but rather a mediation between the two.

The challenge of fully understanding the role of culture in social life is still before us. But to even ask whether culture can in any direct way be linked to causality requires that it be understood as something analytically set apart from what may be its effects. This separation, on seldom recognized in the safety literature, is what we call for here.

2. Conclusion

One could argue that the turn to "culture" has occurred because of the safety community's inability to deal analytically and practically with more entrenched issues of power, status and hierarchy. To turn the magnifying glass on the elite is neither an easy nor a risk-free business. The "turn to culture" also means that we do not have to ask serious questions about how the world is held together, reinforced and made sense of. In other words, culture at least as

defined and talked about in the safely literature, does not allow us to ask the kinds of questions that would lead us to understand and improve upon today's present social institutions. Doing this might mean that we have to take into account domains of society and culture like religion that so far have played little role in the scientific analysis of safety and accidents. There is some irony here. Within the safety community, culture is increasingly being seen as a "prime mover" and as something that is relatively easy to both define and quantify. But social science has tended to move in the opposite direction (Wallerstein, 1996). In the social sciences, no longer is culture seen as the primary mechanism of social life. At most, it is one among many. Nor, as discussed above, is culture thought to be any kind of direct causal mechanism. This implies that most of what constitutes social thought and social theory in safety science seems to regress to a kind of nineteenth century certainty about how the (social) world works.

For these reasons, we suggest that researchers and administrators alike ought to be cautious about viewing aspects of the organization and the behavior of its members as culture and, at the same time, caused by culture. If one follows Weber (Weber et al., 1958, 1978), it is problematic whether things like culture and history either possess causality or can be linked together like cause and effect, at least as these terms are defined in the natural sciences. If one follows best practice (such as Giddens, 1984), the transfer of any explanatory language or mechanism from the natural sciences to the social world and order risks incommensurability (Giddens, 1984). So if we are to continue to use the term "culture" in the safety literature, it might do us well to look at what the term has come to mean in the social science literature from which it originated. In the safety literature, resorting to the term culture seems to offer a way out of some particularly messy analytic (and pragmatic) dilemmas. However, to invoke the term "culture" does not necessarily resolve any of the central dilemmas that characterize social life – especially those related to "understanding", to power and to hierarchy.

Safety scientists have to acknowledge, like almost all social scientists, that no one term or mechanism, no matter how abstract or seductive, can adequately explain the social order in which we live. While this may seem obvious, it seems it has become all too easy to use the term "culture" to refer to any and all aspects of social life. We suggest that researchers in any field will find greater utility in the concept of culture if they apply it with greater precision – reserving it for the systems of beliefs, meanings, norms and values – and understand and research the role of other (non-cultural) social and behavioral factors in their own terms.

References

ACSNI, 1993. Organising for Safety: Third Report of the Human Factors Study Group of ACSNI (Advisory Committee on the Safety of Nuclear Installations). HMSO, London.

Agha, S., Hutchinson, P., Kusanthan, T., 2006. The effects of religious affiliation on sexual initiation and condom use in Zambia. Journal of Adolescent Health 38 (5), 550–555.

Airhihenbuwa, C.O., Webster, J.D., 2004. Culture and African contexts of HIV/AIDS prevention, care and support. SAHARA Journal 1 (1), 4–13.

Antonsen, S., 2009a. Safety culture and the issue of power. Safety Science 47 (2), 183–191.

Antonsen, S., 2009b. Safety culture assessment: a mission impossible? Journal of Contingencies and Crisis Management 17 (4), 242–254.

Bognar, A., Barach, P., Johnson, J.K., Duncan, R.C., Birnbach, D., Woods, D., Holl, J.L., Bacha, E.A., 2008. Errors and the burden of errors: attitudes, perceptions, and the culture of safety in pediatric cardiac surgical teams. Annals of Thoracic Surgery 85 (4), 1374–1381.

Bosk, C., 2003. Forgive and Remember: Managing Medical Failure. University of Chicago Press, Chicago, IL.

Cox, S.J., Cheyne, A.J.T., 2000. Assessing safety culture in offshore environments. Safety Science 34 (1–3), 111–129.

Deal, T.E., Kennedy, A.A., 1982. Corporate Cultures: The Rites and Rituals of Corporate Life. Addison-Wesley Pub. Co., Reading, Mass.

Dejoy, D.M., 2005. Behavior change versus culture change: divergent approaches to managing workplace safety. Safety Science 43 (2), 105–129.

Dekker, S.W.A., 2008. Crew resource management gold rush: resisting aviation imperialism. ANZ Journal of Surgery 78 (8), 638–639.

Dekker, S.W.A., 2009. Just culture: who draws the line? Cognition, Technology & Work 11 (3), 177–185.

Durkheim, É., 1901. Les règles de la méthode sociologique, 2 éd. rev. et augm. F. Alcan, Paris.

Fang, D.P., Wu, H.J., 2013. Development of a safety culture interaction (sci) model for construction projects. Safety Science 57, 138–149.

Feldman, S.P., 2004. The culture of objectivity: quantification, uncertainty, and the evaluation of risk at NASA. Human Relations 57 (6), 691–718.

Ferguson, J., Fakelmann, R., 2005. The culture factor. Frontiers of Health Services Management 22 (1), 33–40.

Fernandez-Muniz, B., Montes-Peon, J.M., Vazquez-Ordas, C.J., 2007. Safety culture: analysis of the causal relationships between its key dimensions. Journal of Safety Research 38 (6), 627–641.

Flin, R.H., Mitchell, L., 2009. Safer Surgery: Analysing Behaviour in the Operating Theatre. Ashgate Publishing Co., Farnham, UK.

Frazier, C.B., Ludwig, T.D., Whitaker, B., Roberts, D.S., 2013. A hierarchical factor analysis of a safety culture survey. Journal of Safety Research 45, 15–28.

Friedland, R., Alford, R., 1991. Bringing society back in: symbols, practices and institutional contradictions. In: Powell, W., Dimaggio, P. (Eds.), The New Institutionalism in Organizational Analysis. University Of Chicago Press, pp. 232–263.

Geertz, C., 1973. The Interpretation of Cultures: Selected Essays. Basic Books, New York.

Giddens, A., 1984. The Constitution of Society: Outline of the Theory of Structuration. Polity Press, Cambridge, Cambridgeshire.

Goh, Y.M., Brown, H., Spickett, J., 2010. Applying systems thinking concepts in the analysis of major incidents and safety culture. Safety Science 48 (3), 302–309.

Grint, K., 2005. Problems, problems, problems: the social construction of 'leadership'. Human Relations 58 (11), 1467–1494.

Guimond, M.E., Sole, M.L., Salas, E., 2009. TeamSTEPPS. American Journal of Nursing 109 (11), 66.

Guldenmund, F.W., 2000. The nature of safety culture: a review of theory and research. Safety Science 34, 215–257.

Hale, A.R., Guldenmund, F.W., Van Loenhout, P.L.C.H., Oh, J.I.H., 2010. Evaluating safety management and culture interventions to improve safety: effective intervention strategies. Safety Science 48 (8), 1026–1035.

Helmreich, R.L., 2000a. Culture and error in space: implications from analog environments. Aviation, Space, and Environmental Medicine 71 (9 Suppl.), A133–A139.

Helmreich, R.L., 2000b. On error management: lessons from aviation. British Medical Journal 320 (7237), 781–785.

Helmreich, R.L., Foushee, H.C., 1993. Why crew resource management? Empirical and theoretical bases of human factors in aviation. In: Wiener, E.L., Kanki, B.G., Helmreich, R.L. (Eds.), Cockpit Resource Management. Academic Press, San Diego, pp. 3–46.

Hofstede, G.H., 1997. Cultures and Organizations: Software of the Mind, rev. ed. New York, McGraw-Hill.

Hopkins, A., 2006. Studying organisational cultures and their effects on safety. Safety Science 44 (10), 875–889.

Hutchins, E.L., Holder, B.E., Pérez, R.A., 2002. Culture and Flight Deck Operations. University of California, San Diego, San Diego.

Kane, A., 1991. Cultural analysis in historical sociology: the analytic and concrete forms of the autonomy of culture. Sociological Theory 9 (1), 53–69.

Lauber, J.K., 1993. A safety culture perspective. In: Flight Safety Foundation's 38th Corporate Aviation Safety Seminar, TX, Irving.

Lee, T., Harrison, K., 2000. Assessing safety culture in nuclear power stations. Safety Science 34 (1–3), 61–97.

Marx, D., 2001. Patient Safety and the "Just Culture": A Primer for Health Care Executives. Columbia University, New York.

Mearns, K., Yule, S., 2009. The role of national culture in determining safety performance: challenges for the global oil and gas industry. Safety Science 47 (6), 777–785.

Norbjerg, P.M., 2003. The Creation of an Aviation Safety Reporting Culture in Danish Air Traffic Control. Naviair, Kastrup, Denmark.

Parsons, T., Shils, E., 1951. Toward a General Theory of Action. Harvard University Press, Cambridge.

Pronovost, P., Sexton, B., 2005. Assessing safety culture: guidelines and recommendations. Quality and Safety in Health Care 14 (4), 231–233.

Pronovost, P.J., Vohr, E., 2010. Safe Patients, Smart Hospitals. Hudson Street Press, New York.

Reason, J.T., 1997. Managing the Risks of Organizational Accidents Ashgate. Aldershot, Hants, England, Brookfield, VT, USA.

Rochlin, G.I., 1999. Safe operation as a social construct. Ergonomics 42 (11), 1549–1560.

Schein, E., 1992. Organizational Culture and Leadership, 2nd ed. Jossey-Bass, San Francisco, CA.

Schoepf, B.G., 1992. Aids, sex and condoms: African healers and the reinvention of tradition in Zaire. Medical Anthropology 14 (2–4), 225–242.

Sexton, J.B., Thomas, E.J., Helmreich, R.L., 2000. Error, stress and teamwork in medicine and aviation: a cross-sectional study. Chirurg 71 (6 Suppl.), 138–142.

Silbey, S.S., 2009. Taming Prometheus: talk about safety and culture. Annual Review of Sociology 35, 341–369.

Smith, D.J., 2004. Youth, sin and sex in Nigeria: Christianity and HIV/AIDs-related beliefs and behaviour among rural–urban migrants. Culture Health & Sexuality 6 (5), 425–437.

Starbuck, W.H., Farjoun, M., 2005. Organization at the Limit: Lessons from the Columbia Disaster. Blackwell Pub, Malden, MA.

Thaden, T., Hoppes, M., Yongjuan, L., Johnson, N., Schriver, A., 2006. The perception of just culture across disciplines in healthcare. In: Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting, San Francisco, pp. 964–968.

Vaughan, D., 1996. The Challenger Launch Decision: Risky Technology, Culture, and Deviance at NASA. University of Chicago Press, Chicago.

Wallerstein, I., 1996. Open the Social Sciences: Report of the Gulbenkian Commission on the Restructuring of the Social Sciences. Stanford University Press, Stanford, CA.

Walton, M.M., 2006. Hierarchies: the Berlin wall of patient safety. Quality and Safety in Health Care 15 (4), 229–230.

Weber, M., Gerth, H.H., Mills, C.W., 1958. From Max Weber: Essays in Sociology. Oxford University Press, New York.

Weber, M., Roth, G., Wittich, C., 1978. Economy and Society: An Outline of Interpretive Sociology. University of California Press, Berkeley.

Weick, K.E., 1987. Organizational culture as a source of high reliability. California Management Review 29 (2), 112–128.

Weick, K.E., Sutcliffe, K.M., 2007. Managing the Unexpected: Resilient Performance in an Age of Uncertainty, 2nd ed. Jossey-Bass, San Francisco.

Westrum, R., 2004. A typology of organisational cultures. Quality and Safety in Health Care 13 (Suppl. 2), ii22-ii27.

White, L.A., 1975. The Concept of Cultural Systems: A Key to Understanding Tribes and Nations. Columbia University Press, New York.

White, L.A., Dillingham, B., 1973. The Concept of Culture. Burgess Pub. Co., Minneapolis.

Wiegmann, D., Zhang, H., Von Thaden, T., Sharma, G., Mitchell, A., 2002. A Synthesis of Safety Culture and Safety Climate Research. Aviation Research Lab., University of Illinois, IL.

Wuthnow, R., 1987. Meaning and Moral Order: Explorations in Cultural Analysis. University of California Press, Berkeley.