



# How perceptions of experience-based analysis influence explanations of work accidents

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## ABSTRACT

**Introduction:** This article looks into how perceptions of experience-based analysis (EBA) influence causal explanations of accidents given by managers and workers in the chemical industry ( $n = 409$ ) and in the nuclear industry ( $n = 222$ ). **Method:** The approach is based on the model of naive explanations of accidents (Kouabenan, 1999, 2006, 2009), which recommends taking into account explanations of accidents spontaneously given by individuals, including laypersons, not only to better understand why accidents occur but also to design and implement the most appropriate prevention measures. The study reported here describes the impact of perceptions about EBA (perceived effectiveness, personal commitment, and the feeling of being involved in EBA practices) on managers' and workers' explanations of accidents likely to occur at the workplace. **Results:** The results indicated that both managers and workers made more internal explanations than external ones when they perceived EBA positively. Moreover, the more the participants felt involved in EBA, were committed to it, and judged it effective, the more they explained accidents in terms of factors internal to the workers. **Practical Applications:** Recommendations are proposed for reducing defensive reactions, increasing personal commitment to EBA, and improving EBA effectiveness.

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## 1. Introduction

Experience-based analysis (EBA) is a process for approaching past operational failures and organizational dysfunctions aimed especially at “providing a means of reflection about experience acquired during serious accidents and/or incidents occurring in normal or disorganized situations, in order to draw conclusions from it, store it in memory, and reuse it” (Weill-Fassina, Kouabenan, & De la Garza, 2004, p. 276). Better yet, EBA is a tool for evaluating or reevaluating risks, based on the after-event analysis of deviations or variations in behavior with respect to norms or standards (regulations, rules, procedures, instructions) and likely to cause an accident. Lessons learned from EBA have important implications in the acquisition of new skills and in gaining control over the areas of uncertainty inherent in the structure of organizations where there are major technological risks (Schöbel & Manzey, 2011), e.g., in the nuclear and chemical industries. Such organizations operate in a highly competitive, controlled, and innovative environment that leaves very little room for error (La Porte, 1996). The implications are great, as are the means allocated to learning from experience and sharing it with others (Marcus, 2005; Miller, Kaufer, & Carlsson, 2000).

Nielsen, Carstensen, and Rasmussen (2006) showed how the implementation of EBA in two Danish steel factories reduced the frequency of work accidents. Similarly, Allen, Baran, and Scott (2010) found that holding regular meetings to review and analyze events in work groups contributed to instilling a good safety climate. Lastly, but in a different perspective, Homsma, Van Dick, De Gilder, Koopman, and Elfring (2009) reported that the analysis of serious accidents is a source of innovation in the firm.

However, the subject of EBA of accidents raises many potentially threatening issues for the individual, with a weight that “foreshadows possible biases in causal explanations and makes it plain that accident explanations can hardly be impartial” (Kouabenan, 1999, p. 61). EBA looks at events whose consequences can not only project a negative image on the persons involved (helplessness, incompetence, negligence, etc.), but also incur considerable losses for those persons, by forcing them to assume responsibility for the event and to satisfy demands for moral and/or financial amends. As a result, the very purpose of EBA – prevention – may in fact be supplanted by other concerns. For example, the need to make amends for damages (or to do justice) can trigger the search for culprits, in view of making them suffer the consequences of their acts or decisions (Johnson, Kirwan, Licu, & Stastny, 2009; Ribalaygua, 2010). Likewise, the need to control the work environment can lead to questioning of the rules and standards of work groups, in order to put an end to suspected rule violations (Ferjencik & Jalovy, 2010; Lawton & Parker, 2002).

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Clearly, the motivations behind a given EBA process determine the direction taken by the accident analyses that ensue. It can target the search for factors at the origin of the accident in order to better control the risky situation, or it can be aimed at assigning responsibility for the event in order to lay blame. In this vein, a recent review of the literature on the criminalization of human error in aviation and healthcare underlined the harmful effects (depression among accused individuals, dissimulation of facts, shame, etc.) of accident analyses that place priority on assigning responsibility to the author(s) of the error (Dekker, 2011). In line with this, Probst, Brubaker, and Barsotti (2008) showed that there was more underreporting of accidents in companies that have a bad safety climate than in ones where the safety climate was good (81% vs. 47%).

In regards to accident analysis per se, Kouabenan (1999) showed that when the goal is to assign responsibility, there may be negative effects on the search for a cause. For this author, accident analyses oriented toward finding the guilty or responsible persons generally tend to exaggerate the causal role of the individual while neglecting that of the accident circumstances and exacerbating defensive reactions. In such a context, “doubt can then set in about what should be considered the most important cause(s) of the accident, since every protagonist involved in an accident or its analysis may be tempted to conceal or minimize those factors that he/she perceives as self-incriminating, and to amplify instead the causal role of external factors, which are perhaps necessary but may not be critical” (Kouabenan, 2001, p. 458).

The utility of the above studies is obvious, because they undeniably contribute to improving accident analyses, and more generally, to enhancing learning processes based on post-accident reviews like those conducted in EBA. However, very little research has been conducted to connect the organization of EBA to the explanations given by accident analysts. Most studies on EBA have primarily examined the causes of incident and accident underreporting. The principal reasons given to explain the underreporting of accidents, incidents, and errors are fear (as a consequence of “a culture of blaming”), the perceived meager utilization of data reported by managers, costs (too time-consuming, too difficult), and risk acceptance (Ahluwalia & Marriott, 2005; Ellis & Davidi, 2005; Ilan, Squires, Panopoulos, & Day, 2011; Probst & Estrada, 2010; Psarros, Skjong, & Eide, 2010; Van der Schaaf & Kanse, 2004; Waring, 2005). Yet, participation by the concerned persons does not end when the event is reported. Willing and trusting commitment must be sustained throughout the event analysis to achieve a proper understanding of the accident situation and promote learning of all the lessons it offers (Sanne, 2008). We therefore propose here to go beyond the accident-reporting phase, in order to look specifically at accident analysis.

During the analysis phase, conflicts and tensions may be uncovered when comparing managers' and workers' causal explanations of accidents occurring at the workplace (Kouabenan, 1985, 1999; Kouabenan, Gilibert, Médina, & Bouzon, 2001). Kouabenan (1985, 1999), for example, showed that managers were inclined to attribute a greater causal role to factors internal to workers (inattentiveness, lack of experience, failure to follow safety instructions, etc.) than to the organization, of which they are generally responsible. Conversely, workers tended to ascribe accidents more to organization-related factors, and thus indirectly, to management (poor working conditions, job requirements, time pressure, equipment in a poor state of repair or not suited to the job, unsatisfactory bodily protection, etc.) than to factors related to their own role. These findings were corroborated by DeJoy (1987), Gyekye and Salminen (2006a), and Salminen (1992).

Furthermore, when accidents occur in a poor safety climate, individuals appear to make more explanations involving managers or the work organization than explanations stressing their own causal role. The fact of accentuating organizational factors minimizes the weight of individual factors and helps avoid negative judgments by other persons within the organization. In the same line, accidents that occur in a context of opposition may provide the opportunity to rekindle or justify complaints or

demands expressed prior to the accident (Kouabenan, 1999). When workers feel that their immediate superiors neglect safety in order to achieve more profitable production, they appear to explain accidents more in terms of their superiors' attitudes than in terms of victim-related factors. Hofmann and Stetzer (1998) showed that individuals based their accident explanations more on factors internal to themselves than on organizational factors whenever they had a positive perception of in-house communications referring to the accident. On this subject, Vibert (1957), cited by Kouabenan (1999), showed that employees who were satisfied with their overall working conditions attributed accidents more to personal factors than to organizational ones. In a study with a sample of 310 workers, Vibert found that “satisfied workers involved and participating in the company mostly attributed accidents to causes proper to the individual.” In contrast, ‘dissatisfied workers,’ less integrated and participating less in the company, more often invoked ‘non-individual’ causes (p. 92). Likewise, in a study with 320 agents of the French telecommunications company, Kouabenan (1999) showed that “persons who feel at ease in the organization generally have a favorable attitude and provide explanations which tend to exempt it from blame, whereas those who are less involved tend to provide explanations that point at the organization and its managers as being the source of accidents” (p. 93). Thus, the less involved or satisfied employees are, the more they are inclined to explain accidents in an external way by ascribing them to factors related to the organization (such as safety-measure inadequacy, faulty equipment, and low responsiveness on the part of managers) rather than by incriminating employees for their carelessness or neglect. Conversely, employees who are satisfied with what the organization offers them, and who feel they are part of it, tend to make more internal explanations (Kouabenan, 1999, p. 93). It seems, then, that accident analyses are less conflictual when the safety climate is positive (DeJoy, 1994; Gyekye & Salminen, 2006b; Hasle, Kines, & Andersen, 2009; Prussia, Brown, & Willis, 2003).

In order to verify the effect of the safety climate in the present study, we looked at how managers' and workers' perceptions of EBA are linked to their respective causal explanations of work accidents. EBA perception is regarded as a dimension of the safety climate that specifically reflects the way in which individuals assess EBA practices in their company and the extent to which they think the organization involves them in these practices.

Based on the above results (DeJoy, 1994; Gyekye & Salminen, 2006b; Hasle et al., 2009; Hofmann & Stetzer, 1998; Kouabenan, 1999; Prussia et al., 2003; Vibert, 1957 cited by Kouabenan, 1999), which show that the more positive employees' attitudes towards the organization or towards the organizational climate are, the more internal explanations they make, we reasoned that a positive perception of EBA practices would lead to internal rather than external causal explanations, and that a negative perception of these practices would lead to the opposite. More specifically, we wanted to find out whether the accident explanations given by managers and workers are more self-directed and less defensive when they perceive EBA positively (i.e., when they judge it to be effective, feel they are involved in it, and voluntarily commit to it). As a whole, we expected managers and workers to give more internal explanations than external ones when they perceive EBA positively than when they perceive it negatively.

Let us begin by describing the research methodology used to verify this hypothesis. Then we will report and discuss the results obtained.

## 2. Methodology of the study

The study was conducted in France, in two industrial firms operating on three sites, two chemical factories and one nuclear power plant.

### 2.1. Research setting

The chemical and nuclear companies where we conducted our study use EBA in all risky domains of production (e.g., fire, explosions,

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