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## Accident investigation on a large construction project: An ethnographic case study

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### Abstract

Unsafe acts are believed to account for approximately 80 to 90 percent of accidents. This paper will investigate this issue through exploring the reasoning behind the unsafe acts that resulted in a minor accident on a large construction project (+\$1B) in the UK. The study described here, part of a wider PhD project, was undertaken using an ethnographic approach. Participant observation enabled the researcher to be involved in the whole accident investigation process including witness statement interviews, informal discussions, post-accident reports and meetings. The understandings displayed by those involved in the minor accident included a desire for a lack of blame, with the incident being described as 'an act of god'. The study reveals intentional unsafe acts that were due to time pressures, an acceptance of the unsafe act as a social norm and a lack of planning and training. Without any investigation, this accident could have been attributed purely to a cable guide, which could have been considered an unsafe condition. However, through thorough investigation there were also four unsafe acts related to the accident discovered: three of which were intentional. The construction industry needs to shift its safety management effort towards the understanding and elimination of unsafe acts despite them being more difficult to identify and prevent than unsafe conditions. Changing intentional unsafe behaviours is one of the next steps for improving health and safety of the industry, and the insights from this paper add to the knowledge of why these unsafe acts occur.

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## 1. Introduction

In 1959, Heinrich stated that accidents are caused by an unsafe condition and/or an unsafe act. Since then, safety management systems have concentrated on eliminating both these areas, though there has been more focus on unsafe conditions on site. This is because physical evidence can be gathered to account for the accident [1] and hence relatively little effort devoted to reducing or eliminating unsafe acts [2]. Donald and Young [3] suggest that little remains to improve on in terms of physical conditions, and considering that approximately 80-90% of accidents are caused by unsafe acts, further construction safety improvement is hardly expected to improve without more concentration on the reduction or elimination of unsafe acts. The construction industry needs to shift its safety management effort towards the elimination of unsafe acts [2] despite them being more difficult to identify and prevent than unsafe conditions [1]. The aim of this paper is to explore safety attitudes and behaviors relating to a minor accident on a large construction project.

## 2. Workers mental process and unsafe acts

Reason [4] defined two types of unsafe acts: errors and violations. Reason asserts that the term violation denotes an intentional act, and in most accident databases, violations are far more common than errors [5]. As unsafe acts are often intentional [6] understanding why these intentional unsafe acts occur is an important step towards elimination. Cognitive theory aims to explain human behavior by understanding thought processes. In this theory, the assumption is made that thoughts are the primary determinant of behavior. There have been a few notable research efforts on workers' mental processes towards safe behaviors. Eagly & Chaiken [7] suggested that attitudes towards safety influence intention, which in turn affects behaviors. While this model has been useful to explain workers' mental processes, it omitted the perception of accidental risks, which is an important aspect of safety behavior analysis [2]. Mearns, Flin, & Gordon [8] build on this model, by emphasizing risk perception in their more comprehensive model. A recent model by Shin et al. [2] added a feedback loop, which is 'key to understanding a workers' mental process to safe behavior'.

### 2.1. Risk perception

Risk perception is defined as a workers subjective judgment on a risk [9]. The relationship between risk perception, risk taking behavior and injury experience are complex [10]. In the construction industry, work undeniably requires a higher tolerance to risk and risk taking behavior than the average occupation [11] and this is partly why some people work in the industry, as they like to take risks [12]. In construction, time and money are two important driving forces. This can mean that for operatives paid on 'price' there is a benefit to finishing quickly, but that often leads to taking risks and cutting corners [13].

### 2.2. Attitude

According to Shin et al. [2] to eliminate worker's unsafe acts, their safety attitudes need to be closely examined. An attitude is 'a psychological tendency that is expressed by evaluating a particular entity with some degree of favor or disfavor' [7]. Workers attitudes towards risk tend to be optimistic, though this can change if a worker experiences a traumatic accident [2]. Attitudes towards behaviors refers to the degree to which a person has favorably or unfavorably evaluated the behavior [14] and are closely related to a combination of expected benefits and cost [2]. According to Shin et al. [2] there are five factors influence attitude towards behavior: habit, attitudes towards target, reward or punishment, norms and/or approval of significant others and self-identified outcomes.

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