

The Arbitrariness of Accident Analysis

Determining the cause of an accident is a psychological (social) rather than logical (rational) process.

One of the many myths of industrial safety is that accident analysis / accident investigation is a rational search for (root) causes. The purpose of the investigation is, by definition, to find out what happened so that we can take steps to ensure that it does not happen again. And finding out how something happened is, we assume, a rational process, the relentless pursuit of causes using clear and objective methods.

To Be Safe

Accidents are usually explained by referring to a model of how causes lead to effects. The Domino model from 1931 used the analogy of a row of domino pieces that fell one after the other. And in the 1980s, the Swiss cheese model explained accidents as combinations of active failures (or unsafe acts) and latent conditions (hazards).

All accident models share the unspoken assumption that outcomes can be understood in terms of cause-effect relations. This *causality credo* – itself another safety myth – can be expressed as follows:

- An accident is an effect, and therefore has a preceding cause. There is furthermore an evenness between causes and effects, which means that an accident happens because something has failed or malfunctioned.
- The causes of an accident can be found if only enough evidence is collected. Once the causes have been found, they can be eliminated, encapsulated, or otherwise neutralised.
- Since all accidents have causes, and since all causes can be found, it follows that all accidents can be prevented. This is the vision of *zero accidents* or zero harm that many companies find attractive.

According to the zero accident vision, the goal of safety management is to ensure that nothing goes wrong, whether counted as accidents, incidents, loss time injuries, etc. We can therefore *be* safe if we can ensure that nothing goes wrong.

Even though those in charge often promise “to leave no stone unturned” when accidents are investigated, everybody who works with safety in practice knows that there

are many issues and concerns that may constrain an investigation. There may be significant time and public (political) pressure, especially for the more serious events. The depth of analysis is often limited by available resources and by deadlines. The range of available (traditional) methods is limited. And the investigation often looks for liabilities as well as for causes.

To that can be added the fact that accident investigations like any other investigation or analysis is limited by the What-You-Look-For-Is-What-You-Find (WYLFIWYF) principle. It is a consequence of the WYLFIWYF principle that the assumptions about the nature of accidents, the *causality credo* in particular, constrain the analysis.

Determining the cause of an accident is a **psychological** (social) rather than **logical** (rational) process.

Causes are not **found** but **constructed**.



There are no true - or “root” - causes waiting to be detected



Causes are the outcome of a (tacit) social agreement, often based on tradition and common experience

To Feel Safe

Accidents are not only a hindrance to purposive human activity, but are also unexpected, even when they are imaginable. Because accidents take us by surprise, they are psychologically unpleasant. Human beings have a basic need to feel safe, to feel that nothing can harm them physically, economically, or in other ways. When something unexpected and unpleasant happens, we therefore need to restore our feeling of safety.

Finding a cause has a practical value, because knowledge of the cause is seen as necessary to prevent that the accident is repeated. But finding a cause also has psychological value because it relieves us from the anxiety that follows the unknown. This

was recognised more than a century ago, when the philosopher Friedrich Nietzsche wrote that to “to trace something unfamiliar back to something familiar is at once a relief, a comfort and a satisfaction, while it also produces a feeling of power. The unfamiliar involves danger, anxiety and care – the fundamental instinct is to get rid of these painful circumstances. First principle – any explanation is better than none at all.”

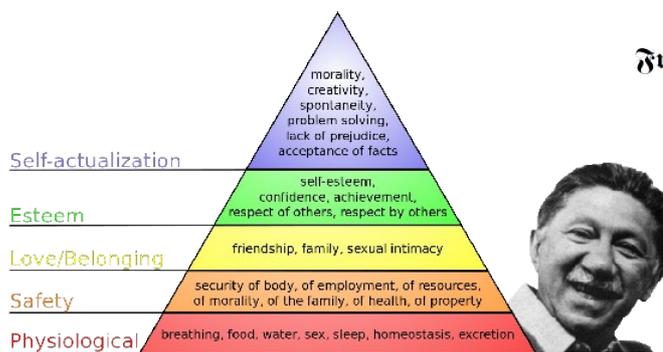
A cause is the identification, after the fact, of a limited set of aspects of the situation that are seen as the necessary and sufficient conditions for the effect(s) to have occurred. We can therefore **feel** safe, if we can think of an acceptable explanation for the unexpected.

“(t)o trace something unknown back to something known is alleviating, soothing, gratifying and gives moreover a feeling of power. Danger, disquiet, anxiety attend the unknown - the first instinct is to eliminate these distressing states. **First principle: any explanation is better than none ...**”

“The cause creating drive is thus conditioned and excited by the feeling of fear.”



“*Twilight of the Idols*”
Friedrich Wilhelm Nietzsche (1844-1900)



Maslow's hierarchy of needs.

To Really Be Safe

Safety is traditionally defined as a condition where the number of unwanted outcomes (accidents / incidents / near misses) is as low as possible (Safety-I). But this deceptively simple definition is however problematic because it defines safety by its opposite, by what happens when it is missing. It also means that safety is measured indirectly, not as a quality in itself, but by the consequences of its absence.

While it is natural to be concerned with what goes wrong, we should also realise that when something happens it either goes right or wrong, but not both at the same time. We could therefore also look at how things go right, and define safety as a condition where as

much as possible goes right (Safety-II). From this perspective, the purpose of safety management is to ensure that everyday work succeeds. This can clearly not be done only by responding to what goes wrong. Safety management must also be proactive. That requires an understanding of the nature of successful work, of how the work environment develops and changes, and of how functions may depend on and affect each other. This understanding requires looking for patterns and relations across events rather than for causes of individual events. And it is more important **really** to **be** safe making sure that everything works as it should, than to **feel** safe by clinging to socially acceptable causes.