Safe Places versus Safe People

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Safe People: The Wild Goose Chase

There is a great deal of faith placed in investigating accidents and finding the cause as a means to implementing measures to prevent further accidents. Unfortunately the whole area is hampered by folklore, emotion, and fuzzy definitions. Prevention usually stems from a enthusiastic search for the cause of accidents. This search also begins with a bias that inevitably leads to the behaviour of people, usually the victims, being central to the problem. This mistake sets the scene for a 'wild goose chase' that ends with trying to prevent accidents by encouraging safe behaviour or weeding out the accident-prone workers. The first problem lies with the common understanding of the word *accident.*

The Mistaken Belief that Accidents are Unpredictable

The popular, or dictionary-based, definitions of *accident* quote words like **unexpected** and **unfortunate** (The Macquarie Dictionary 1985). Likewise in safety literature it is common for *accident* to be defined with words like **unplanned** (Heinrich 1941; Blake 1963; Wigglesworth 1972; James 1983; Bamber 1994; West 1994; Stranks 1994), **unintended** (Blake 1963; Yellman 1987; Stranks 1994), **unexpected** (Kuhlmann 1986; Bamber 1994; West 1994; Stranks 1994), or **uncontrolled** (Heinrich 1941).

These definitions give accidents an air of mystery and fatalism. If accidents are unplanned, uncontrolled, and unpredicted then they are unplannable, uncontrollable and unpredictable. Then by definition they are also unmanageable. If we can't predict then how can we plan or control? We can't. This approach implies that there is little that can be done in advance to prevent accidents. The role of management and planning is irrelevant in this model.

The Self-Perpetuating Myth of 'Unsafe Acts'

Often the analysis of accidents is based on the model of *unsafe acts or unsafe conditions*. This way of thinking has its roots in the industrial revolution where the focus on the prevention of injury was concerned with the guarding of machinery. Given the great problems with machinery-based injuries it became customary to view the causes of accidents as either *machinery or non-machinery* accidents (for example; Stephenson 1926; Viteles 1932; Watkins & Dodd 1940). Later these terms became known as, *unsafe acts or unsafe conditions* (for example; Vernon 1936; Heinrich 1941; Denton 1982; Watson 1986; Stranks 1994).

The unsafe acts and unsafe conditions model has had a powerful impact on the thinking in safety today. Furthermore it is well believed that unsafe acts represent by far the greater proportion of the two possible causes. It has become entrenched that unsafe acts are the primary cause of accidents. Sometimes other labels for unsafe acts are used, for example; attitude, carelessness, risk taking behaviour, accident proneness, and absent-mindedness. This barrage of victim blaming continues today, most notably by the Victorian Transport Accident Commission's (TAC) blitz of our televisions and other media. The TAC inform us that bloody idiots, speeding drivers, careless people changing tapes, impatient people, and tired people, are responsible for accidents. The message is clear that that the behaviour of people is the reason for the problems on the road.

Any scan of a newspaper story about the road toll, or a plane crash, or occupational injuries, will reveal the same thing; something like; *"studies have shown that 90% of accidents are due to carelessness"*.

Mostly these statistics are extremely fuzzy. For years people have been saying that the figures are based on subjective judgements and could just as easily be reversed to show that unsafe conditions were the main problem (for example; NSC 1959; ILO 1961; Blake 1963; Kinnersley 1973; Hammer 1976; ILO 1983; Thomas 1991). In the report of *Bitter Wages: Ralph Nader's Study Group Report on Disease and Injury on the Job*, Page and O'Brien (1973) commented that;

One of the most persistent of the arguments mounted against broad federal involvement in the struggle against work accidents and diseases emerged from the notion that the overwhelming majority of job injuries result from worker carelessness; therefore, the proper and better approach to occupational safety is to educate employees, rather than impose mandatory standards on employers.

Some companies have gone to great lengths in their efforts to "teach" safety and motivate workers to be careful...

A closer look [at statistics] reveals that the worker-carelessness theory is a hoax. It is a version of the "nut behind the wheel" argument used in the unsuccessful attempt to stop legislation giving the federal government authority to impose performance standards upon automobiles. As hoary as the work safety movement itself, the worker-carelessness argument has a very shaky basis in reality. Although one cannot deny that some work accidents are causally related to worker carelessness, this does not mean that they all are. Nor does it mean that the frequency and severity of these accidents cannot be substantially reduced by designing the work environment and work practices to take human failings into account. (Page & O'Brien 1973, pp. 145-146)

The idea that unsafe acts are the biggest cause accidents is self perpetuating. A person is always present at some point in the failure that leads to an accident. A person always did something before the accident. Whatever this was it is proven to be unsafe because it lead to an accident. Beginning an accident investigation with the unsafe act model in mind invariably implicates a person (normally the victim) in the cause. This label is therefore easily applied to virtually all accidents. Thus the unsafe act paradigm is self-perpetuating. In reality there are no accidents that can be attributed solely to an unsafe act alone, or an unsafe condition alone. The use of the model has been biased toward blaming the victims. This has sometimes been known as the *myth of the careless worker* (Kinnersley 1973; Mathews 1986). The theory has no real basis and consequently no role to place in the analysis and understanding of accidents.

The Misleading Link Between 'Cause' and 'Prevention'

The purpose of finding out the cause of accidents is supposedly to guide prevention. Heinrich (1941) gave impetus to unsafe acts theory with the claim that analysis of insurance statistics showed that 88% of accidents were due to unsafe acts. Heinrich claimed that all these unsafe acts were due to a faulty attitude that could be traced back to either, an inherited propensity to be reckless, or a characteristic of carelessness learnt

from social surroundings. This sounds fanciful but the prevention methodologies that followed are still widely promoted. The problem of inherited recklessness could not be altered and so the only means of dealing with this was to weed out the accident prone people with careful selection procedures. This remains a popular way of thinking and is supported by misleading statistics that purport to give weight to the theory. Like Deming (1982) ridiculed management for their baseless awards for employee of the month, etcetera, Kletz (1990) ridiculed the implication that those who appear to be having more than their share of accidents are somehow to blame. Kletz illustrated the foolishness with the following example. Assuming 100 accidents per year are distributed randomly among 200 workers at a single factory, the Poisson equation predicts that;

121 people will have no accidents
61 will have one accident
15 will have two accidents
3 will have three or more accidents.

It is simple to then create misleading statistics. Given the average accident rate is 0.5 accidents per person per year, we can say, "three people have had six times the average rate!" Or alternatively, "10% of the workforce are having 40% of the accidents!". Obviously, "we must do something about these people!" These type of statements are in fact completely misleading. They indicate incorrectly that that there's something accident prone about these people; however there is nothing different about these people. The statistics are simply the result of random variation. Programs to weed out accident prone people based on personality are thus widely discredited.

The second problem according to Heinrich was bad habits learnt from bad examples. The obvious remedy for this problem was to change the habits by surrounding these potential trouble makers with good role models. There is a great popularity today with behaviour training programs and safety coaching programs that rely directly on this theory. The use of propaganda also relates to this theory.

Finding the cause is thought to be a way to guide the prevention of accidents. Unfortunately by starting with a faulty model of unsafe acts and unsafe conditions the only

result is mistakes. The first problem is that the statistics are wrong. The second and more serious problem is that the common models of analysis are so contaminated that they give nothing but misleading information and divert attention from more reliable means of prevention; namely the *safe place approach*.

Safe Places

Control at Source

The safe-place approach relies on a model of the accident process rather than an analysis of the cause of accidents. Finding the cause of accidents is of little use. The safe place approach is directed toward the prevention of accidents rather than finding the cause of past accidents. The basic model is that of the *hazard source*, *pathway*, and *person*.

hazard source ➔ pathway ➔ person

The concept of the source of risks, is one that dates back most directly to the study of occupational hygiene. It had been customary in occupational hygiene to view the source of contamination as the hazard and to regard the control of the problem source as a priority (Hamilton 1929). The overall process of industrial disease was then conveniently modelled as; *hazard source ➔ pathway ➔ person*. Hamilton, recognised as a pioneer figure in the establishment of the hygiene profession, made it clear that controlling the source of the problem was the only reliable way to preventing occupational diseases. The control at source model for prevention is now embedded in legislation. For example, the *Occupational Health and Safety Act 1985* has as one of its objects;

> *...to eliminate, at the source, risks to the health, safety and welfare of persons at work. (Occupational Health and Safety Act 1985, p. 5)*

Hierarchy of Control

Often the approach of tackling the source of the problem as a priority and the behaviour and personal protection of the worker as a last resort is called the *hierarchy of control.* For instance the recently released *Code of Practice for Plant* (HSO 1995) made under the *Occupational Health and Safety (Plant) Regulations 1995*, suggests the following hierarchy for the management of plant hazards.

1. *Elimination*
2. *Substitution*
3. *Engineering Controls*
4. *Isolation*
5. *Administration*
6. *Personal Protective Equipment (HSO 1995)*

This way of thinking is an application of the model of; *hazard source* ➔ *pathway* ➔ *person*. The hierarchical method became common in occupational hygiene (for example; Bloomfield 1936; Brandt 1947) and was later applied to the problem of occupational injuries (for example NSC 1959). The hierarchy of control is now a general approach to achieving health and safety. There are many versions of the hierarchy but they generally share a common theme of first targeting the source of the hazard, and working along the process, until the last line of defence is reliance on the behaviour of the people at risk.

Passive Countermeasures

An important concept in the safe place approach is the notion of passive countermeasures. Passive countermeasures operate independently of the user, whereas active countermeasures require the involvement of the user for success. An example of this would be to compare the use of seat belts and airbags as a means of protecting people in motor vehicle collisions. The airbag is a passive control as it does not rely on the user knowing anything about how it works or remembering to turn it on. In contrast the seat belt relies heavily on the behaviour of the users. The difficulty of relying on the active behaviour of the users is shown by the inundation of advertising attempting to get people to use seat belts. Active controls are inherently unreliable and require constant support, whereas passive controls do not rely heavily on the appropriate behaviour of the user.

A further familiar example would the difference between having a whistle on a kettle or having a kettle that automatically turned off. The whistle is an active control, it requires active participation of the user for it be effective. The automatic kettle requires a much reduced level of vigilance on the part of the user and so is inherently more reliable.

Conclusion: A Different Paradigm

One of the main problems with the prevention of accidents has been that they are thought of as unplanned, uncontrolled and unpredicted. This implies that accidents can't be managed. With the exasperation that comes in the midst of grappling with this unpredictable phenomenon, it seems that our only hope is to beg people to be careful. We do this often via prizes, posters and televisions advertisements, in the vain hope that people will somehow jump out of the way as the unpredictable beast called an accident pops up characteristically unexpectedly.

To escape this mystical approach and introduce a sense of manageability to the process, a new paradigm is necessary. Accidents must be defined as being planned, controlled, and predicted. They must be seen as plannable, controllable and predictable, if they are to be managed. Accidents are predictable; people in hazardous jobs get injured. Accidents are predictable by examining the system of control over hazards. The accident arises out of a loss of this control, but the frequency of this loss of control is plannable, controllable and predictable according to the quality of the control mechanisms. The severity and frequency of injury is also predictable by understanding size and nature of the hazards and by analysing the numbers and proximity of the people at risk. The old models of unsafe acts and unsafe conditions was misleading. Analysis using the model was biased and lead to an unfortunate preoccupation with behavioural based *safe person* strategies and a diversion of attention from more reliable *safe place* methods of prevention. Safe place controls are the more reliable mechanisms of prevention, they focus on the hazard source, and place emphasis on passive controls that operate independent of vigilant behaviour of those at risk.

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