

Planning for Emergency Behaviours

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On 11 May 1985 a serious fire at Bradford City football ground killed 56 people and injured 265. It was the last football match of the season and Bradford City had won promotion. Television cameras were present to record what should have been a celebratory concluding football match. Instead, the fire was recorded but this provided researchers with detailed documentary evidence that could support interviews and other data collection after the event.

Often one of the first reactions to disasters is usually to call for more controls over people or better safety systems, i.e., technologically sophisticated hardware in order to give more advanced warning. While these may be necessary at some point, research undertaken immediately after the Bradford City fire demonstrated that understanding human behaviour in emergency situations – as in all planning, design and management situations - should be the starting point for emergency planning strategies rather than legislative or engineering solutions.

In research terms people's behaviour in fires is an interesting as well as difficult area of investigation, because there are many problems in studying people's behaviour in emergency or disaster situations which are not found elsewhere.

1. Events such as fires are rare and often unpredictable, so it is impossible to plan or set up studies in advance. You cannot identify likely people who will experience a fire. Of course, some groups may be more at risk, but conventional sampling terms do not work.
2. Those who have experience of a fire cannot be questioned in the normal way. Their experience may have been too emotional and traumatic. They will need to be asked questions in a very detailed and sensitive way, such that many interviewers may not have the skills and will require specialist training.
3. Such research also raises important ethical questions.
4. The people who have the most significant and critical information are likely to have been killed by the event, or at least to have been seriously injured, so they may not be able to retrieve their story.
5. Fires and other emergency situations are often rapidly occurring, complex and confused events. Getting a detailed account from several or even one person may be difficult.

6. There are opportunities for using forensic evidence, i.e., the location of bodies along with other information about prior movements and regular/habitual behaviour which may allow for the reconstruction of what actually occurred. On the basis of these, inferences about cognitive and affective processes that may have influenced behaviour may be discerned..

7. The locating of fire incidents and the people involved relies on records and documentation. In the UK, such information is of quite high quality, but in many cases the principal source of what is seen to be reliable information may come from fire officers or engineers who analyse the scene after the event. It tends to be their views concerning people's behaviour in fires which inform subsequent fire regulations. It is quite evident from observations at the Bradford City football ground fire that it is the human aspects of the early stages of a fire which are often crucial to people's behaviour, yet this information is typically not available to them or it is not evident from the remains of a fire.

The research undertaken in Bradford provided detailed information about what people *actually* do in emergency and life-threatening situations, rather than what we - and this includes experts - assume people do. Several important myths exist concerning people's behaviour in fires and other emergency situations. Whenever there is a 'disaster' the media seek out alleged eye-witnesses and interview them for their reactions. This often involves 'feeding' interviewees with questions such as 'Was there screaming and panic?' It is too easy for people to agree with the interviewer. Equally, people will often say what they think the media expect them to say, i.e., "there was a great deal of panic", if only because they feel there perhaps should have been panic because they in turn have always been told this is what happens in such situations. Panic implies wild, uncoordinated and irrational behaviour. The evidence is that people are likely to behave in rational, cooperative and affiliative ways (Sime, 1980).

The media is important for another, perhaps more significant, reason. Most people do not have experience of disasters such as fires. If we are faced with an emergency situation or indeed any unusual situation, the repertoire of behavioural responses we can call upon is inevitably going to be limited. What options are available to us? We can draw on others' experience of which we may have some accounts. But given people's limited experience of fires or if they have been in a serious fire and have been traumatised by it, they may be unlikely or unwilling to talk about it. Second, we may engage in our normal behaviours but perhaps do them with a greater sense of urgency. Surprisingly, there is some evidence for this (Donald and Canter, 1990). Alternatively, we can draw on popular representations of appropriate behaviour. These will be derived from the media. The role of film, and in particular Hollywood disaster movies, may play a particularly significant although perhaps misleading model.

From the psychologist's point of view, the problem is that there has never been an attempt to develop an organised, systematic, research-based account of what actually happens to people in large crowds in emergencies. From this it would be possible to develop a better understanding of the optimum approach to dealing with these situations. Instead, a set of ground rules have accumulated that are based first of all on police control and secondly on the addition of ever more sophisticated hardware. Technological fix and legal approaches whereby the solution to a problem is seen in technical terms and thereafter the problem is defined in such a way that only technical or policing solutions are possible, permeates most strategies and tactics for dealing with crowd safety.

Conflict of Interest

The problem with technological fix and legislative solutions is that there is a danger that two very different strategies are now clearly in conflict. While most legislation has been geared to ensuring ready escape from football grounds in an emergency, there has also been a desire to keep football crowds under control by the increasing use of barriers, fences and other forms of hardware. In the early 1980s many football matches were interrupted by crowd invasions onto the pitch.

As a consequence, it was recommended that fences and/or moats be erected around football pitches so that spectators could not physically get onto the playing area. It was precisely because of this that over 90 football supporters were crushed to death at Hillsborough because as more fans were instructed to enter a section of the ground which was full to capacity already, those at the front of the terrace could not escape onto the pitch. When the fatal fire burst out in the stands at Bradford City football ground, many people were only able to escape by climbing on to the football pitch – had a fence or moat been erected the death toll would have been in the hundreds. There can be a conflict between the objectives of control and safety.

Government Guidelines on Evacuation Behaviour

All football grounds, sports stadia, theatres and places of public entertainment are governed by regulations that limit the number of people that can be in a particular space. If we take one section of a football ground, how do we determine how many spectators it should hold?

The basis of these calculations is to calculate the average number of people that can evacuate the narrowest exit within a particular period of time. Having set the time you require everyone to leave a specific space, it is possible to work out how many people should be allowed in that particular space.

So, with an evacuation period of 2.5 minutes, a corridor 2.75 metres wide and assuming an average egress rate of 50 persons per minute, then one should expect it would be possible to evacuate 625 people from a given space (i.e., 5 people width x 50 people/minute x 2.5 minutes). If there is only one corridor exit from this section of the football ground then the maximum number of people that can occupy this section of the ground is 625.

Although these engineering solutions look accurate and useful, in reality, the evacuation rate is much less.....

- People do not flow through exits like liquids in pipes
- People do not completely fill exit routes with their shoulders touching the walls on either side
- People come in many different shapes and sizes
- People move at different speeds depending on age, (dis)ability, the density of the crowd.
- As people get closer together so it is difficult for them to take larger steps – slow down
- People do not divide themselves evenly between the different available exits

Consequently researchers have measured actual flow rates that are consistently lower than the rates recommended in government regulations.

What happened at Bradford City Football Ground?

Combustible rubbish such as sweet papers, cigarette butts and dead matches had accumulated in the space under the seats of the Main Stand and for some time and was probably about 12" deep. The stand, built in 1908, was constructed of wood and was very dry; therefore as soon as a fire started it would not take long for the wooden Stand to catch fire. The fire was most probably started by an accidentally dropped match or a cigarette stubbed out in a polystyrene cup. The sequence of events which took place was fairly typical for a structural fire.

Canter has modelled this process and suggests that, based on evidence from a wide range of different types of fires, people's responses go through three distinct stages – interpret - prepare – act (Canter, Breaux and Sime, 1990). These are crucially important because the intuitive model often held about people's behaviour in fires is one of assuming that as soon as a fire is noted, or an alarm sounded, people will automatically evacuate as an almost Pavlovian response.

The First Stage: Interpret

The first stage in an emergency of this kind is that there are ambiguous cues that something - possible life-threatening - may be happening. This is an aspect of emergency situations such as fires that is frequently misunderstood. In the early stages it is not exactly clear what the nature of the problem may be. All that people know is that there is some possible danger or perhaps something unusual is happening. People will have the option of ignoring the cues or investigating further. The first sign of a problem at Bradford was when two spectators noticed that their feet and legs were getting warm. They looked down and saw the glow of a small fire through gaps in the floor of the Stand. In these early stages of a fire people need to find out what is happening. In a crowd they will ask the people near them or they will listen carefully to any suggestions from figures of authority. The critical point is that some type of initial questioning or search for further confirmatory information occurs in this initial ambiguous stage. The importance of this cannot be over-emphasised. Seeking further information, checking with others or looking around are of critical importance for two reasons. First, they take time to

carry out. Second, they lead to a set of expectations as to what is happening and what is the appropriate way of dealing with a fast changing situation.

Second Stage: Prepare

In the second stage, the options for any individual increase. They can explore and seek out more information such as the availability of equipment to deal with the situation or persons in authority who should be alerted. They can withdraw from the situation, or they can start to instruct others as to actions they may take. Canter argues that the roles and associated rules which influence or govern people's relationship to place or that particular situation will have a significant influence on their actions and the outcomes. In the early stages of the Bradford fire it was clear that many people did not take the event particularly seriously. Spectators close to the fire moved away but they stood and turned to watch it. While one man went to fetch a fire extinguisher, another poured half a cup of coffee on the fire - an action which, not surprisingly, had little effect. The police were alerted by the spectator searching for a fire extinguisher and they, in turn, went to look before radioing for help. In the early stages, the emergency may not be taken seriously. The police in particular need time to assess what is going on. In this case a senior police officer walked the full length of the football pitch in order to examine the fire before he started giving orders for people to leave over the front of the stands onto the football pitch. Once some recognition of danger has been acknowledged, then people have to select appropriate actions. This again may require checking with others and will certainly rely upon the knowledge people have of what actions are possible. In some cases, people may decide to help others or to go for help.

Third Stage: Act

The final stage is when people actively try to cope with the situation. They may choose to evacuate, fight the fire, warn others or simply wait to be rescued. This is when the timing in relation to escape routes, exit widths and the other aspects of egress become critical. Now there are a large number of people trying to leave a confined space under considerable pressure of time and small accidents can turn this into a very dangerous stage.

Because the tempo of a fire increases exponentially, the situation can go from being potentially or moderately dangerous to extremely dangerous within minutes if not seconds. The same time pressure exists in crowd surges and crushes. Pressure can build up slowly, but when a critical density is reached, the situation becomes dangerous almost immediately. As discussed above, the length of time to evacuate to a safe location once the decision has been made is planned to be in the region of no more than two and a half minutes. But the time to recognise that there is something serious happening and that they are personally at risk, and then the time to come to a decision as to what to actually do, may be considerable. In the Main Stand at Valley Parade it was 3 minutes. Even under ideal circumstances, or in a situation where the danger is clearly visible as in the Bradford fire, it can easily take a minute before people decide to act.

Conclusions from Bradford

It can be seen from the Bradford City football ground fire that the early planning for potential accidents, the quick and effective communication and the ready recognition of potential danger and how to cope with it can all be far more important than having precisely the right number of exits. One conclusion that some might draw from these findings is that by means of the development of new technology it will be possible to give people information in a way that will greatly speed up their initial reaction and their desire to leave a building in an emergency. While this may be the case, it is also possible that the introduction of one more piece of technology, with all its likelihood of error and misinterpretation and at the same time working within a context of public ignorance, will only hinder rather than help the risk identification and response process. Such a strategy has the potential to detract from the fact that the core of the problem is effective management procedures, good training, efficient communication and recognition that any emergency procedure must take into account the psychology of the individual and the psychology of the group. This is not to say that engineering or technological solutions are not important, but they should be developed in the context of what we know about human behaviour, rather than what we think we know or what we would wish it really to be.

Key References

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