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# **‘PANIC’ AND HUMAN BEHAVIOUR IN FIRE**

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## **ABSTRACT**

The word 'panic' is frequently used in media accounts and statements of survivors of emergency evacuations and fires, but what does it really mean, is it a phenomenon that actually occurs? This paper will review the definitions, and present evidence of behaviour from actual fire incidents that may have been misreported or misinterpreted as panic. Despite the numerous evidence that panic is a very rare occurrence in fires, the idea of panic and the term continue to be used by the public as well as fire experts. It is necessary to demystify the misconception that panic is an essential element of a fire and identify any scientific justification for continuing using this concept.

## **BACKGROUND**

Large numbers of deaths in catastrophic events are often attributed to panic, just as is the action of a father going back inside a burning house to save his child. In conversations, in the media, even fire experts have portrayed occupants' actions in fires as "panic behaviour." It is important to attempt to better understand this concept and to identify the factors that need to be observed to conclude that a panic response took place. Moreover, if specific factors leading to panic are identified, it will be possible to predict how panic could have happened and take measures to change such an outcome.

Over the years, panic has been discussed by several authors. Psychologists and sociologists have discussed the concept of panic for a variety of situations. Their frame of reference was adapted to the fire situation to explain tragedies and to justify decisions to change codes and standards. By the 1970s, however, some researchers started looking very closely at human behaviour during specific disasters; their conclusions challenged the common conception that panic was the explanation for the event outcome. In the fire field, it was suggested that the concept of panic is a myth meant to blame the outcome of a tragedy on the occupants when in fact the building design or its management were possibly at fault.

The debate started about 40 years ago between the very large group of proponents of the panic behaviour theory, which provides a relatively easy explanation for any situation gone bad, and the smaller group of social scientists who suspected that a more complex explanation was usually necessary to elucidate disaster outcomes.

This paper will summarize the definitions of panic behaviour discussed in the literature, related to the response of people during fire situations. It will examine the concept from the view of the general public, including the media. Evidence of behaviour from actual fire incidents will be presented through anecdotal accounts and case studies that have been categorized as panic. Overall, this paper is an attempt at clarifying the misconception that panic behaviour is an inevitable aspect of a fire emergency and arguing that people do indeed behave in a rational manner in the event of a fire.

## THE MEDIA, CINEMA AND MY BEST FRIEND'S VIEWS

The media is a great fan of the panic concept. Following the Beverly Hills Supper Club fire in the USA in 1977, *The Sun's* headline was "Panic Kills 300," the *Daily Mail* had "Panic and 300 Stampede to Death" and the *New York Times* spread over several pages "About 200 Feared Dead in Kentucky Club Fire; Many Trapped in Panic; Kentucky Fire Kills About 200 in a Club." Panic is so much expected during emergencies that journalists have a number of questions about panic when interviewing survivors. Following the emergency landing of Flight 1549 in the Hudson River on January 15, 2009, the CNN journalist, Wolf Blitzer, asked a passenger "All right, so then what happens? You hit the water. Do people start to scream? I know there are a lot of people you say praying. But was there a sort of panic that developed?" And the interviewee answered "I don't recall panic really at all."<sup>1</sup>

The media is an essential source of information and has a major impact on how the public sees the world; their constant attempt at dramatizing events plays a big part in the assumption held by the public that people panic in fire emergencies. Despite the media bias, when listening closely to survivors being interviewed, they seemed to report many more observations of calm and silence than what could be quoted as a "panic response."

The cinema has used the concept of panic to its extreme, portraying hysterical occupants in a variety of emergencies, including fires. Many film enthusiasts will recall the 1974 *Towering Inferno*, and the mad attempts of guests to escape in the stairs and on the roof. Science-fiction disaster movies are noteworthy for their dramatic mass-panic scenes, such as in 1998 *Armageddon* or 2005 *War of the Worlds*. In depicting an emergency in a movie, some characters are often illustrated engaged in selfish or risky actions that turn out badly, which heightens the dramatic effect. Movies are not reality, but nevertheless they nourish the public imagination, who come to expect to see in real life what they have seen on the big screen.

A few years back, a friend of one of the authors had a fire in her house. She had just put an empty pot on the stove when the doorbell rang. She went to answer the front door, then on her way back she stopped in the bathroom to touch up her hair and makeup when suddenly the smoke alarm went off. She ran to the kitchen to discover half-meter flames licking the kitchen cabinets. She recounts: "for two seconds I panicked, then I closed the door, grabbed the phone on my way out where I called the fire department." She got off with a fright but did not really panic in this event, despite using the word. Individuals in general often use the term 'panic' to describe their own emotional state and as an assessment of their ability to respond to a problem when they feel stressed, anxious or fearful. They may also use the word to describe the behaviour of others who appear anxious, frightened or scared, or who engage in a response that does not appear to be the most appropriate for the situation at hand. In media accounts analyzed following the evacuation of the World Trade Center in 2001, it was found that young males had a tendency to judge that women panicked, as they noticed some women crying during their descent.<sup>2</sup> It is interesting to note that some of the most dramatic language such as 'chaos,' 'total chaos,' 'mayhem' was used by the youngest males. In the eyes of a 23-year-old, seeing a grown woman cry was perceived as panic, which is a debatable appraisal.

With this colloquial use of the word, the concept of panic can put the responsibility for inappropriate response on the victim, and as a result, leave the impression that life-safety precautions could not or would not have prevented the resulting deaths.<sup>3</sup> In his much cited book, *Panic Behavior: Discussion and Readings*, Duane P. Schultz concludes that the large number of fatalities in the Iroquois Theatre Fire in 1903 and the Coconut Grove Nightclub Fire in 1942 were essentially caused by panic, as the fire was brought quickly under control.<sup>4</sup> Chertkoff and Kushigian have explained in extensive detail that Schultz's conclusions were inaccurate and that in fact, the victims' behaviour and actions did not cause the majority of deaths in those fires.<sup>5</sup>

Over several decades, studies specifically looking at panic behaviour in fires have consistently shown that non-adaptive and irrational behaviours are actually a rare occurrence. Unfortunately, even today,

building managers and the public at large, to a certain extent, do not seem convinced of the absence of panic in fires or other emergency events.<sup>6,7</sup> Anecdotal evidence indicates that this opinion is shared by many fire safety engineers and firefighters.

As recently as 2000, the U.S. National Transportation Safety Board was trying to persuade the International Council of Cruise Lines and the International Chamber of Shipping to accept a proposal to require automatic local-sounding smoke alarms on passenger ships.<sup>8</sup> The ICCL feared that the automatic alarms, even sounding locally, would trigger mass panic by passengers and impair crowd control by the ship's crew. (Note: ICCL cruise lines agreed to install such smoke alarms in 2002, and Cruise Lines International Association members agreed to install them not later than July, 2007.) Thus the misconception that panic is a common response during fires could impact safety designs and emergency procedures for public spaces. Consequently, it is essential to describe the possible circumstances and behaviour of people, which are labeled 'panic,' more accurately.

## DEFINITIONS

Several definitions of the concept of panic have been suggested in the literature. Over a century ago, Gustave Le Bon, in his book, *The Crowd: A Study of the Popular Mind*, attempted to explain and describe the behaviour of crowds of people.<sup>9</sup> Much of our early conception of panic behaviour seems to spring from Le Bon's ideas of a crowd. He defines a "psychological crowd" as a group of people where individuals have lost their own personality to share the same motivations and thoughts as the crowd, which is composed of the lowest common denominator as "a crowd displays a singular inferior mentality." According to Le Bon, some characteristics of a crowd are its excessive suggestibility which outweighs reasoning, its feeling of invincibility due to number and anonymity, and the contagion to all crowd members of sentiments and acts. Although this is an old conception of a crowd and how it might respond in the face of a threat -- emphasizing instinct over socialization, emotion over reasoning, competitive, selfish behaviour and disorganized response -- the image of the panicked crowd is very strong in our minds.

Definitions of panic can be found in dictionaries and in the sociology and psychology literature. It has been defined by Goldenson as "reaction involving terror, confusion and irrational behaviour precipitated by a threatening situation." Johnson wrote, "behavior involves selfish competition uncontrolled by social and cultural constraints," and "breaking of social order, competition unregulated by social forces."<sup>10,11,12</sup> Keating outlined four elements of panic: a) hope to escape through dwindling resources; b) contagious behaviour; c) aggressive concern about one's own safety; and d) irrational, illogical responses.<sup>13</sup> Quarantelli describes panic as an acute fear reaction marked by flight behaviour and the panic participant as nonrational in his flight behaviour.<sup>14,15,16</sup> In the human behaviour literature, 'panic' is usually defined as some sort of irrational behaviour, and research findings consistently show that people do not exhibit such irrational behaviour in fires. In fact, altruistic behaviour is seen to be the norm in serious fires.<sup>17</sup> Human behaviour under stress is relatively controlled, rational and adaptive.<sup>15</sup> It is also found that cooperation rather than selfish behaviour are predominant even among total strangers.<sup>18</sup>

What is frequently reported as 'panic' is behaviour with an unsuccessful outcome that was observed in other people.<sup>19</sup> The term is also used by people to describe their own state of heightened anxiety, while the actions they report taking themselves are usually logical and appropriate. Indeed, it can be seen frequently in the media's reporting of fires. There are many examples in the reporting of mass-casualty events, where the media has determined that the cause of the deaths was panic. There are other emotional terms that could appropriately describe what is usually reported as panic, for example, fear. Oltmanns and Emery say that fear is experienced in the face of real, immediate danger and usually builds quickly in intensity, helping to organize a person's behavioural response to threats from the environment.<sup>20</sup> Anxiety is a related emotion, similar to fear, but applies in cases where the actual threat cannot be pinpointed.<sup>21</sup>

Wenger points out that flight behaviour should not be confused with panic.<sup>22</sup> Flight can be the appropriate response in the face of danger, and it is non-adaptive flight as a form of mass behaviour that should be considered. His conditions for panic include - the danger is perceived as a specific threat and this results in a social crisis; only one or limited escape routes exist; people believe that escape is possible; competition rather than cooperation is necessary for escape; and there is a lack of ties to other individuals. Panic can be averted if the crisis can be neutralized in some way and if group ties prevent competitive behaviour.

Oltmanns and Emery describe the fear response to threats from the environment as escape or fighting back.<sup>20</sup> More recent research indicates that the 'fight or flight' response, which has long been considered the primary response to stress in humans, is actually more typical of men than women, whose response has begun to be characterized by 'tend or befriend.' Taylor, et al., found in their research that social contact was a more likely stress response for women.<sup>23</sup> This variation in behaviour between men and women has been observed in fire emergency situations, where men are more likely to engage in firefighting or investigation behaviours and women are more likely to alert others.<sup>17</sup>

## **ANECDOTAL EVIDENCE**

Sime pointed out that one of the problems in using the concept of panic is that panic behaviour is often attributed to a person by an 'observer,' while the person supposedly engaged in panic behaviour has a very different perspective on what occurred.<sup>24</sup> Evidence of that phenomenon was found in the interviews conducted by Patricia Brennan of Victoria University with survivors of serious fires in Australia.<sup>25</sup> In the course of her interviews, she found that panic was a behaviour reportedly engaged in by 'others' while the interviewees described their own behaviour in more rational terms. Brennan also uncovered several instances where there were significant discrepancies in reported behaviour between people present at the same event. In these cases, each person had a rational explanation for his or her own behaviour, while that same behaviour appeared irrational or 'panicky' to others. In other cases, survivors used the term 'panic' to describe their own behaviour, but the actual actions they engaged in show that they did not panic. Several of these cases will be detailed here.

### **Fire in a Hostel for the Elderly -- Five Killed**

In this incident, the manager of the facility shut off the building alarm because "The elderly residents hear the alarm sounding, they go into a panic and they just run in every which direction. And then we've got to go and find out where they are." A security guard broke a front window to get inside and open a door from the inside, to facilitate the evacuation. In his words then, "Because the smoke was burning my eyes and my throat I actually panicked a bit and went back through the window instead of going through the door." And a resident, who had woken, smelled smoke in the room, dressed, and using a cane and feeling his way through smoke to the front door, believed that he must have panicked when he saw the smoke because he left without putting his teeth in. In the case of the security guard and the resident, their actions were prudent, and do not meet any of the definitions of panic or panic behaviour presented above.

### **Dryer Fire in a Hotel Guest Laundry**

In this case, when the receptionist was told about the fire in the guest laundry, she "started to panic," in her words. But her actions were appropriate. She ran down to the laundry to investigate, and when she saw smoke, she left to call the fire department. She then alerted the kitchen staff to come and give her a hand (they thought she was joking), then they alerted the guests. She then called her boss who was off-site. She and the others also stopped a guest from trying to extinguish the fire with a fire extinguisher (playing the hero). The receptionist commented in her interview on how amazing it was to watch everyone else's reaction, apparently surprised that they acted so calmly and effectively.

### **House Fire Involving a Mattress**

A woman attempting to extinguish a mattress fire with her husband describes her feelings at the time as 'panic.' When asked what panic feels like she said, "with panic attacks... you can't do things quick enough. I'm a quick person and I panic because I can't get it done." But rather than freezing, she said that it makes her do things more quickly and effectively. "I'm a quick worker what I do. My husband's slower to react than me. You realize that you *can't* get completely under the bed, you *can't* get to your wardrobe, you *can't* get the mattress out. And this is all within less than a minute. Afterwards you think I should have thrown things out the window, in hindsight, I should have done this... But you don't do it."

### **Fire in an Apartment Building**

A person from an apartment six floors above the unit of origin attempted to escape with her roommate via the stairwell but they were forced to return because of the smoky conditions there. They unlocked the door to their apartment and retreated to the balcony to await rescue. She describes the two of them as "very panicky" as they called for help from the balcony. A man on the balcony below them told them to calm down. In spite of repeated statements of being panicky, she reported very rational actions -- dressing and retrieving keys, wallet and phone before leaving the apartment, then on returning to the apartment, closing the door and putting towels underneath to block smoke, retreating to the balcony and calling the fire department to let them know they were trapped in the building.

### **Describing Husband as Panicking**

In the account of a woman whose husband had gone upstairs to investigate the smell of smoke, she is asked if she told her husband when she took their child and went outside and replies that she did not -- he was upstairs "screaming and panicking." She had mentioned that when he discovered the fire (a curtain had been ignited by a heater), he called downstairs for water, which another relative brought up to him. She describes herself as shaking uncontrollably outside, even after her husband came out and reported that everything was now fine. Although she describes him as screaming and panicking, the actions she reports are calling for water to extinguish the fire and then taking action to control the fire before any significant damage was done, thus showing reasonable actions in the serious situation.

### **Described by Wife as Panicking**

After a house fire that started when oil on the stove ignited, the family (a couple and their teenage daughter) described their actions while attempting to extinguish the fire, which extended beyond the range hood, prevent its spread to nearby combustibles and notify the fire department. The wife reported trying to smother the fire with a tea towel, and then a bathmat, before asking her daughter to phone the fire department. She then pulled cane baskets away from the spreading flames and stood by, keeping an eye on the fire and watching for spread. After attempting to smother the fire with the bathmat, the husband moved the burning pan to the sink, remembering that he should not put water on the burning oil. Thinking he had the fire under control, he told his daughter to cancel the fire brigade response. He said near the end of the interview that his wife thought he was panicking, but he was reliving his experience in a fire 17 years earlier that had destroyed their house.

### **Described by Observer as Panicking**

When a fire broke out in an office building, 20 people, most of them described as elderly, were involved in a class on the building's third level. When they tried to evacuate into the corridor, most were driven back into the classroom by the thick, black smoke coming up the stairs. A woman working alone in the next room closed the door to her office, opened a window and waited there after calling out for help. She describes the people in the classroom as very frightened, yelling and

throwing things out the window, while she herself did not panic, as her office was not filling with smoke and she was aware that the fire brigade was on the way.

Meanwhile, in the classroom, a 72-year-old man whose lungs had been damaged by tuberculosis when he was young was extremely fearful of the smoke in the room and waited by the window. He suggested to a woman with him that if conditions got really bad in the room, they could possibly jump out the window onto a rooftop that he thought wasn't more than one story below them. When the woman said she didn't think she could jump, it occurred to him to check the potential of that option by throwing a chair out the window onto the roof, and see what happened. When he saw the chair break through, he realized that that wasn't a viable option.

The activity that appeared to an observer in the next room as panicky was in fact a test of a potential plan of action by a man who admitted he was very frightened but still had the presence of mind to experiment with his options.

## **CASE STUDIES**

Although the term 'panic' is still commonly used in media reports of fire incidents, the facts as reported in post-fire investigations cast significant doubt as to its appropriateness. Studies into fire disasters consistently find that altruistic behaviour is the norm. Although evacuees might be anxious, and frequently use the word 'panic' to describe their own or others' reaction to events, they do not behave in an irrational or antisocial manner. The following case studies provide examples of large fire disasters, which took place over 35 years, where panic was used to describe the human behaviour. A closer examination of the facts of these case studies have demonstrated a different conclusion.

### **Beverly Hills Supper Club Fire, USA, May 28, 1977**

Despite the newspapers of the time describing the cause of the large loss of life in this fire as "people trapped in panic," the extensive interviews with survivors of the fire revealed that the staff and patrons reacted in ways that were far from panicked.<sup>26</sup> Staff, keeping to their roles and taking care of their customers, facilitated the evacuation of hundreds of patrons of the nightclub, by informing them of the emergency situation and guiding them to exits. Customers, for the most part, followed the instructions they received from staff. This orderly reaction occurred in spite of the fact that there was no evacuation plan for the sprawling structure and staff were not trained or drilled in what to do in case of a fire. Until they encountered smoke from the fire, staff and patrons alike generally did not consider the emergency serious. In numerous interview accounts, 'panicked' behaviour was only reported when smoke and flames overtook people as they evacuated, and the reported behaviour, rushing to exits, would have been the rational response under those conditions.

### **Stardust Nightclub Fire, Ireland, February 13, 1981**

This fire occurred in a disco located in a former factory building.<sup>27</sup> The two-story building had windows only at the front, and those were covered with security bars. There were six exits in the building, including the main entrance. Two of the exits were locked before the fire.<sup>28</sup> Eight hundred people were estimated to be in the building at the time of the fire. The fire, when first observed, involved seats in a closed-off alcove area of the club, although an increase in heat had been felt by patrons in the ballroom some minutes earlier. Staff attempted to extinguish the fire, but it spread rapidly along the seats. As they were abandoning their efforts to extinguish the fire, the false ceiling in the alcove and in sections of the ballroom began to collapse, spreading smoke and flames through the ballroom. The disc jockey made an announcement about the fire, describing it as a "slight problem" and telling people not to panic and move to the exits. According to the post-fire inquiry report, "a number of patrons had begun to leave the ballroom in a state of what some of the witnesses described as 'panic.'" However, others remained, watching the fire and some, dancing. According to witness interviews after the fire, when the ceiling collapsed, "the patrons panicked and stampeded to the exits."<sup>28</sup> The main entrance quickly became jammed and then the lights went out. In the end, 48

patrons were killed and over 200 were injured. Official reports of the fire mention that the patrons panicked, although one reports that there were no significant crush injuries to any of the victims that resulted from trampling or panic.<sup>29</sup>

A victim described her experience as a 16-year-old in an account included in the fire inquiry report.<sup>30</sup> On noticing flames at the ceiling of the club, she returned to her seat to retrieve her jacket. She describes herself as being in the same state of panic as others in the club, and was not at all convinced by the disc jockey's statement that everything was under control. Almost immediately, she became disoriented when the lights went out and smoke filled the room. She was eventually found by a friend who guided her to an exit that led outside the building. Thinking that he was pulling her into a corner of the room to wait what she considered the inevitable outcome of the event, she tried to fight him off, to move to the exit she knew. He prevailed, however, and managed to assist her to safety. Although she uses the term 'panic' to describe her own state of mind, and although her actions in trying to fight off her rescuer may have seemed irrational, she was actually attempting to make her own way out, by the only exit she knew.

### **Gothenburg Discotheque Fire, Sweden, October 29, 1998**

Panic reportedly ensued when fire was discovered in one of the two stairwells at a disco in a two-story building in Sweden in 1998.<sup>31</sup> The upstairs dance hall was approved to hold 150 patrons, but there were between 340 and 400 young people there that night. When patrons rushed toward the only available exit, crushing and congestion occurred. Sixty-three people were killed and more than 200 were injured. Information is available from interviews and questionnaires distributed among many of the patrons at the venue that night.<sup>32</sup> The first patrons who became aware of the fire cues (mainly the smell of smoke) tended to dismiss them, as smoke from the smoke machine, tear gas or cardboard hung over a lamp. When one of the disc jockeys warned the crowd of the fire, many of those in the hall ignored the warning and continued to dance. One man who observed smoke left after a minute to get some fresh air, but not because of any fire. Another thought that the disc jockey was joking when he warned of the fire.

The fire had been set in one of the two available stairwells, and when the door to that stairwell was opened, heat and smoke spread throughout the hall. The transcript of the call from the first person reporting the fire was that there was panic in the room, but dispatchers had trouble at first determining the address of the fire. The single available door had an opening 80 cm wide, opening outward onto a 1.5-meter wide stairwell that discharged directly to the exterior. There were 13 windows on the upper floor, but five were equipped with security bars and all were 2.2 meters above the floor.

A crush formed at the door, with bodies found stacked in the opening. A few dozen occupants were rescued by the fire brigade over ladders.

### **World Trade Center Attack, USA, September 11, 2001**

"Panic on the stairs" was the headline of a BBC News Online article on September 12, 2001.<sup>33</sup> The article consists of reports from occupants of the two towers, describing their experiences that day. One of the people quoted describes panic in the stairwells of the second tower, before it was struck. His account, however, only describes a crowded situation in stairwells and elevators. This contrasts to the findings of several evacuation studies, which are consistent in their reporting of orderly, altruistic behaviour by almost all of the occupants interviewed.

A study based on media accounts of survivors reported, based on a reading of 745 accounts from 435 survivors, that the overall impression of the emotional atmosphere during the evacuation was that of calm and order.<sup>2</sup> While some survivors reported crying and being anxious or nervous, the majority viewed themselves and others as composed.

It was possible to identify how survivors perceived others for 268 people. The observations included 'calm,' 'momentarily panicked,' 'upset,' or 'helpful,' and multiple responses could be coded for each person. The majority, 57 percent, described people around them as calm and orderly. Some 31 percent judged others as 'upset,' which included crying, shouting, nervous or anxious, but rational. There were 29 percent of the people who described others as 'momentarily panicked,' in that they were pushing, shoving or generally displaying behaviour associated with chaos, while 22 percent found others to be 'helpful.'

Of the survivors in WTC 1 (the first tower that was struck) who reported their perception of others, 60 percent judged others to be 'calm,' compared to 54 percent in WTC 2. Only 21 percent in WTC 1 described others as 'momentarily panicked,' compared to 39 percent in WTC 2. In WTC 2, the perception of 'momentarily panic' occurred mainly after WTC 2 was hit.

It appears from the media accounts that many occupants in WTC 1 were oblivious of the unfolding situation; they knew something major had happened but they didn't know what it was. Two accounts illustrate the differences in perception of others, and the type of language used by the survivors in these interviews. A survivor from the 65<sup>th</sup> floor of WTC 1 said that those in the stairwells "maintained their calm really well" and went on to say that "A couple of people started crying a little, but we said, 'We're going to get out of here, we just have to take it one step at a time.' It wasn't quiet, people were talking – in fact someone was laughing, it was pretty normal."<sup>34</sup> In contrast, many occupants of WTC 2 had seen the situation next door when they decided to evacuate. One survivor from the 70<sup>th</sup> floor of WTC 2 said "she and her fellow coworkers walked down to the 59<sup>th</sup> floor and took an elevator to the 44<sup>th</sup> floor, when at that point, another plane hit their tower and then there was a mad scramble down the stairs with people pushing, shoving and yelling."<sup>35</sup> The latter description should not be misleading to assume this was panic behaviour, instead it illustrates a pattern of flight behaviour perfectly rational under the circumstances.

### **Station Nightclub Fire, USA, February 21, 2003**

In media reports of the fire at the Station nightclub in 2003, several survivors mentioned panic behaviour. News video, shot inside the club as the fire and evacuation began, shows no evidence of panic. However, as conditions inside the club rapidly deteriorated, as in the Beverly Hills Supper Club, evacuees had to contend with two of Keating's elements of panic -- hope to escape through dwindling resources and aggressive concern about own safety. A review of media accounts that is currently underway has found several cases where evacuees describe aggressive behaviour, either their own or others, but do not mention cases of irrational or illogical responses.<sup>36</sup> Pushing to the exit, even to the point of trampling others, when flames and smoke had overtaken them and the only exit known to most occupants was blocked, cannot be considered irrational or illogical.

### **THE EXPERT'S VIEW**

The Case Studies reported above are situations where the classic elements that tend to lead to a conclusion of panic were present -- the fire spread at an incredible speed; there were limited known or available exits, and the buildings were overcrowded. These conditions do not necessarily lead to mass panic but they certainly can lead to a tragedy.

For experts in the field of human behaviour in fire such as Jonathan Sime, concluding that occupants panicked in a fire is usually a judgment made in retrospect, which does not consider the perspective of the person at the time of the event.<sup>19</sup> All human behaviour in fire can be rationalized when the event is seen through the subject's perspective.

The judgment that panic took place during a fire is very much influenced by the outcome of the fire. For example, when a crisis response, such as re-entering a burning building, results in a fatality, it is labeled 'panic,' yet when the identical response results in lives saved, it is labeled 'heroic.'

Decision-making during a fire emergency is different from day-to-day decision-making. While there is so much more at stake, the person usually senses that the decisions must be made quickly, might be irrevocable, and available information on which to base decisions may be limited or overwhelming.<sup>37</sup> Behaviour such as flight, that might look disorganized to the observer, might actually be a rational response to the threat perceived by the evacuating occupant.<sup>38</sup>

Considerable effort is being invested in developing computer models to take into account the evacuation timing of buildings. Computer tools appear particularly interesting since they allow the user to virtually vary the design of a space, modifying the width, length or number of corridors and stairwells as well as the number and distribution of occupants within a space. Several evacuation scenarios can be tested to obtain an array of egress times. The occupants, who are called agents or automats, move at specific speeds and in specific directions determined by the modeller. One of the objectives of these computer models is “the need to develop strategies to evacuate people from danger zones in a systematic manner without triggering panic behaviour.”<sup>39</sup> The simulation of human behaviour is not an easy task and simulating the movement of panicked people is possibly even more difficult to accomplish due to the lack of data in the real world of occupants panicking during a building evacuation. Furthermore, such simulation does not appear particularly useful, given the rarity of such events taking place.

## **THE ROLE OF INFORMATION**

One important impact of the rejection of the concept of panic is that management should envision the building occupants as allies during a fire rather than a mass of irrational people who need to be controlled. Withholding information or using coded information among staff to prevent occupants’ knowing that there is an emergency can be detrimental. People may not act or may delay their action as they are not aware of the situation. Instead, it is much more constructive, and more likely to lead to a positive outcome, to provide the occupants without delay with the information they need to make the right decisions.<sup>6</sup>

It has been stressed repeatedly by human behaviour experts that what is needed for occupants to make timely decisions is information. By providing information, people can refine their situation awareness, making them more competent at weighing their options before engaging in proper actions. During a fire emergency, information can take many forms. There is the information that should be provided prior to an event through education and training. If occupants cannot be trained, as in shopping malls or airport terminals, it is essential that staff in place has received training and are fully aware of their role as leaders in case of an emergency. At the time of the event, information that is provided by signage, announcements and staff should provide the timely information to support occupants’ decision-making. After the event, debriefing the occupants regarding what happened, what went well or less well should take place so that occupants can understand the situation and be better prepared for a future event.

Information is the key to a successful building evacuation during an emergency.

## **SUMMARY**

Findings from the above studies and interviews suggest that panic, in terms of irrational behaviour, is rarely seen in fires. This paper has attempted to further document this and show that descriptions of ‘panic’ relate more to fear or heightened anxiety than any sort of behaviour leading to the death or injury of a person. Relevant authorities such as firefighters and building designers should take this into account and implement regulations around these findings.

As Sime reiterated, the concept of panic will remain limited in its utility unless confusion in its use is resolved.<sup>24</sup> It is therefore essential to focus less on the description of panic in fires and more on providing adequate information to people. Information should be provided in the early stage of a fire development, it should pinpoint where the fire started, where it is likely to spread, and the location of

the nearest exits. In addition, the information should help in evaluating if the people would be better off staying in their original location rather than evacuating.

Panic will remain a concern of the public as long as the term continues to be used frequently in media accounts, reinforcing the impression that it is a common and possibly inevitable occurrence. The media therefore needs to take a greater responsibility and make more accurate reports of peoples' behaviour in a fire. Human behaviour scientists should also avoid using the term panic, as there are more appropriate concepts and terms to characterize, explain and predict human behaviour in fire.

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## REFERENCES

1. CNN, 2009. *The Situation Room - Airliner Goes Down in Hudson River*. [Online] (15 January 2009) Available at: <http://transcripts.cnn.com/TRANSCRIPTS/0901/15/sitroom.03.html> [Accessed 3 April 2009]
2. Proulx, G., Fahy, R.F., and Walker, A., 2004. *Analysis of First-Person Accounts from Survivors of the World Trade Center Evacuation on September 11, 2001*. Research Report #178, National Research Council Canada, Ottawa, Canada. <http://irc.nrc-cnrc.gc.ca/pubs/rr/rr178/>
3. Sime, J.D., 1990. "The concept of 'panic.'" In D. Canter (Ed.), *Fires and human behaviour* (2<sup>nd</sup> ed.), David Fulton Publishers, London, pp. 68.
4. Schultz, P.D., 1964. *Panic Behavior: Discussion and Readings*, Random House, New York USA.
5. Chertkoff, J.M. and Kushigian, R.H., 1999. *Don't Panic, The Psychology of Emergency Egress and Ingress*, Praeger Publishers, Westport, CT, USA.
6. Proulx, G., and Sime, J.D., 1991. "To prevent 'Panic' in an underground emergency: Why not tell people the truth?" In G. Cox and B. Langford (Eds.), *Fire Safety Science - Proceedings of the Third International Symposium*, Elsevier Applied Science, London, pp. 843-852.
7. Sheppard, B., Rubin, G.J., Wardman, J.K., and Wessely, S., 2006. "Terrorism and Dispelling the Myth of a Panic Prone Public," *Journal of Public Health Policy* 27, pp. 219-245.
8. National Transportation Safety Board, 2000. "Safety Recommendations to the International Council of Cruise Lines and Cruise Line Companies Regarding Fires on Board Passenger Ships," *NTSB News*, Public meeting of July 11, 2000.
9. Le Bon, G., 1896. *The Crowd: A Study of the Popular Mind*, The Macmillan Co., New York, USA. <http://etext.virginia.edu/toc/modeng/public/BonCrow.html>
10. Goldenson, R.M. (ed.), 1984. *Longman Dictionary of Psychology and Psychiatry*. New York: Longman.
11. Johnson, R.N., 1987. "Panic at "The Who Concert Stampede": An Empirical Assessment", *Social Problems*, Vol. 34, No. 4, pp. 362-373.
12. Johnson, R.N., 1987. "Panic and the Breakdown of Social Order: Popular Myth, Social Theory, Empirical Evidence", *Sociological Focus*, Vol. 20, No. 3, pp 171-183.
13. Keating, J.P., 1982. The myth of panic. *Fire Journal*, 76(3), pp. 57-61.
14. Quarantelli, E.L., 1957. "The behavior of panic participants", *Sociology and Social Research*, Vol 41, pp. 187-194.
15. Quarantelli, E.L., 1977. "Panic Behavior: Some Empirical Observations," in D.J. Conway (Ed.) *Human Response to Tall Buildings*, 27 Stoudsburg, Dowden Hutchinson & Ross, pp. 336-350.
16. Quarantelli, E.L., 2001. "The Sociology of Panic," *International Encyclopedia of the Social and Behavioural Sciences*, Smelser and Baltes (eds.) New York: Pergamon Press, pp. 11020-11023.
17. Bryan, L.J., 2002. "Behavioral Response to Fire and Smoke", *SFPE Handbook of Fire Protection Engineering*, Third Edition, Chapter 3-12, NFPA, Quincy MA, pp 3-315 - 3-341.

18. Cocking, C., Drury, J. and Reicher, S., "The psychology of crowd behaviour in emergency evacuations: Results from two interview studies and implications for the Fire & Rescue Services," *Irish Journal of Psychology*. Special Edition: Psychology and the Fire & Rescue Services. (In press, 2009).
19. Sime, J.D., 1990. "The concept of 'panic.'" In D. Canter (Ed.), *Fires and human behaviour* (2<sup>nd</sup> ed.), David Fulton Publishers, London, pp. 76.
20. Oltmanns, T.F. and Emery, R.E., 1995. *Abnormal Psychology*, Prentice-Hall Inc., Englewood Cliffs NJ, p. 198.
21. Sternberg, R.J., 1998. *In Search of the Human Mind*, 2<sup>nd</sup> Edition, Harcourt Brace & Company, p. 543.
22. Wenger, D., 1978. Some Observations on the Nature of Panic Behavior: A Normative Orientation. Paper presented in the panel on 'Panic' session at the Conference on Behavior in Fires, National Bureau of Standards, Washington DC, 30 October - 1 November 1978.
23. Taylor, S.E., et al., 2000. "Biobehavioral Responses to Stress in Females: Tend-and-Befriend, Not Fight-or-Flight," *Psychological Review*, 107(3), July 2000, pp. 411-429.
24. Sime, J.D., 1978. The Concept of 'Panic in Fires' - A Brief Appraisal. Paper presented in the panel on 'Panic' session at the Conference on Behavior in Fires, National Bureau of Standards, Washington DC, 30 October - 1 November 1978.
25. Brennan, P., 1998. "Victims and Survivors in Fatal Residential Building Fires," *Proceedings of the First International Symposium – Human Behaviour in Fire*, University of Ulster, Fire Safety Engineering Research and Technology Centre.
26. Best, R.L., 1977. *Reconstruction of a Tragedy: The Beverly Hills Supper Club Fire*. Boston MA: National Fire Protection Association.
27. Malholtra, H.L. and Hinkley, P.L., *Preliminary Report of the Visit to the Scene of Stardust Disco Fire in Dublin on 14/15 February, 1981*, Building Research Establishment Fire Research Station, contained in the appendices of the *Report of the Independent Examination of the Stardust Victims Committee's Case for a Reopened Inquiry into the Stardust Fire Disaster*, 2009.
28. Coffey, P., 2009. *Report of the Independent Examination of the Stardust Victims Committee's Case for a Reopened Inquiry into the Stardust Fire Disaster*, Department of Justice, Equality and Law Reform, Dublin. [Online] Available at <http://www.justice.ie/en/JELR/REPORT.doc/Files/REPORT.doc> [Accessed April 2009]
29. Anon., 1981. Paragraph 9.22 of the *Stardust Tribunal of Inquiry* as quoted in Appendix 3, *Report of the Independent Examination of the Stardust Victims Committee's Case for a Reopened Inquiry into the Stardust Fire Disaster*, Department of Justice, Equality and Law Reform, Dublin, 2009. [Online] Available at <http://www.justice.ie/en/JELR/REPORT.doc/Files/REPORT.doc> [Accessed 3 April 2009].
30. Stationery Office, 1991. *Report of the Stardust Victims' Compensation Tribunal*, Dublin.
31. Erlandsson, U., Jonsson, I., and Totting, B., 1999. *Brandkatastrofen i Göteborg – 98-10-29*, Räddningsverket, Karlstad.
32. Statens Haverikommission, 2001. *Brand på Herkulesgatan i Göteborg, Ö län, den 29-30 oktober 1998*, Rapport RO 2001:02, Statens räddningsverk, Karlstad.
33. BBC News Online, 2001. *Panic on the stairs*. [Online] (12 September 2001) Available at: <http://news.bbc.co.uk/2/hi/americas/1539112.stm> [Accessed 3 April 2009].
34. Anderson, P., 2001. *We the living: One company that made it*. CNN, 21 September 2001. [Online] Available at: <http://archives.cnn.com/2001/CAREER/trends/09/21/vic.martin.progressive/index.html> [Accessed 3 April 2009].
35. Black, B., 2001. "How the telephone linked an anxious family on September 11," *Concordia's Thursday Report*, November 22, 2001. [Online] Available at: [http://ctr.concordia.ca/2001-02/Nov\\_22/12-Vallejo/index.shtml](http://ctr.concordia.ca/2001-02/Nov_22/12-Vallejo/index.shtml) [Accessed 3 April 2009]
36. Fahy, R.F. and Proulx, G., "Occupant Response and Evacuation at the Station Nightclub Fire – An Analysis of Witness Statements," to be published in the Proceedings of the 4<sup>th</sup> International Symposium on Human Behaviour in Fire as a poster, 2009.
37. Proulx, G., 1993. "A stress model for people facing a fire," *Journal of Environmental Psychology*, 13, pp. 137-147.

38. Shields, T. J., and Proulx, G., 2000. "The Science of human behaviour: Past research endeavours, current developments and fashioning a research agenda." In M. Curtat (Ed.), *Fire Safety Science - Proceedings of the Sixth International Symposium*, International Association for Fire Safety Science, Boston, pp. 95-114.
39. Schneider, B., 2008. "The Reference Model SimPan – Agent-based Modelling of Human Behaviour in Panic Situations," *Tenth International Conference on Computer Modeling and Simulation*, IEEE Computer Society, pp. 599-603.