The mass psychology of disasters and emergency evacuations: A research report and implications for the Fire and Rescue Service[1]

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Abstract

A three year research project into human behaviour during emergency evacuations was conducted at the University of Sussex from April 2004. Three different kinds of research were carried out: real-life role-play evacuations, virtual reality computer programs of simulated evacuations, and interview studies with survivors of various mass emergencies. Based on a review of the literature and these studies, it was concluded that, far from mass panic occurring, behaviour during emergencies is often ordered and meaningful, with social norms and conventions remaining, even during extreme danger. Co-operation rather than selfish behaviour appears to predominate, even amongst crowds of total strangers. It was argued that a common identity emerges amongst those affected during emergencies that explains this co-operation. Fire Service commanders should view the emergence of such a common identity as a source of potential help, and look at ways of encouraging this co-operative identity as a means to enhancing safe and efficient evacuations of large numbers of people from danger during emergencies.

Introduction

Coverage of crowd responses to emergencies and disasters (such as fires and terrorist attacks) commonly refers to the concept of 'mass panic' when describing the behaviour of those affected. This concept suggests that, since the crowd is less intelligent and more driven by simple emotions than the lone individual (Le Bon,

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[1] This article is based on a research report (Drury & Cocking 2007) for practitioners involved in emergency planning, and can be downloaded in full via:
http://www.sussex.ac.uk/affiliates/panic/Disasters%20and%20emergency%20evacuations%20(2007).pdf

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1895/1968), reactions to an emergency will be disproportionate to the danger (Smelser, 1962). 'Instinct' overwhelms socialization in these situations, any collective bonds between people dissolve, and personal survival becomes the overriding concern (Strauss, 1944). This results in competitive and selfish behaviours within the crowd which are highly 'contagious' as people follow uncritically the 'panicked' behaviour of others (McDougall, 1920).

However, rather than risks being associated with over-reaction in emergencies, the danger often lies within people's under-reactions. Studies of behaviour in fires (e.g. Donald & Canter, 1990) has found that rather than evacuating at the first sign of danger (such as a fire alarm going off, or the appearance of smoke) people often delay their escape, preferring to wait for cues from others. Sime (1995) suggested that in order to calculate the time (T) for a crowd to escape danger, one needs to consider the time taken to decide to start to move (t1), as well as the time it takes to physically escape the danger (t2), so that T = t1+t2. The speed with which fires can spread means that by not acting immediately upon the potentially urgent need to evacuate, any delays could have fatal results, leading a Senior Officer in the London Fire Rescue Service to conclude that;

'When people die in fires, it's not because of panic, it's more likely to be the lack of panic' (Townsend, 2003, p.73; cited in Kemp, 2003)

Other research has argued that existing norms of social behaviour often endure during emergencies. Johnson's (1988) analysis of the 1977 Beverly Hills Supper Club fire, in which 165 people died, found that queuing, routine courtesy and helping were widespread. Even at the moments of greatest urgency, and when there was more individual competition, social bonds did not collapse entirely. For example, people were more likely to help the elderly than others, and family units continued to function. In a similar vein to this normative approach, Donald & Canter's (1990) study of the 1987 King's Cross Underground fire also found that people were often unwilling to deviate from familiar patterns of behaviour. Therefore, some commuters continued to follow the routes that they were accustomed to, although this meant some delayed their exit, or exposed themselves to danger.

More recently, Mawson's (2005) affiliation approach to behaviour in emergencies has suggested that when threatened, we seek familiarity (hence family groups will stay together rather than exit individually) rather than simply evacuate, and that the presence of familiar others (affiliates) has a calming effect. However, this desire to stay with others can also have fatal consequences, as evidence from fires (Cornwell, 2001) has found that people tend to escape (or die) in groups, and that these affiliative ties rarely break down.

While these approaches improve upon on the panic model, some problems remain. A mass of evidence has been accumulated to support the predicted continuity between mundane and disaster behaviour (e.g. Chertkoff & Kushigian, 1999), but there are still some behavioural discontinuities which need to be explained. For example, while it might be normative to help someone in distress in everyday circumstances, it is surely stretching the concept of 'norm' to apply it to risking one's life to help strangers, as has been found to happen in some emergencies. Likewise, while the affiliation approach explains the patterns of behaviour well when the crowd is made up of small groups of families or friends, such events often involve large numbers of strangers. Yet in these events too, there is often evidence of mutual helping and even self-sacrifice. It is argued here that to complement these normative and small group models - i.e. to explain *collective* mutual aid in emergencies - a model of *mass emergent* sociality is needed - something the present research attempted to explain.

Research aims

The research was conducted at the University of Sussex, UK during 2004-7, and sought to develop a new model of mass evacuation behaviour through drawing upon the social identity approach in social psychology (Reicher, 2001), particularly self-categorization theory (SCT; Turner, 1982, 1991; Turner, Hogg, Oakes, Reicher, & Wetherell, 1987). The basic premise of SCT is that we have not only a personal self (i.e. that which makes us subjectively unique as individuals), but many social selves reflecting our membership of various different social groups or categories. Seeing oneself as personally interchangeable with other ingroup members on some relevant dimension – 'depersonalization' – means seeing these other ingroup members as part of the self. This, in turn, means caring about these others and acting in their interests, even where they are not personally known. SCT would therefore suggest that collective emergency behaviours, including mutual concern and helping, and even personal self-sacrifice, could be explicable in terms of a shared identity.

Thus we hypothesized: (a) That mutual concern and hence helping would be greater in a physical crowd where there is psychological unity (based on shared identity) than where such unity is low or non existent (b) That there would be fewer personally selfish behaviours in a physical crowd where there is psychological unity (based on shared identity) than where such unity is low or non existent.

Objectives:

The project had four objectives:

1. To develop a new psychological account of the factors which determine how people react to emergency mass evacuations. Part of the rationale for this objective lay in the fact that the current literature on emergency behaviour does not draw upon recent developments in social psychology. In particular, the most influential group/crowd approach in social psychology, the social identity approach has not been applied to these kinds of phenomena.

2. A second objective, therefore, was to investigate whether the impact of shared identity (versus lack of shared identity) in an emergency is manifested as individualistic 'panic' or collective co-operation.

3. A further objective was methodological. We sought to develop an experimental paradigm to investigate reactions to mass evacuations through the collection of behavioural, self-report and physiological data, using 'virtual reality' technology. Given the methodological limits of previous laboratory work in this area, there was a need to develop some form of experimental simulation that was both engaging and ethically sound. We sought to compare this visualization design with a room evacuation design in terms of their viability.

4. Our final objective was to draw out practical implications of the research in terms of providing information and training for organizations involved in crowd safety in public places and events. All crowd theories and models of evacuation behaviour have applied aspects. If there was any evidence for the role of social identity in mass emergency behaviour, this was therefore expected to be of interest to practitioners, particularly those in the Fire and Rescue Service.

Method overview

Three strands of research were carried out: (1) room evacuation experiments (2) virtual reality (computer simulation) experiments; and (3) interview studies with survivors of emergencies. On top of this, we also managed to supplement the interview data of survivors' experiences with contemporaneous archive material. While we wanted to gather accounts from participants who had experienced real emergencies, the obvious limitation of interview and other field methods is their lack of control. Our experimental studies, while lacking some of the validity of the fieldwork, would include some of the key variables thought to be relevant in mass evacuation behaviour, and so would complement the interview research. Details of each are presented below.

Results 1: Room evacuation studies.

We ran three room evacuation experimental studies, each time trying to develop and build upon the format.

Room evacuation study 1.

130 people took part in the first study. They gathered in a laboratory room in groups of up to twenty at a time and were asked to imagine they were evacuating a room in an emergency. Various cues were provided to enhance the simulation, such as a smoke machine, a siren and verbal requests that they leave as quickly as possible. To test the idea that a shared social identity makes mutual concern and helping more common and personally selfish behaviours less common, we treated half of the participants each time as members of a relevant social category (e.g., 'Sussex University students') but addressed the rest simply as individuals. We filmed their behaviours (looking at the extent of helping, waiting for others to go first versus stepping in front of others, for example). We also gave participants a questionnaire at the end to measure subjective factors and take manipulation checks, such as level of identification with the group and feelings towards the other people evacuating.

The study found no significant differences across conditions. The most obvious problem was that participants often did not take the scenario seriously enough. There was no sense of urgency and hence no need to let others go first or push them out of the way.

Room evacuation study 2.

The second study had 81 participants. We made changes to the procedure to improve psychological engagement (e.g. introducing a 'threat' of non-payment as an incentive to leave the room more urgently). Patterns of 'selfish' and 'selfless' behaviours observed were in line with the hypothesis, but patterns for co-operative behaviours and jamming were not. Results for subjective urgency were mixed. Engagement with the evacuation was better than in the previous study. Also, there was evidence that the identity manipulation appeared to work better. The key issue was that the main behavioural measure – whether participants pushed or formed a bottleneck at the door – was inadequate, i.e. the evacuation was over too quickly to give people an opportunity to display 'selfish' versus helping behaviours: absolute numbers for both of these were very low.

Room evacuation study 3.

We addressed the problem of opportunities for 'selfish' and 'selfless' behaviours that arose in the first two studies with a new design which embedded the 'evacuation' within an unrelated, fake 'intelligence test'. Thus we didn't rely upon role-play, but still asked people to enter or leave a room as quickly as possible in order to complete the tests. As this design meant that the group of participants had to each go through the door in a hurry twice, there were more opportunities for displaying the behaviour of interest. 198 people took part in our final study, this time in groups of up to 30 at a time.

Analysis of results from this study revealed no differences on our main measures. It was known that the lack of real threat would create issues in trying to render an emergency evacuation into an experimental simulation. Moreover we mostly failed in these studies to get those in the 'shared identity' condition to see themselves as a group. However, our informal observations and some of the participant feedback suggested that, while our experimental manipulations didn't work as intended, they had effects in line with aspects of the social identity approach and with some of our original expectations. According to SCT, one factor that may lead people to see themselves as group members (rather than as individuals) is a common relationship or a shared fate in relation to some external other. Thus we had predicted that the *meaning* of the event (e.g. as an 'attack' by 'them' on 'us') could itself produce a group identity (which in turn would produce the behavioural effects of interest – given sufficient opportunities, of course). In the third study, whether we attempted to impose a social or a personal identity on our participants, by cramming them into a room together, we (unintentionally) made them see themselves as a group in relation to ourselves, the experimenters. Thus, the study seemed in effect to say something about the process whereby a personal identity becomes transformed into a social identity. The significance of this question of the transformation of identities in relation to a common 'other' becomes clearer in the later interview research.

Results 2: Visualization studies.

For the second strand of the experimental simulations, we developed a computer visualization (or 'virtual reality') program of a crowd evacuation from an underground railway station. The program was modelled on a computer game (using similar graphical techniques and user interface). The 'task' facing the user was to evacuate the station as soon as possible, while at the same time facing bottlenecks caused by the rest of the crowd. The user could push others aside but also had to decide whether to stop and help people at four different points in the simulation who were apparently injured. Within this design, we were able to vary key dimensions, such as the appearance of the characters in the evacuation, and the number of other evacuees, and to enhance the urgency of exit through an increasing 'danger' indicator. Participants' identity was varied by a vignette at the beginning of each trial which cast them either as group members or individuals in an aggregate crowd. We then measured the number of 'injured' characters who were helped and the extent to which participants pushed characters out of the way. A post-test questionnaire assessed self-reported shared identity, feelings towards others, and intentions to help.

We ran five visualization studies.

Visualization study 1

Seventy-two people took part in the first visualization experiment. While it was difficult to get people to think of themselves as group members (versus individuals) in the way we intended, there was nevertheless a link between feelings of psychological 'groupness' and the amount of helping: the more people saw themselves as group members, the more likely they were to help fallen characters – even though such action delayed their own exit.

Visualization study 2

The second study was a student project with forty participants using a different vignette. While again the manipulation of salience was too weak to have an effect in itself, it was found that the more people saw themselves as group members the more they helped, the less they pushed, and the more they expressed a willingness to help others.

Visualization study 3.

A third experiment, in which 62 people took part, eliminated potential problems with the procedure (such as engagement) but also weakened the identity manipulation. There was more helping in the 'group identity' than the 'personal identity' condition but this difference was not statistically significant.

Visualization study 4.

40 people took part in a fourth experiment, which was carried out as a student project and with a different vignette again. Those in the 'group identity' condition displayed significantly more helping behaviour than those in the 'personal identity' condition. There was also a correlation between helping and positive feelings towards the ingroup.

Visualization study 5

The final study was a student project which used the Tay Social Psychology Group Immersion Lab at St Andrews University. The visualization was treated too much as a game by some earlier participants; this was possibly due to the fact that it appeared in the form of a computer program on a small screen in front of them. The Immersion Lab, by contrast, surrounds the participant on every side by the visualization. The study sought to separate out the effects of shared fate – an antecedent of shared identity - from one of its possible causes, mortality salience. As expected, people helped more in group-identity conditions than they did in the individual-identity condition. However, and as predicted, hesitation times were lower in the 'common fate' condition than in the other two conditions.

Overall, the visualization studies support the conclusion that, where there is a sense of collective identity, there will be greater mutual concern and helping than where identity is not shared. Importantly, people with a stronger shared identity in these studies tended to help fallen characters (even though this meant delaying their own exit) than did those for whom the sense of shared identity was weak.

In terms of the aim of developing an experimental simulation that was both engaging and ethically sound, the visualization paradigm was successful – particularly when compared with the room evacuation design: participants took the visualization more seriously; and the visualization enabled more measures and more opportunities for helping versus personally selfish behaviours than the room evacuation.

Results 3: Interview studies.

We intended to interview people from two sorts of mass emergency situation: those where there was a high level of unity (explicable in terms of a shared social identity) versus those with low (or no) unity. However, in the process of conducting the interviews, we found that most participants' level of identification with the crowd shifted over the course of the emergency event. In almost all cases, the crowd tended to become more unified over time; there were no 'low shared identity' emergency crowds. Thus we began to examine shared identity as varying over time rather than across crowds, and as a cause (of helping and co-ordination) but also as an outcome. This is detailed below.

Interview study 1: Comparative interview study

To recruit interviewees, we placed advertisements in newspapers and pursued personal contacts. Interviews were carried out with twenty one witnesses of eleven different incidents: five from sinking ships; six from football stadium disasters; four from the 'Fat Boy Slim' free party on Brighton beach in July 2002; three from office evacuations in response to perceived terrorist attacks; one from the IRA Harrods bombing in 1983; one from a hotel fire; and one from a train derailment. In each case, the participant was in a crowd, facing a perceived impending threat and with limited opportunities for escape. We asked participants to recount events as they remembered them. The rest of the interview was organized according to the following issues: (i) Behaviour: e.g., 'What did you and others do in response to events? Did people co-operate/ help each other out? (ii) Perceptions/ feelings: e.g., 'What were you thinking/ feeling as incident progressed? Do you think that anyone panicked? (iii) Identities: e.g., Did you feel a sense of unity towards those in the evacuation with you?' The resulting data-set was analysed qualitatively using content and thematic analysis.

As expected, there was evidence (a) that everyday norms were upheld – for example, people formed queues; (b) that social roles continued to operate – for example teachers continued to act with authority in relation to schoolchildren in their charge; and (c) that many people stayed with their small affiliation groups and gave more assistance to their affiliates than to others. There was also clear evidence against the panic model and for the social identity account of mass emergency evacuation behaviour, as follows.

First, there was no mass panic. While the word 'panic' was quite frequently used in the interviews, it usually referred to individual feelings of fear of distress, was normally displayed by people screaming or crying (as opposed to displaying any overt physical behaviour associated with panic), and did not spread to others. Indeed, when asked directly, interviewees were typically explicit that, though there was fear, there was in fact no widespread personally selfish behaviour.

Second, there were significantly more accounts of helping (being helped, helping others, observing help) than of personally selfish behaviours (e.g., others being pushed or ignored). In general, when people were physically able, they helped others, even those they had not previously known before the emergency.

Over half of our interviewees referred unambiguously to a sense of unity or togetherness with the rest of the crowd during the emergency. This sense of unity typically extended to strangers. In most of the references to common identity, it is described as emerging over the course of the emergency itself. Only a minority referred to any sense of crowd unity prior to the emergency – and for most of these the sense of unity increased in response to the emergency. The source of unity was the crowd members' experience of shared fate in relation to the threat facing them. While they might have come to the event seeing themselves as so many individuals, the threat facing them all led them to see themselves as 'all in the same boat'. Moreover, just as those who reported a strong sense of shared threat also reported a strong sense of unity, most of those interviewees who did not perceive a threat to the crowd (e.g. some of those at the beach party) did not report any sense of unity with the rest of the crowd.

This study supports the argument that shared identity in an emergency evacuation enhances mutual concern and helping in a crowd. But it also suggests that such shared identity can develop from the experience of the emergency itself. However, there are a number of limitations of this study. While a common pattern was found across different events, some of these events took place a long time in the past and some of the accounts lack detail. The idea that shared identity can emerge from within the emergency event itself was a hypothesis that came out of the study.

Ideally we still needed to study a single event with a large number of accounts. If it was an event where most people were amongst strangers and we still found evidence of shared identity and helping then this would be stronger evidence in support of our approach.

Interview study 2: The July 7th London bombings

The July 7th London bombings of 2005 took place while this research project was halfway through. The four bombs (three on the London Underground and one on a London bus) killed fifty six people (including the four bombers) and injured over 700. The events were characterized by much shock and fear on the day, and thousands of people were affected directly or indirectly. We gathered the following accounts from survivors or eye-witnesses of the bombs: (i) extracts from 141 different articles in 10 different national daily newspapers in the days immediately after July 7th. (ii) 114 detailed personal accounts of survivors that had either been posted on the web, delivered in evidence to the London Assembly hearings into July 7th (held on March 23rd 2006) or published in books or retrospective newspaper features. (iii) responses to our on-line questionnaire ; thirteen people e-mailed in their accounts (the questionnaire is available at:

http://www.sussex.ac.uk/affiliates/panic/lb/index.htm); (iv) 12 face-to-face interviews with survivors who felt able to do so. Each of these lasted around an hour. The questions were adapted from the previous interview study. In total, and not counting the contemporaneous newspaper data (where it was difficult to make reliable attributions), we collected data from at least 145 people, most of whom (ninety) were actually caught up in the explosions. This is about 5% of all those directly affected by the blasts.[4] This data was analysed both quantitatively and qualitatively. Results are as follows.

(1) There was *talk* of 'panic' (but also of 'order'). In the 141 newspaper accounts gathered immediately after the events, fifty seven eye-witness accounts used the term 'panic', but this usually described the behaviour of isolated individuals rather than the crowd as a whole. However, in contrast, there were also twenty eye-witness accounts which explicitly denied that there was panic, and thirty seven such accounts referred to 'calm' amongst those affected by the bombs, and fifty eight to an 'orderly evacuation'.

(2) Co-operation and helping were common. In the personal accounts, forty two people reported helping others (most of them helping more than one other), twenty

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[4] This figure is based on the London Assembly (2006) estimate that 3000 people were directly affected by the four explosions.

nine reported being helped by others, and fifty reported witnessing others affected by the explosions helping others (most of these again, helping more than one other). Most of the people affected were amongst strangers; for example in the personal accounts, nearly sixty people reported being amongst people they did not know (including forty eight people who were actually on the trains or bus that exploded) while only eight were with family or friends at the time of the explosion. There was a widespread fear of death through secondary explosions or the tunnel collapsing. Yet many people continued to care for those who needed help.

(3) Selfish behaviour was rare. In the personal accounts, we found only four cases of people's behaviour that could be described as personally selfish, and six cases where the speaker suggested that another victim behaved selfishly to them or to someone else.

(4) The newspaper data contains few references from witnesses or survivors to unity (though none to disunity) but the theme is prevalent in the more detailed data-sets. Thus in the personal accounts, eleven survivors or witnesses described a 'shared fate' with others caught up in the bombing and eighteen to a sense of unity during the event; no survivors or witnesses denied that there was unity. Nine out of twelve of our interviewees were explicit that there was a strong sense of unity in the crowd; i.e. that they felt unity themselves (eight) and/or saw it in others (seven).

This study of the July 7th bombings would therefore suggest that a common identity was the basis of at least some of the mutual concern and helping displayed by those affected and that this common identity grew from a shared relationship to the bombing itself. Thus disasters and emergencies can bring people closer together rather than set them against each other.

Future research priorities:

Two areas arising from this project seem worthy for further research. First, given that event planning and public space construction rely on computer models of crowd movement (mundane as well as emergency), and given that the psychology employed in these models is usually inadequate (Still, 2000), there is a need to examine how psychological processes could operate as parameters in computer models. Some of the major modelling groups have themselves called for greater psychological input (e.g. Galea, 2006); and there is already work to build in a level of psychological groupness among other variables in computer models (Langston, Masling & Asmar, 2006). But this could be taken a lot further – ideally by a programme of research which would link such mathematical models with front-end visualization procedures of the sort employed in the current project, to test ideas in a

fully interactive setting. These models could be developed further still to explore the possibility of using them as a training tool for members of the emergency services.

Second, the concept of resilience was found useful to describe some aspects of the crowd response to the July 7th bombings. This concept has so far mostly been applied to the aftermath of disasters, and, in particular to the emergence of support networks amongst rescuers and other emergency teams (Tierney, 2002; Tierney & Trainor, 2004). Thus it is worth noting that in both our interview studies we found post-event mutual support amongst victims and members of the emergency services involved. Many interviewees said they derived psychological benefits from sharing their feelings with others who had had the same experiences. Such networks may enhance resilience and shield survivors of trauma from some of its worst psychological consequences. The importance placed by survivors on these mutual support networks clearly points to the need for further research on their psychological basis, significance and consequences. The implications for after-care for both survivors and those from the emergency services could be radical and far-reaching.

Conclusion and implications for the Fire Service:

In summary, the findings from these studies contradict the 'panic' model of crowd behaviour in emergencies. They also suggest that those theories previously developed to explain co-operation in crowds (norms and affiliation) are insufficient. Evidence that people take risks to help others within a crowd of strangers (as in the July 7th bombings, for example) seem explicable in terms of shared identity. A shared identity means that a danger to the 'other' is experienced as a danger to 'self', and so people tend to co-operate with those who they share a common fate. It would seem prudent therefore to consider ways of encouraging this common identity and hence co-operation among crowd members during mass emergencies.

Firstly we would suggest that **communication with the crowd is crucial.** If crowd behaviour is not only cognitive but also meaningful, this suggests that the public will respond effectively (i.e. co-operatively and in an orderly manner rather than anti-socially or over-emotionally) if given more rather than less information about the nature of the threat. It was because crowd behaviour was regarded as meaningless or at best lacking critical judgement that in the past there has been a tendency to withhold information from the public in times of emergencies, despite there being no evidence to support the notion that crowds will necessarily descend into mass panic when told of a threat. There is even evidence (e.g. Proulx & Sime 1991) that suggests the exact opposite- e.g. that providing information about threats can actually increase the speed and efficiency of evacuations. However, the source of information and whether it is trusted by the crowd is also important if people are to

act efficiently in escaping danger. For instance, operational commanders could consider using representatives from the crowd to convey messages to other crowd members to encourage action.

During emergencies, bystanders also commonly volunteer to help (either in assisting the evacuation, helping the injured, or providing information to passers-by), thus freeing up emergency service personnel for more specialized tasks. Therefore, crowd members could be seen as a potential resource pool to draw from rather than as a potential hindrance to the rescue effort in need of being moved along. It is also possible to encourage such altruism by appealing to the crowds' collective and co-operative nature - as assuming they will behave as selfish individuals may make this more co-operative norm more difficult to develop.

To conclude, the findings from this research suggest that far from being a source of potential problems during emergencies, crowds can be part of the solution in ensuring more safe and efficient evacuations, and that the public is often more resilient than they are given credit for. It has even been argued (e.g. Furedi, 2007; Wessely, 2005) that over-protective responses by government agencies in emergencies may stunt the public's own natural resilience. Therefore, fire and other emergency service planners would be best advised to consider research such as this when planning their responses to mass emergencies and treat those affected not as passive victims, but as potentially active partners in facilitating the situation towards a safe and efficient resolution.

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