Crowds can be lethal – but also surprisingly rational. As scientists learn more about how groups of people behave, they're figuring out how to prevent deadly incidents in the future.

By Christine Ro
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Sometimes, being part of a large crowd can be worse than uncomfortable: it can turn lethal. Deadly crowd crushes that occurred in 2017 include incidents in an Angolan football stadium, an Italian piazza and a Moroccan food aid centre.

These events are tragic and mostly avoidable. Scientists in the UK around the world are figuring out new ways to minimise the chance of them happening again.

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"Most of human behaviour is very predictable, because we are very rational beings," says Shrikant Sharma, Smart Space Group Director of UK engineering firm BuroHappold. This predictability allows data analysts to envision how people will move through space – and how that can be affected by changes to their environment.

Crowd psychology has been around since the 19th Century.

rational beings

But it's only in the last few decades that there's been a major shift to seeing crowds as more than mindless masses. "The crowd is as psychologically specific as the individual," says the University of Sussex's **John Drury**, an expert on the social psychology of crowd management.

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In the 1980s, psychological findings were applied to riots, in the 2000s to mass emergencies, and in the 2010s to music festivals and large events. Now, crowd psychology is being used in more specialised emergencies – such as CBRN (chemical, biological, radiological or nuclear) attacks.

John Drury: "The crowd is as psychologically specific as the individual" (Credit: Getty Images)

Crowd consciousness

In fact, the work of psychologists and disaster specialists shows that a **collective identity often emerges** during emergencies. This identity is key to determining how cooperative and resilient a crowd will be in a given situation. In their interviews with survivors of the 2005 **7/7 London bombings**, for example, Drury and colleagues found that there had been lots of cooperation between members of the crowd: they comforted each other, shared water, and provided basic first aid.

"It's important not to do things that would undermine the emergence of this shared kind of social identity," Drury says. Because crowd identity comes to supersede other affiliations, for example, it would be unhelpful to divide the crowd into religious or ethnic groups in the hope of making it more manageable. These findings have been integrated into emergency response guidelines of organisations like the UK's National Health Service (NHS).

Crowds can be lethal – but also surprisingly rational (Credit: Getty Images)

It's also key to understand the 'rules' that govern a given kind of crowd. Take **moshpit behaviour** at a punk or metal gig. There's a logic to this seething mass of bodies, though it might not be visible to outsiders. This logic keeps fans from being trampled. Remarkably, it even means that moshers moving in a rough circle often will end up right where they started. "Crowd safety managers know that when you see slamdancing and moshing, that is rule-bound," Drury says.

But if inexperienced security officers who don't know the scene assume that this behaviour is dangerous and start applying physical force, this could be what actually makes the situation dangerous. This happened at the **1989 Hillsborough disaster**, when 96 people died after being crushed in a football stadium in Sheffield, UK. Some police and stewards were so preoccupied with possible hooliganism that their actions, like **penning fans into tight packs**, made things worse.

"If people are primed to

From a psychological standpoint it is also important not to overstate the dangers of a crowd. Drury explains that despite how rare disasters are, the media and popular

believe that others will panic in a crowd, they're more likely to panic themselves

culture often exaggerate the dangers. It's more dramatic for storytelling purposes to use a term like "panic" rather than "sudden evacuation", for example, even though mass panic is rare.

The problem is that if people are primed to believe that others will panic in a crowd, they're more likely to panic themselves – even in the absence of actual danger.

Advance plan

When it comes to a particular event or building, research also is helping the development of ways to keep crowds safe. Often, the best measures are the most unexpected.

The work of psychologists and disaster specialists shows that a collective identity often emerges during emergencies (Credit: Getty Images)

From a light-filled office overlooking the River Avon in Bath, Sharma's Smart Space **team** gathers abundant data on factors that influence crowd behaviour, from wind conditions to cultural preferences for personal space. Using their own crowd simulation software package, they plot these variables in different scenarios to show how even simple steps – like moving an exit in a block of flats – can avoid overcrowding.

"Data will often challenge your assumptions," Sharma says. Hospital staff may report that one area of their floor is the busiest, for example. But placing tracking tags on staff

might show that the centre of activity is elsewhere. This would suggest a different way of organising the space.

Sometimes recommendations are even simpler. One Newcastle school faced a crush of students each time the school bell rang. Sharma's team watched students struggling to walk down a corridor in multiple directions. They realised that the school's idea – widening the corridor – would be both unnecessary and costly.

The logic of moshpit behaviour keeps fans from being trampled at music gigs (Credit: Getty Images)

Instead, Sharma's team recommended something far simpler: get rid of the school bell. Once teachers were able to wrap up their lessons within a range of a few minutes, classes didn't all let out at precisely the same time. Suddenly, moving down the corridor was relatively smooth.

As a result, even in places with limited resources, Sharma believes that asking the right questions could help avoid crowd crushes. Mumbai's train stations are notoriously overcrowded, for instance. Ensuring that correct information is shared, and paying attention to how passengers are diverted from the exits, could help avoid more tragedies like the **2017 stampede** on the stairs of Elphinstone Road station, which resulted in at least 22 deaths.

Despite the progress that crowd management science has made, there's still more scope for improvement.

The work of psychologist **Anne Templeton** of the University of Kent, for example,

shows that many crowd simulation tools fail to account for the way members of a crowd interact with each other. A ‘physical crowd’ (basically just a group of bodies in the same space) would be modelled differently to a ‘psychological crowd’ (where a crowd has a shared sense of identity). For instance, Templeton says, “at a fundamental movement level, psychological crowds will walk slower and further in order to keep close formation with fellow crowd members.”

Even in places with limited resources, asking the right questions could help avoid crowd crushes (Credit: Getty Images)

The increasing sophistication of data modelling may allow for these harder-to-see factors to be incorporated into scenario planning. “Physical crowds can become psychological crowds in emergencies, and so computer models should also be versatile to accommodate the change in group identity and behavioural changes that come with it,” Templeton says. Interviews (what people say) could be combined with sensors (what people do) to achieve a fuller understanding of human behaviour and needs.

Crowds are surprisingly complex and sophisticated. But so, increasingly, are techniques for understanding them.

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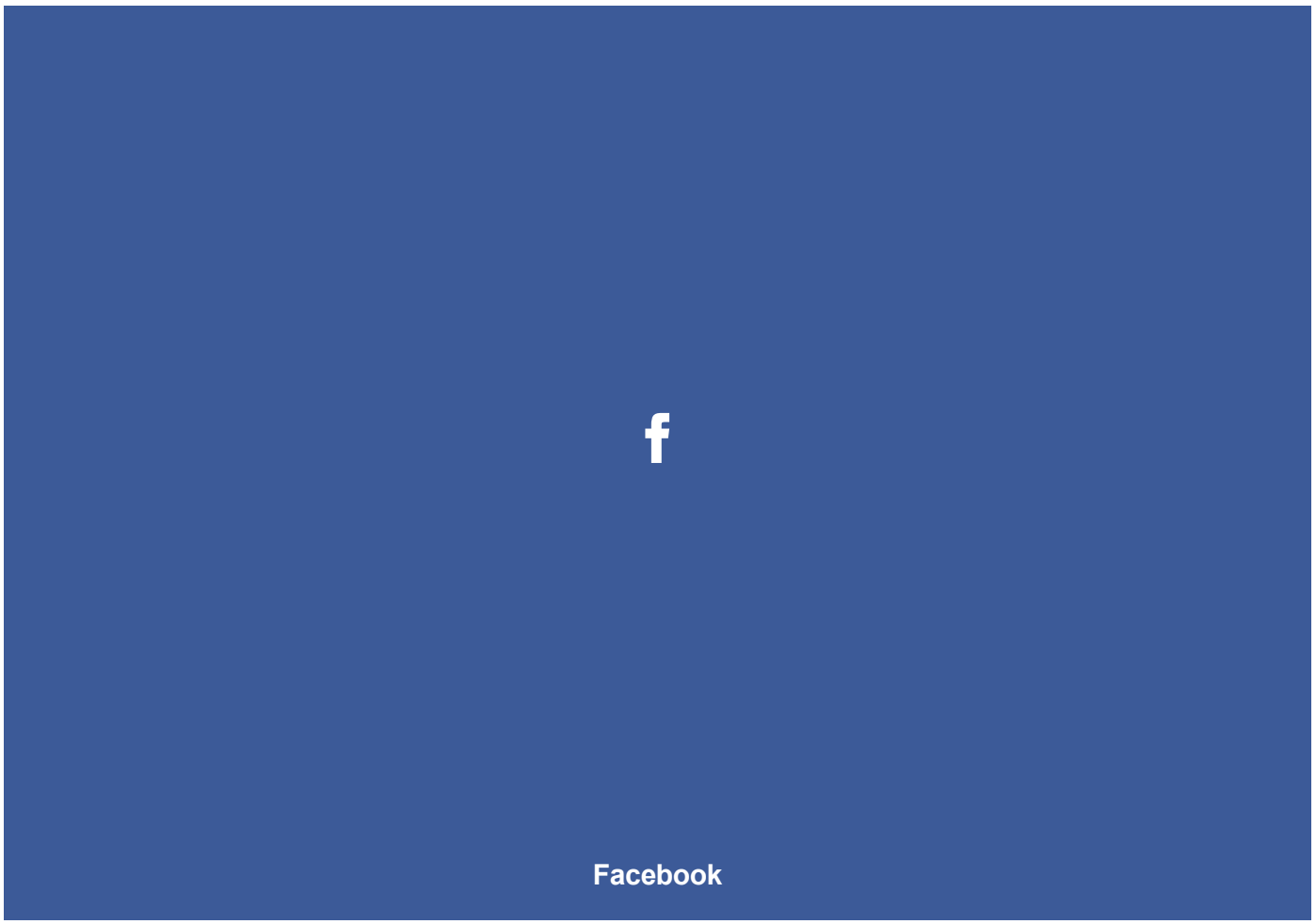

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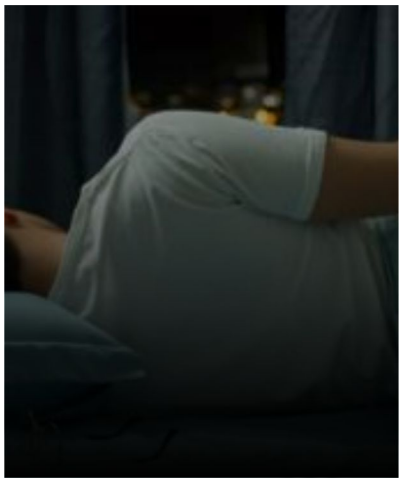

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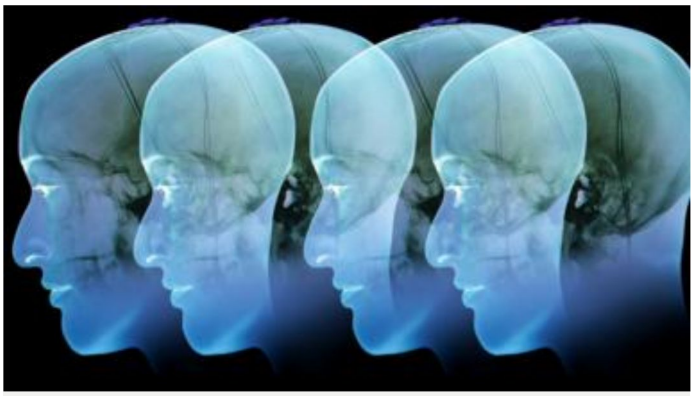

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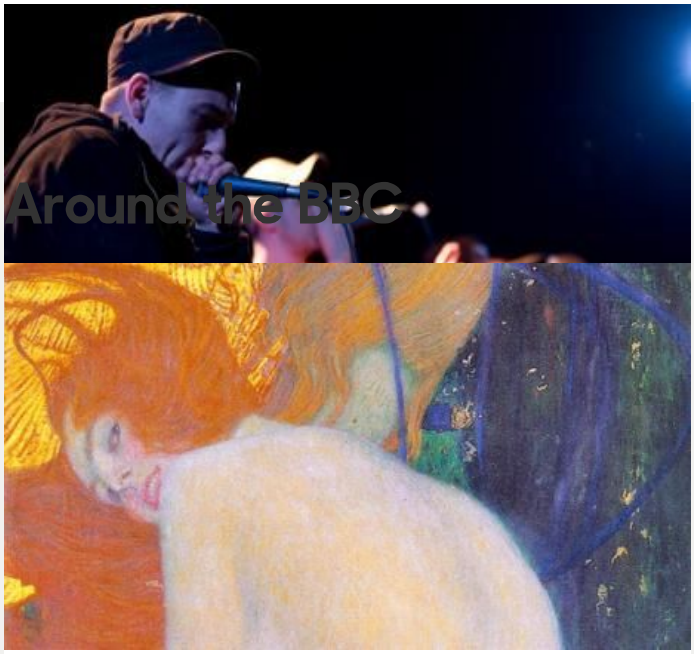

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