

per minute.

Users: 110,000

Free World Dialup www.freeworlddialup.com

411: Calls are free to the US and UK, and supercheap worldwide. But you can only talk to other VoIPsters. PC and headset required.

Users: 72,000

Vonage www.vonage.com

411: Reach any conventional phone in the world using your existing handset (free adapter required). The price: \$35 a month.

Users: 64,000

SipPhone www.sipphone.com

411: Free calls to anywhere once you buy the \$80 handset. But you can only call other IP phone fans.

Users: would not disclose

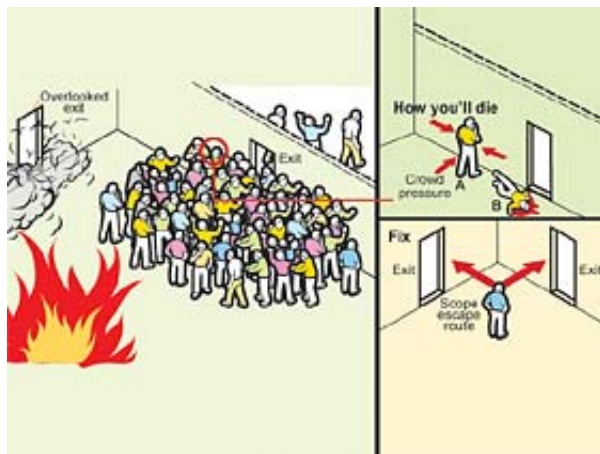
- Xeni Jardin

START behavioral science

The Madness of Crowds

Four ways frightened mobs flee from danger - and how you'll die if you don't escape

Set your emotional dial, for a moment, to panic: Someone shouts "Fire!" in a crowded theater. Your hands tremble, your pulse races, a cold sweat spreads across your back. You're trapped with hundreds of others. What would you do to escape? Scientists and architects think they know. They have long had mathematical models that predict crowd behavior, but testing was always a problem. Until now. In an article in the Proceedings of the National Academy of Sciences, researchers simulated a mass exodus by dropping mice into a tub of water. The models held up. The mice? Don't ask.



HERDING

WHAT HAPPENS: Disaster gives voice to your inner sheep; people follow a crowd to an open door even if other exits are clog-free.

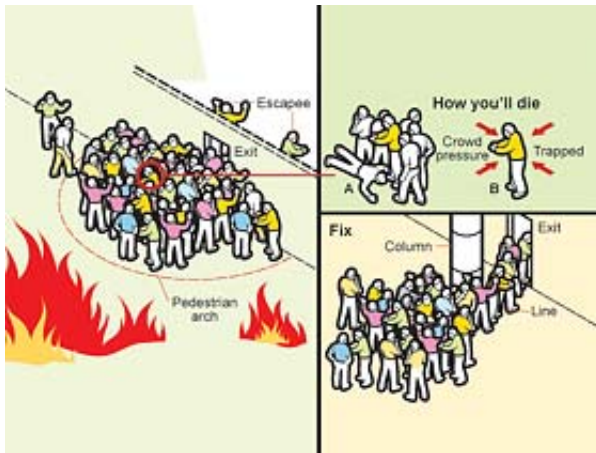
CAUSE: Most people head for the door they used to get in. The Rhode Island nightclub that burned last year had four exits, but most of the bodies were found around the front door.

HOW YOU'LL DIE: A fleeing crowd pushes as one; the resulting pressure is like a back-walk massage from a sumo wrestler. Ribs crack, organs squish, and the air squirts out of your lungs like ketchup from a foil packet.

THE FIX: Scope out a couple alternate escape routes before disaster strikes - why do you think the nice flight attendant

Jameson Simpson

shows you the exits on an airplane?



PEDESTRIAN ARCH FORMATION

WHAT HAPPENS: It's the Three Stooges effect: The door is wide enough for only one, but everyone wants to be first. More stooges give you a semicircle of gridlock as everyone seeks the shortest straight-line vector to the exit.

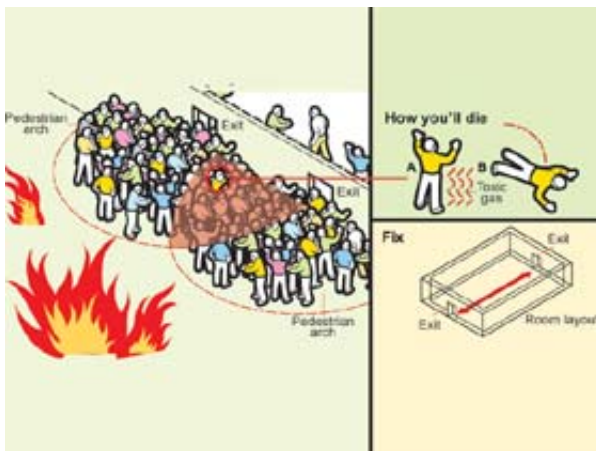
CAUSE: People are sticky - they wedge into the area in front of the doorway like a cork. The exit clogs, with intermittent bursts of escapees when force exceeds friction.

HOW YOU'LL DIE: Trapped behind injured neighbors or a doofus who insists others go first, you'll be jostled in place like a grain of sand in an hourglass.

THE FIX: A column a few feet in front of the exit can help break up an arch, splitting the jam into smoothly flowing streams. Being first in line helps, too - lingering near the

Jameson Simpson

exits during a show isn't just cool, it can save your life.



DISRUPTIVE INTERFERENCE

WHAT HAPPENS: Two doors, two pedestrian arches - if they overlap, chaos ensues at the junction.

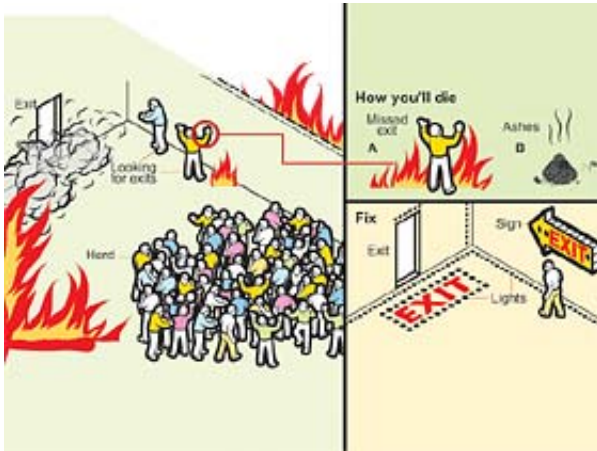
CAUSE: Your eyes are on the exit, not the bodies in front of you.

HOW YOU'LL DIE: In a fire, if the crushing doesn't get you, toxic gases probably will. The poisonous-fume hit parade includes carbon monoxide and superdeadly phosgene. "One or two whiffs of phosgene and you're down," says one firefighter.

THE FIX: Two doors are better than one, but arches can spread all the way across narrow rooms. Architects should put doors at opposite ends of the room. And if you're in the scrum, try not to freak out. The exit throughput rate drops as

Jameson Simpson

the panic level climbs.



Jameson Simpson

WALL SEEKING

WHAT HAPPENS: Some of the herd peel off on their own; they end up creeping along the edges of the room.

CAUSE: Rugged individualists know that in the midst of a panic, the mob is the worst place to be. They also know that walls are inevitably interrupted by exits.

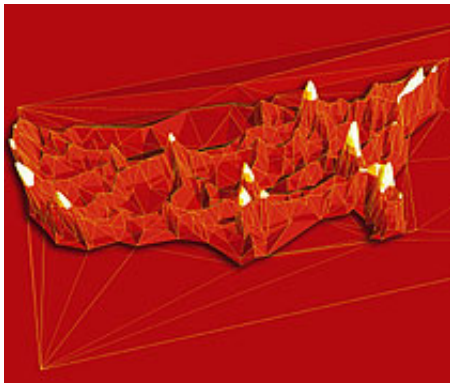
HOW YOU'LL DIE: Scared and alone. If you miss the exit or go the wrong way along the perimeter, whatever you're running from will get you. If too many individualists have the same plan, you'll bump into them, slowing your escape.

THE FIX: Better exit indicators - bright, flashing lights at exits and along floors; public address systems; and Klaxons.

- Thomas Hayden

START networks

A Dissertation So Good It Might Be Classified



Raj Kulkarni

Fiber nation: Gorman's US map (top) drawn from public sources depicts the most dense concentrations of fiber-optic networks as peaks connected by fiber cables. The map of San Diego (below) shows fiber density as shades of orange and the connecting cables as blue lines. The city's

Sean Gorman knows where all the US fiber-optic cable is buried. He can fire up his digital map, then zoom in on a bank in Manhattan, drill down to a critical cable feeding a Nebraska nuclear power plant, and pinpoint the data lines serving a military installation in San Diego. No wonder the government wants to confiscate his dissertation.

For his doctorate in public policy, the George Mason University student set out to pinpoint the network's weaknesses in 2002. He mined public records, then used a series of algorithms to build fine-grained models. The result is the most comprehensive map of the nation's fiber-optic infrastructure - a network that handles Internet traffic, landline and mobile calls, military communication, financial transfers, air traffic control, and data transmissions to power grids and water systems.

Gorman, 29, is scheduled to defend his dissertation in January. But officials from the National Security Agency, the FBI, the CIA, and the Department of Homeland Security have said his project would be valuable to terrorists and should be classified as top secret - even Gorman himself wouldn't be allowed to read it. Former White House cybersecurity czar Richard Clarke suggested the work be burned.

So far, George Mason - which is eligible for research funding from the DHS - is cooperating with the government, keeping Gorman's work under wraps. Gorman believes his maps and analysis should be published, but only with the approval of the Feds. "The US university system is a great asset for developing technology," he says. "But it needs to work collaboratively with the government." In his case, there may not be much choice.

- Matthew Cole