Behavior

Risk and resilience after disaster

Tragedy struck an Indianapolis hotel on the morning of Oct. 20, 1987. Literally from out of the blue, an Air Force jet fighter crashed into the lobby. Most of the hotel guests had already checked out and none of those remaining died. However, nine hotel employees perished as the wayward plane sprayed chunks of shrapnel and set off an inferno. The remaining 22 employees in the hotel survived, but they experienced the terror of watching the plane heading toward them, the horror of its impact and the agony of the helpless victims.

In such instances, disaster workers with limited resources are faced with an awesome task – deciding which survivors are most in need of immediate mental health services. Prompt psychiatric help may be especially important for survivors with a history of severe depression, many of whom sink back into depression in the weeks following a sudden disaster, according to a preliminary report in the February AMERICAN JOURNAL OF PSYCHIATRY.

Between four and six weeks after the Indianapolis tragedy, Elizabeth M. Smith of the Washington University School of Medicine in St. Louis and her colleagues interviewed 17 of the surviving hotel employees and 29 additional hotel employees who were not at work when the crash occurred.

More than half of the sample – a total of 25 – had at least one of the following psychiatric disorders: post-traumatic stress, major depression, generalized anxiety and alcohol abuse or dependence. The two employee groups had approximately the same rate of psychiatric disorders. Employees who reported the most emotional upset in the wake of the disaster were no more likely to receive a psychiatric diagnosis, the researchers note. But more than two-thirds of those with a mental disorder in the weeks after the crash reported a prior history of psychiatric problems.

Depression ranked as the most common diagnosis, affecting 19 people, including all 10 employees who reported prior bouts with depression. Curiously, five individuals said they had fully recovered from the incident despite describing clear signs of depression.

Seven of the 10 employees with post-traumatic stress arising after the disaster had no histories of the disorder.

There was plenty of emotional resilience as well as turmoil in the wake of the plane crash, the researchers add. Almost half of the hotel employees did not develop any psychiatric disturbances.

Haphazard homicides at home

A study of domestic violence released last week finds no patterns or signs indicating which violent incidents are most likely to result in a killing, providing both bad and good news to police officers.

The bad news is that in the hazardous realm of domestic violence, where police called to the scene are often in imminent danger themselves, there apparently are no reliable ways to predict whether a homicide is likely. The good news is that the data do not support contentions in recent lawsuits in some cities alleging police liability for failing to protect spouses who were hurt or killed after previous threats.

The study of violence in the home was conducted in Milwaukee by investigators from the Crime Control Institute, a nonprofit research group in Washington, D.C. The researchers tabulated 15,537 reports of domestic battery to the Milwaukee police in a 22-month span from 1987 to 1989. Of the 33 domestic homicides in that period, only one yielded evidence of prior violence between the same two people. Threats to kill, or pointing of guns, occurred in 110 incidents, but when the cases were monitored for an average of 16 months, not one of the threats led to injury or death.

Biology

Ivan Amato reports from Santa Fe, N.M., at the second Artificial Life Conference

Dramatizing life's chemical prelude

The complex biochemical dance that continually unfolds in living cells must have originated somewhere. According to the standard evolutionary picture, that somewhere was a primordial soup stocked with the kinds of small molecular building blocks, or monomers, that linked into nucleic acids (RNA and DNA) and proteins – the long polymeric molecules central to contemporary life forms. But it's a long way from a brew of unconnected monomers to an interdependent set of intracellular polymers that pull off feats such as replication, metabolism and differentiation into specific cell types.

In cells, proteins assist in the replication of nucleic acids, which themselves orchestrate the assembly of proteins. "Neither can be produced without the other," notes J. Doyne Farmer, a complex-systems theorist affiliated with Los Alamos National Laboratory and the Santa Fe Institute, both in New Mexico. Chemists have known for decades that amino acids – the monomers that link into proteins – spontaneously form under laboratory simulations of the primordial soup. But these monomers fail to reliably link into long polymers. So a question emerges: How might a set of mutually dependent polymers have emerged from the primordial soup?

To probe this question, Farmer and co-workers model a primordial soup of monomers with a neural network computer program. The computer program feeds monomers into the model soup and "artificial chemistry" governs how they link into varying chains. The program also bestows components of the soup with catalytic powers for either linking or breaking other components of the soup. As the program runs, different polymers become more abundant than others and certain sets of polymers develop so-called autocatalytic relationships. That means that each member of the set forms from one or more catalytic reactions involving other members of the set. In other words, sets of polymers develop the type of chemical interdependencies found inside cells.

"We would like to say that these [autocatalytic sets] have life-like properties," Farmer says. He and co-workers intend to use the simulations to study how autocatalytic sets evolve and how they might have provided a chemical scaffolding for life's emergence from the primordial soup.

Tracking an intracellular computer

Under the molecularly-thin skin of every neuron lies a web of protein filaments collectively known as the cytoskeleton. Its growing list of cellular duties includes structural support, transporting chemicals from one place in the neuron to another, and coordinating cell division, growth and morphology. If Steen Rasmussen of Los Alamos National Laboratory, Stuart Hameroff of the University of Arizona College of Medicine in Tucson and their co-workers are right, the cytoskeleton also serves as an intracellular nervous system that processes molecular-level information. Since the cytoskeleton influences synapse dynamics, it may even have a role in cognitive processes, Hameroff says.

These scientists and several other research groups conjecture that the cytoskeleton's grid-like structure, and its orderly way of disintegrating and rebuilding, may enable it to act as an intracellular computer. One variation of the idea identifies the computer inputs as cellular states such as temperature and the concentrations of various molecules. The cytoskeleton processes these states, or inputs, by changing its own molecular structure. This culminates in outputs such as changes in the cell's shape. Sophisticated but preliminary computer simulations of the cytoskeleton's fluctuating architecture suggest that real cytoskeletons may be able to process, respond to adapt to molecular inputs the way the simulated ones appear to do, Rasmussen says.

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