

the place. "You see chaos appear right before your eyes," Brewer said.

The IBM team's predicted value of the trap potential at which the system would move from order to chaos matched almost exactly with the experimental value. The group has still not calculated the value at which the system lapses back from chaos to order, which is a slightly different number and is much harder to compute.

Much remains to be done, Brewer said.

The group has made a number of predictions and "it would be nice to experimentally confirm some of them." Calculations show, for instance, that at certain trap potentials there are "windows" of order inside the chaos. In such cases, the ions have a relatively simple, stable motion the group would like to observe.

Past that, various theories exist about exactly how a system moves from order to chaos, and the IBM group plans to deter-

mine which one, if any, describes the system of trapped ions. "It appears that the two-ion system offers significant advantages in the future in elucidating the nature of chaos," Brewer said.

■ ROBERT POOL

#### REFERENCES

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## Study Raises Estimate of Vietnam War Stress

In sharp contrast to a massive study released just a few months ago, a new study, funded by the Veterans Administration (VA), has found that 470,000 Vietnam veterans still suffer from a major psychological disorder directly related to the war. The earlier study, conducted by the Centers for Disease Control (CDC), found only 66,000 to be affected with post-traumatic stress disorder, or PTSD.

The discrepancy between the two studies seems certain to fuel the debate on the psychological aftermath of the Vietnam war, a debate that has focused largely on PTSD. Congress is keenly interested in the prevalence of this disorder, as it bears directly on the adequacy of the VA's treatment and benefits programs.

From the outset, PTSD has been mired in controversy, both over what it is and how many veterans are affected. Although the disorder was officially recognized by the American Psychiatric Association only in 1980, it has surfaced after every war, when it has been known as shell shock or battle fatigue.

As now defined by the American Psychiatric Association, PTSD is a problem of varying intensity, from mild to life-threatening, that results from exposure to a traumatic event—"an event outside the range of usual human experience." It can take many forms, but the main symptoms include reexperiencing the event (in nightmares, flashbacks, or "intrusive recollections"); avoidance or withdrawal from the outside world; and increased arousal, such as hypervigilance or exaggerated startle reaction.

In 1984 Congress told the VA to find out exactly how many Vietnam veterans are affected, and thus what the need for services is. But CDC completed its study first, which was a broader look at physical and psychological health of Vietnam veterans. CDC found that only 2% of Vietnam veterans currently suffer from PTSD, although veterans were twice as likely to have serious problems like depression and anxiety (*Science*, 8 July, p. 159).

In part because of the publicity surrounding the CDC study, Senator Alan Cranston (D-CA), chairman of the Veterans Affairs Committee, called hearings on PTSD on 14 July. At those hearings, the VA presented its preliminary findings from its long-awaited National Vietnam Veterans Readjustment Study. The final study should be completed in November.

According to the new study, conducted for the VA by the Research Triangle Institute of North Carolina, 15% of veterans who served in Vietnam, Laos, or Cambodia still suffer from PTSD. That translates into 470,000 of the 3.14 million men who served in the war. For the 7,166 women who served, mostly as nurses, the prevalence is 9%. For minorities, the figures are far

higher: the prevalence is 19% among blacks, and a whopping 27% among Hispanics.

The study, which was based on face-to-face interviews with 1600 Vietnam veterans, also found that PTSD cases are concentrated among those veterans who experienced heavy combat or were otherwise exposed to high "war zone stress," such as loss of buddies or witnessing or participating in atrocities. They were three to five times more likely to have PTSD than their counterparts exposed to less combat or stress.

Although these figures are preliminary, "we are very confident in the results," says Richard Kulka of the Research Triangle Institute. And, he adds, "we are very confident that 2% is not correct."

To the Research Triangle Institute team, the dramatic differences between the two studies can be traced to the instruments used to measure the prevalence of PTSD. CDC used a structured interview known as the Diagnostic Interview Schedule. The problem, says Kulka, is that while that interview works well for most psychological disorders, it had never been tested to see how well it picks up PTSD. As part of the VA-funded study, the Research Triangle Institute researchers tested that instrument, as well as three others, to see if they could distinguish persons diagnosed with PTSD from those who do not have it. Says Kulka: "The DIS did not do very well"; in fact, it significantly underestimated the number of cases. The VA-funded study used instead a modified version of the Diagnostic Interview Schedule and the Mississippi Scale for Combat-related PTSD.

CDC, on the other hand, maintains that the VA study used a looser definition of PTSD and thus identified less severe cases. To Frank Destefano of CDC, the key message is that "both studies show a substantial number of Vietnam veterans still suffer from PTSD 15 to 20 years after the war. The exact percentage is probably between 2% and 15%."

How the differences between the two studies will be sorted out is not clear. For now, they provide an upper and lower bound, and the underlying message for Congress, both research teams agree, is that many veterans still need treatment.

Cranston has introduced legislation, expected to pass the Senate soon, that requires the VA to give priority care to any veteran diagnosed as having combat-related PTSD, whether or not the benefits branch has made a formal determination that compensation is due—a determination that can take years. On 13 July the Senate also added on to the VA appropriation an extra \$5 million for PTSD treatment.

■ LESLIE ROBERTS