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12 OCTOBER 1990
VOLUME 230
NUMBER 4978

The Rational Approach to the Irrational

Last week a crazed gunman terrorized hostages in a bar in Berkeley, killing one and
wounding many others. Homicidal maniacs have appeared in all cultures over the
entire length of human history. Society's modern response to their chaotic behavior
has most often been a diligent search of their childhoods, as though understanding their
upbringing and circumstances would explain their aberrant actions. There is nothing wrong
with that kind of investigation, and in some cases history and environment will reveal clues.
However, it is time the world recognized that the brain is an organ like other organs—the
kidney, the lung, the heart—and that it can go wrong not only as the result of abuse, but also
because of hereditary defects utterly unrelated to environmental influences. Some inherent
defects may be exacerbated by environmental conditions, but the irrational output of a faulty
brain is like the faulty wiring of a computer, in which failure is caused not by the information
fed into the computer, but by incorrect processing of that information after it enters the
black box.

This issue of Science is illustrative of the kinds of research that can offer great help to
society in this area. Today research in the sciences is flourishing, as exemplified by
eight reports that span the area from molecular manipulation of ion channels to a study of
primate behavior to a study of human twins. This rapid progress is aided by advances in the
social sciences in general and the advent of three major new tools. The first is genetic
engineering, and the second, the noninvasive physical probes for imaging the brain. The
third is the Human Genome Project, which will provide information of particular value to
the study of the neurosciences. The ability to combine analyses of structural changes in the
genome with family histories has already provided valuable insights into neurological
disorders, of which Huntington's disease, neurofibromatosis, and Alzheimer's disease are
only a few examples. There are legitimate arguments in regard to how fast such a project
should go or how it should be administered, but there seems to be little doubt that it will
help in the mental health area. Schizophrenia (the disease from which the Berkeley gunman
is thought to have suffered) and other major mental illnesses can have a multigenic origin.
A sequenced human genome will be a very important tool for understanding this precise
category of diseases.

As a special feature in this issue, Science presents a human genome map that can be used
as a wall chart, together with an accompanying article by J. C. Stephens et al. This map,
which records the state of the art in sequencing, mapping, probes, and polymorphisms will
not only allow researchers in the field to identify their own particular opportunities, but keep
others abreast of the rapid advances in this area. An article in the Research News section
illustrates the history that has brought us to this point in discovery. Technological advances
in genome analysis are also described in scientific papers in this issue.

As we extend the life expectancy of individuals and provide cures for infectious diseases,
the affliction of mental disease becomes more glaring. Advancing research can cure some
fraction of these illnesses. It may also provide predictive diagnoses to distinguish those who
are severely ill from those who merely represent harmless aberrations from the norms of
society. The article on identical twins reared apart shows that some physiological and
psychological traits are inherited; however, this does not minimize the influences of
environment and motivation. While some inherited illnesses cannot be alleviated without a
biochemical cure, in others there is only a tendency to disease, which can be ameliorated or
prevented by a helpful environment.

The combination of new tools may not only let us help in reducing crime, but also aid
some of our most disadvantaged citizens, the mentally ill. Although increased funding of
mental health centers, stricter gun control, increased supervision of the mentally unbalanced,
or higher standards for probation officers may be desirable, they are Band-Aid remedies. In
the long run, the solution will be found in the knowledge required to produce accurate
diagnoses and cures. The research to provide that knowledge will be far cheaper, and the
results much fairer, than Draconian law enforcement.—DANIEL E. KOSHLAND, JR.
The Rational Approach to the Irrational
Daniel E. Koshland Jr.

Science 250 (4978), 189.
DOI: 10.1126/science.250.4978.189