

Justice Is Blind to Scientific Evidence

By BART KOSKO

Most adults missed something in the films "Star Wars" and "Goldfinger" because, according to a new National Science Foundation study, only 45% know that lasers focus light waves rather than sound waves. That finding bodes well for more junk science in the courtroom.

The recent NSF study found that overall scientific literacy in the United States remained fairly low; only 54% of adults know it takes the Earth one year to orbit the sun. The study also found that belief in pseudoscience continued to rise: Even though no scientific evidence supports astrologers' claims, a full 41% of adults believe that astrology is somewhat scientific. A stronger finding is good news for psychic hotlines: 60% believe that some people possess psychic power or ESP. And only 54% agree that humans developed from

earlier species of animals. Perhaps the rest have found a better way to explain their own tail bones.

The study suggests that most adults are not fit to serve on a jury that must decide questions of fact based on scientific or technical evidence.

The law has long since recognized the educational limits of jurors. Judges alone decide questions of law. They alone interpret the text of statutes and contracts because long ago, most jurors could not read. Judges also decide all questions of fact in nonjury trials. And they have the power to take "judicial notice" of an alleged fact and force all parties and jurors to accept the alleged fact as true.

A unanimous U.S. Supreme Court gave federal judges even more power in 1996, when it said that juries no longer could interpret the technical claims in a patent. Now only federal judges can interpret a patent's claims. But just how technically competent are judges?

A study in the judges' magazine *Judicature* gives some disturbing answers. The study interviewed 400 state trial court judges from all 50 states. It found that "many judges may not be fully prepared to deal with the amount, diversity and complexity of the science presented in their courtrooms" and that "many judges did not recognize their lack of understanding."

The study measured how well trial judges understood the four so-called Daubert factors that the Supreme Court in 1993 said federal courts should consider in deciding whether to admit scientific evidence into court. A majority understood the two easiest Daubert factors: whether the evidence had undergone peer review and whether it was generally accepted. But only about one judge in 20 understood the two key Daubert factors of testability and error rate.

A claim or theory is testable if, and only if, it is falsifiable—some observation could in principle refute or falsify it. For example, ob-

serving more helium than hydrogen in the universe would falsify the theory that the universe began in a fiery "Big Bang" because that theory predicts the reverse proportions. Such testability distinguishes science from nonscience. Yet only 6% of judges understood the concept of falsifiability. A short-term solution is for judges to hire their own scientific experts to help them decide the claims of dueling experts. But experts are expensive, and trials can last for months or even years. The long-term solution is more science training in elementary and high schools and in law schools.

Until then, many judges will continue to let dubious experts testify before scientifically incompetent jurors who can free murderers or bring down whole corporations. That breach of care borders on judicial negligence because ignorance of science is no excuse.

Bart Kosko is a professor of electrical engineering at USC.