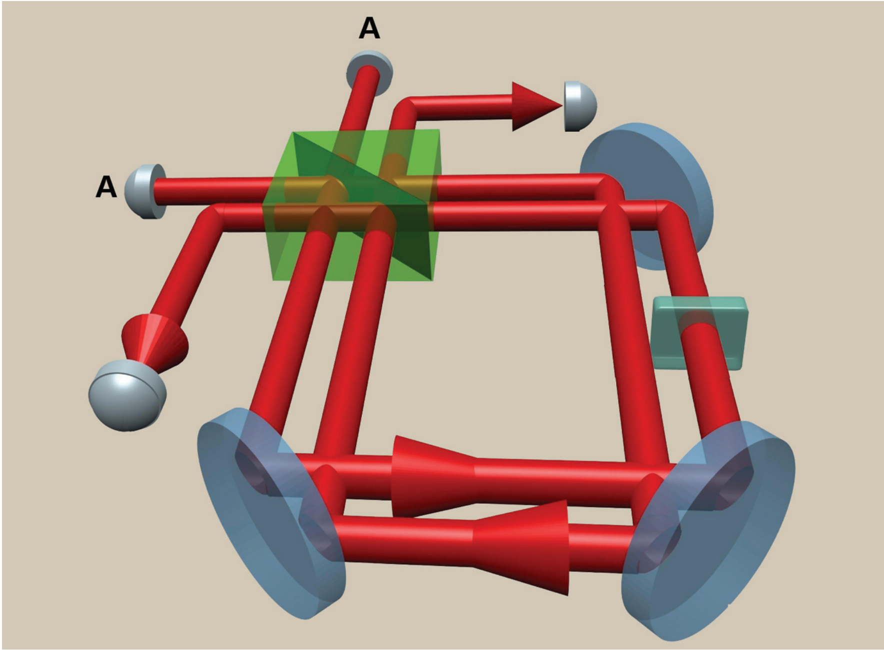
isn't such a strict connection between a gesture and an emotional context as there is with [an ape's] scream," Pollick says.

Bonobos and chimpanzees are the two closest evolutionary cousins to people. The human lineage diverged from the bonobo-chimpanzee lineage about 6 million years ago, and the last common ancestor of bonobos and chimps lived about 2.5 million years ago. Any similarities in how the two ape species use hand gestures were probably inherited from that common ancestor, giving scientists a window into the past.

"I think this is the best kind of evidence that you'll find" for how language evolved, comments Susan Goldin-Meadow, who studies human gesture and language at the University of Chicago. Fossils reveal almost nothing about how people's distant ancestors communicated, so scientists can infer the past only by looking at modern humans and other primates, she says.

For example, all apes use hand motions to communicate, but monkeys and other animals don't. And gestures are ubiquitous in human communication. "In every single culture, we gesture as we talk," Goldin-Meadow says.

Scientists don't agree on whether and how gestures influenced the evolution of language. For example, Goldin-Meadow suggests that hand motions could have developed in parallel with vocal sounds rather than coming first. —P. BARRY



ENHANCED VISION Four photons fed into an interferometer in pairs at the two entry points (A) split and form entangled quadruplets circulating in opposite directions, bouncing off mirrors (gray disks). The interference pattern that the photons produce (in the green box at left) precisely reveals the thickness of a glass plate (small square at right).

Quantum Loophole

Some quirks of physics can be good for science

Quantum theory notoriously sets limits on how precisely we can make measurements. But the quirks of the quantum realm can also be turned to advantage. Physicists have now demonstrated a way to almost double measurement precision when using photons to gauge distances.

Like markings on a ruler, the orderly waves of laser light can be used to measure lengths. In an interferometer, a laser beam is split into two beams that take two different paths. The beams bounce off mirrors and converge at the other end of the instrument, where their crests and troughs add together or cancel, depending on how these features line up. The resulting interference pattern reveals tiny differences in how far the two beams traveled. For example, a small displacement of one mirror will cause the interference pattern to shift.

The precision of such a measurement depends on the wavelength of the light used. In the 1990s, physicists proposed that they could improve the sensitivity of interferometers by employing sets of photons in the same quantum state, or entangled, as if they formed a molecule of light. When several photons are coaxed into such molecules, the scientists predicted, an interferometer would respond as if the combined photons had a wavelength smaller than that of the individual photons.

Physicists first demonstrated the effect with pairs of photons in 2002. That strategy could increase sensitivity by about 40 percent over the sensitivity of two nonentangled protons.

A Japanese-British team has now done even better using four photons at a time. In their setup, the physicists feed the two pairs into an interferometer. Each photon then splits, taking two paths simultaneously in what's called a quantum superposition of states. The result is one set of four photons forming an entangled state that circulates around the interferometer in one direction, accompanied by another entangled quadruplet circulating in the other direction.

Each four-photon set, acting as a single quantum persona, "behaves as if it had a shorter wavelength," says team member Jeremy O'Brien of the University of Bristol in England. This is potentially like using a ruler with spacing four times as fine, he explains. In the case of four nonentangled photons, the improvement over using a single photon is only twofold.

In their experiment, the researchers arranged for one of the paths to cross a glass plate, which has the same effect as altering the length of the path. Interference between the two entangled states measured that length difference with the expected increase in precision. The results appear in the May 4 *Science*.

Paul Kwiat of the University of Illinois at Urbana-Champaign says that this experiment is an interesting demonstration, but that to get dramatic improvements, physicists would need to get many more photons to cooperate. "We don't yet know how to make sources that have [a quadrillion] entangled photons," he says.

Jonathan Dowling of Louisiana State University in Baton Rouge says that the four-photon method could be useful in some applications, such as using laser light to etch circuits on computer chips to provide features smaller than those that can be achieved now. —D. CASTELVECCHI

Automatic Networking

Brain systems charge up in unconscious monkeys

Anesthetized monkeys may be dead to the world, but their brains remain surprisingly lively. Organized patterns of

N. TOMOHISA/SCIENCE