fessionals in the more abstract sciences should accept the fact that their fellow citizens haven't a clue what all those weird equations mean, will never use them, and basically couldn't care less.

Pity the poor abstract theologians, who have had the same problem for millennia. Religious leaders were a different breed. They never used abstractions; they just told real life stories (for example, Jesus' rabbinical parables on the good Samaritan or the prodigal son, or the battle stage in the Hindu epic *Mahabharata*).

If physicists want citizens to learn science, they should start with things the average citizen can observe repeatedly with as many senses as possible—especially touch.

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Riordan replies: The question of what is "real" has been debated—and will continue to be debated—by philosophers for centuries. If nothing is real except for observations, as Richard Henry states in his last sentence, then quantum mechanics itself must not be real or true. Therefore, his strict empiricist conclusion rests on very shaky ground.

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SQUIDs Remain Best Tools for Measuring Brain's Magnetic Field

The uninformed reader might be misled into believing that optical magnetometers (see PHYSICS TODAY, July 2003, page 21) will soon displace SQUIDs for biomagnetic measurements. I have spent 30 years using superconducting quantum interference device (SQUID) magnetometers and miniature induction-coil magnetometers to measure biomagnetic fields with ever-increasing spatial resolution. Several significant obstacles lie between optical magnetometers and high-resolution measurements of the brain's magnetic field.[1]

Several points are worthy of careful analysis. First, the typically reported sensitivity of SQUIDs, 1 fT/Hz$^{1/2}$, is not a fundamental limit set by the Josephson effect, but a practical one. One must consider thermal (Johnson and thermoelectric) noise within the Dewar flask and the object being studied; the object's intrinsic noise—for example, brain noise (thermal currents and background neural activity within the brain); fluctuations of magnetic shields; environmental magnetic noise; the desired spatial resolution; and the dynamic range of the electronics. SQUID sensitivities of nearly 10^{-17} T/Hz$^{1/2}$ have been reported.[2] With the exception of SQUID microscopy, more sensitive SQUIDs are not generally needed for biomagnetism, because the existing ones have reached the noise floor set by the Dewar, the object being studied, or the environment.

Because superconducting pickup coils can either trap or exclude magnetic flux, SQUIDs have the tremendous advantage of being able to measure femtotesla magnetic fields in the presence of tesla-strength steady fields and microtesla time-varying ones. A well-balanced SQUID gradiometer operating in the geomagnetic field can achieve a common mode rejection of up to 10^7. Electronic gradiometry allows high-quality SQUID recordings of the adult and fetal magnetoencephalogram (MEG) in unshielded laboratories.[3]