

From Skepticism to Belief, the Interface of Science and Society

I. Skepticism - evaluating belief systems

- All scientific claims should be subject to rigorous, unbiased examination
- Extraordinary claims require extraordinary proof

II. Science - characterized by the *Scientific Method*. Science is a communal process that does not work in a vacuum. No individual "owns" a scientific idea or theory,

The scientific method has evolved over time but has its European roots in the work of Galileo, Copernicus, Bacon and Newton. Other origins in Arab, Persian and Chinese cultures.

- The "practical" scientific method
 - Hypothesis
 - Funding (peer review part I. Not all funding sources are alike)
 - Experiment/Research
 - Data Evaluation
 - Peer Review Publication (peer review part II)
 - Peer Review Talks (peer review part III)
- Theories are the most highly evolved form of scientific thinking
- Ability to prove false is crucial
- Seeks answers beyond verification of pre-existing notions
- Dynamic and subject to paradigm shift
- Democratic, but not egalitarian
- 10,000:1 is *not* a scientific debate

Scientific debates: extinction of dinosaurs, gamma ray bursts, string theory.

Public policy "talking head" debates: anthropogenic global warming, manned space travel

III. Philosophy/Math

An attempt to find symbolic order in the universe. Logic based on rigorous proof. Math is an important tool in most science because it allows scientists to *interpolate* and *extrapolate* from existing data.

IV. Bad Science - Characterized by lack of adherence to the scientific method including lack of empirical data, lack of meaningful peer review. *Ad hominem* attacks against critics and skeptics common.

- cold fusion, isomer weapons, cryptozoology, conspiracy theories, weather wars, much forensic science, some medical science

V. Pseudoscience - Scientific sounding jargon but little else.

- chiropractic, intelligent design, perpetual motion, herbalism, homeopathy, therapeutic touch, fringe medicine

VI. Paranormal - explanations for the *seemingly* unexplained

- astrology, dowsing, remote sensing, telekinesis, psychic phenomena

VII. Politics/Religion

- Require faith and belief. High emphasis on personal values. Egalitarian but often not very democratic.