

SCIENCE EDUCATION AND MORAL EDUCATION

by *Holmes Rolston III*

Abstract. Both science and ethics are embedded in cultural traditions where truths are shared through education; both need competent critics educated within such traditions. Education in both ought to be directed although moral education demands levels of responsible agency that science education does not. Evolutionary science often carries an implicit or explicit understanding of who and what humans are, one which may not be coherent with the implicit or explicit human self-understanding in moral education. The latter in turn may not be coherent with classical human self-understandings. Moral education may enlighten and elevate the human nature that has evolved biologically.

Keywords: Darwinism; ethics; evolution; moral education; nature and culture; science education; values clarification.

Sometimes seemingly separate story lines collide and surprise us with a deeper logic. While events are taking place, in their novelty, they are over the heads of the actors; what is really going on only becomes clearer later, after a creative advance in understanding. Martin Eger's story of two controversies—in science education and moral education—is seminal for the issues his dual tale invites us to clarify. Here is education at its best; we are told a story about the education of high school youth. When we who hear it sort through its penetrating irony, we find ourselves better educated.

Nor is this drama over. We have only reached the point of seeing how the two stories in their clash and mutual transformation have now become one, whereupon we—as actors—must identify the leading questions we have to resolve.

SCIENCE AND ETHICS AS EMBEDDED IN CULTURAL TRADITIONS

In theory and in practice we now face troubling questions about the extent to which any convictions that persons hold are embedded in

Holmes Rolston III is professor of philosophy at Colorado State University, Fort Collins, Colorado 80523. He is the author of *Science and Religion: A Critical Survey* (Random House, 1987) and *Environmental Ethics* (Temple Univ. Press, 1988).

[*Zygon*, vol. 23, no. 3 (September 1988).]

© 1988 by the Joint Publication Board of *Zygon*. ISSN 0591-2385

their cultures. Both science and morals (as well as religion, politics, art, literature) are historical traditions, communal achievements, that shape their own criteria of rationality and intelligibility, their value judgments, their directions of development. Scientists quite as fully as moralists operate in mutually reinforcing networks of truths. Humans—whether modern, postmodern, liberal, conservative, or classical—live within more or less coherent, sometimes complementary and conflicting traditions. These are delivered to us in our schooling; they form us as they inform us.

No one person's education verifies directly more than a fraction of these commonly accepted truths: that the Earth is round, that moss sporophytes are diploid, that DNA exists, that Jesus died on the cross, that slavery and murder are wrong. We inherit these truths, spot-testing them in our own experience, plus thinking through their implications and some testing of the reliability of our sources. Except where we labor on the cutting edge of a discipline, decisions here are mostly about whom to trust. An education sometimes involves hands on experience; it is mostly handed on.

One should think for one's self. Indeed! Yet no one thinks by one's self, any more than one talks by one's self; one thinks in community with the resources of one's tradition. One may hear the beat of a different drummer, but one cannot evaluate that beat until one has also experienced the classical rhythms. Those who create a moral system from scratch, just as those who do science alone, are likely to remain primitive. One should think for one's self, standing on the shoulders of those who have thought before—skeptical of lonesome beliefs, shared by no one else, favoring beliefs arising in conversation with many others who think in mutual support. A thousand heads are better than one—unless the head is that of Socrates, Jesus, or Albert Einstein.

What Thomas Kuhn taught us a generation ago about science, Alasdair MacIntyre taught us a decade ago about ethics, and George Lindbeck has more recently taught us about theology. Each is embedded in a conceptual framework so comprehensive that it shapes its own criteria of adequacy. Pervasive and persuasive paradigms govern what communities of scientists look for and how they interpret what they find. The search for an autonomous, universal ethic, defended by a neutral rationality, has failed; ethics attaches to dynamic, historical world views. The primary goal of a humanist is typically to be self-actualizing; but Christians, Buddhists, Muslims will demur—or concur by reunderstanding what self-actualizing means. Some kinds of ethics do not have to be derived from theology, but other kinds must or may be—and are for many Americans—and such ethics may bear an uncertain relationship to an ethics grounded in Darwinism (as we see below). Science and ethics have universal intent but are also contextual.

EDUCATING COMPETENT CRITICS

In education a dynamic equilibrium is often established between respect for knowledge already (presumed to be) attained—the community tradition—and radical criticism of that tradition, as needed for advancing knowledge. The clash of these two stories in moral and science education disrupts this rather delicate balance.

Whoever seeks an education (the high school youth included) needs to assume by common sense that fathers and mothers have already learned something worth passing to sons and daughters. Science agrees: by natural selection, only traditions that work survive. That these systems are established, functional, tested, is presumptive evidence in their favor. Loren Graham, historian of science at MIT, writes: “Human beings are probably wiser than they know; *both* the genetic bases of their behavior *and* the cultural, ethical bases of their behavior have been selectively tested throughout the evolution of civilization” (Graham 1979, 39). If so, we can preferentially trust our innate capacities when these are educated by the classical ethical and religious systems.

No one thinks much who thinks alone; we think intersubjectively in dialogue with myriads of others. However, in science, ethics, or religion, when everyone thinks alike no one thinks very much. “Iron sharpens iron, and one man sharpens another” (Proverbs 27:17). Truth comes from the “collision of adverse opinions” (Mill [1859] 1961, 245; Eger 1988, 296), from “the enterprise of giving honest reasons and welcoming radical questions” (Scheffler 1965, 11; Eger 1988, 294). *Semper reformanda* was a Reformation watchword; the growth of science has deepened that conviction. Traditions must launch and guide but underdetermine an education, leaving enough openness for mutation and growth, trial and error exploration. This benefits both the individual and the tradition. If one actually has the truth, one need not fear that it will be damaged by criticism. If one thinks one has the truth (but might not) one should welcome criticism; only thereby is error detected. Hence the cognitive benefits of pluralism.

The paradox of a paradigm, whether in science, ethics, or religion, is that the longer it survives, the better its interpretive and functional power, the closer we probably are to the truth, and the more we ought to hang on to it because it is to be expected that the nearer we are to the truth, the harder a theory will be to overthrow. The ultimate theory, if ever one is found, will be unfalsifiable anywhere in practice. It will be logically flawless because it is entirely true. Just this element of trust that is well justified makes it harder to get a wedge of doubt in, to seek truth in unlikely directions, to challenge the prevailing authorities. One needs both to seek disconfirmations and to distrust them.

All this demands an already competent critic, but how do we educate critics? Is this best accomplished by presenting eighth graders with a smorgasbord of conflicting views and leaving them to make up their own minds? Critical insight comes with serious participation in a form of life as surely as with naive detachment. Perhaps coming under the sway (the test) of a "controlled presentation"—whether of a scientific or a moral system—sharpens powers of perception and judgment. Whether relativity theory or monotheistic ethics, one has to learn a tradition sympathetically, empathetically, before one has the power to criticize it—especially if the criteria are intrasystemic. A premature invitation to skepticism is an invitation to misunderstanding. If there are truths that come only with conditioned disclosure, a novice is in no position to judge.

Teachers should not present students with diverse alternatives, good and bad, and then "sit idly by while students 'decide' an issue that they are in no position to resolve rationally. . . . Teachers have the right, as well as the responsibility, to give their students as clear a picture of the way the world works as we now possess" (Kitcher 1982, 176). However, is that the case in science education, and something else in moral education?

DIRECTED EDUCATION?

The clash of the two stories forces us to ask how far science education and moral education are analogous in this balance between respect for and criticism of tradition. This question has to be asked first in terms of what fosters progress, historically, on the frontiers of the respective disciplines. Facts and causes are the domain of science, values and duties the domain of ethics; but criticism is equally requisite in both domains. Those who are familiar with philosophical education know that critical dissent is cultivated. A theological seminary can and ought to be as critical an environment as a graduate school in physics. The rabbis put it aphoristically: "Where there are two Jews, there are three opinions!"

The question has to be asked, secondly, at the level of biography as persons enter a discipline. Lawrence Kohlberg claims that there are six (or seven) stages in the moral life; no analogous claims have been made for scientific life. He further claims that conflict-induced reorientation is needed to advance to each higher moral stage. If true in the logic and psychology of morals, this might not be true in science. Perhaps we gain moral convictions differently from the way we gain scientific convictions.

How much should be prechosen? More in science than morals? Or vice versa? There does seem a relevant difference. The student is not free to

choose in logic, algebra, physics, biology. To ignore what others have learned is to choose ignorance over education. Students have to be "trained," to follow in the tracks of what ancestors have discovered, before they can make any further discoveries of their own. An eighth grader (or adult) is no more free to choose natural history than to choose the nutritional value of potatoes.

A moral value held by the pressure of consensus, not yet chosen, is juvenile, not adult. On that point values clarification insists, against the behaviorism otherwise often rampant in public schools. Whatever is recommended by the mentors ("Thou shalt not steal, murder, commit adultery, bear false witness") remains external until internalized by the oncoming generation. Moral responsibility demands a level of agency that science education does not. People are responsible for their values as they are not for their science. Content in relation to process differs; directed science education is desirable; directed moral education is not. There must be more context of choice. That is half the truth. Is it the whole truth?

Is there no moral tradition to which the young student should be directed? There is no agreement on the frontiers in morals (abortion, homosexuality) or science (whether selection operates primarily at the level of genes, organisms, species; whether we can naturalize epistemology). Yet there is widespread agreement in morals as there is in science. Over the centuries, based on long experience, moral conclusions are really more stable than scientific conclusions. Honor parents; do not steal, murder, commit adultery, lie—the second table of the Ten Commandments, to which all Christians and Jews attach the first table. The Golden Rule is endorsed around the world. The United States by legislation prohibits slavery, racial discrimination, polygamy. Few persons will quarrel with many of the twelve points in the Scout law. Out of the past, George Washington, Abraham Lincoln, Martin Luther King, Jr., will do as exemplars who respected the tradition and splendidly criticized it.

EVALUATING NATURE AND HUMAN NATURE

When the two tales clash, there arise questions of implicit understandings of human nature. Both science and moral education orient the student in the world in ways too subtle and profound for the eighth grader or even the teacher to detect. Even the "experts" in evolutionary theory, ethics, and psychology have the biological bases of human behavior under intense debate. Despite claims of neutrality, the values clarification program does make certain assumptions about human nature—that humans are and ought to be self-actualizing, free, and able to make their own rational decisions from early youth onward.

Notwithstanding claims to be scientific and value-free, evolutionary teaching does carry overtones for human self-estimates—that humans have evolved under the forces of natural selection, with mind, behavior, and drives shaped accordingly. To make matters worse, these implicit anthropologies may be incoherent.

The theory of evolution is about the remote origins of Earth's living forms, but it has complex implications for present human self-understanding. Are humans specially created in the image of God or descended randomly from the apes? The popular version exaggerates the dichotomy, but it cannot be denied that evolutionary science radically affects human self-estimates. The evolutionary scientists themselves have been the first to draw those conclusions.

Gavin de Beer, in the learned and authoritative *Encyclopedia Britannica*, after telling us that "evolution is accepted by all biologists," concludes, "Darwin did two things: he showed that evolution was a fact contradicting scriptural legends of creation and that its cause, natural selection, was automatic with no room for divine guidance or design. Furthermore, if there had been design it must have been very maleficent to cause all the suffering and pain that befell animals and men" (de Beer 1973, 23). This encyclopedia is in almost every high school library in the nation, routinely extolled as a paradigm authority.

G. G. Simpson, a justly admired Yale paleontologist, concludes a popular evolutionary survey, in print in three editions over a generation, and likewise found in high school libraries nationwide: "Man was certainly not the goal of evolution, which evidently had no goal. He was not planned, in an operation wholly planless. He is not the ultimate in a single constant trend toward higher things" (Simpson 1949, 292). Such scientists ought, of course, to express their convictions; other scientists conclude differently. Meanwhile let no one say that evolutionary theory is value-free, in principle or in practice.

If this is a sample of the result when we "offer children the best-sifted and most firmly grounded ideas that we have" (Ruse 1982, 328), then one may want to offer eighth graders a little assistance in how to question authority. "What Creationists really propose," laments Philip Kitcher, "is a situation in which people without scientific training—fourteen-year-old students, for example—are asked to decide a complex issue on partial evidence" (Kitcher 1982, 176; Eger 1988, 298). The bright young readers of *Encyclopedia Britannica* or of Simpson's *The Meaning of Evolution* in the high school library are hardly asked by these authoritative scientists to do anything less, unless it is merely to accept these experts' authoritative conclusions about human origins and nature.

After the bell rings, moving out of biology class into social studies, or health, or wherever values clarification is taught, little may be said

about origins, but as much and more will be implicit or explicit about human nature. Eighth graders will be taught, enthusiastically, that they can and ought to face decisions about right and wrong with a radically open mind—trusting their own “free rational judgment” (Scheffler 1965, 11; Eger 1988, 294) to decide what is best for themselves. High schoolers will, on average, do the right thing if given clarified options; and even for those who do the bad thing, freedom to choose the bad is better than moral pressure that biases to the right.

That eighth graders, coached by a little nondirective values clarification, can make good decisions with radically open minds, in full control of biasing desires, free from peer pressures, advertising influences, unconscious drives, useful and independent critics of their tradition—that may be the arrogance of humanism as much as the truth. Will the student be advised that Jesus, Buddha, Aristotle, Augustine, Thomas Aquinas, Martin Luther, John Calvin, Blaise Pascal, Fyodor Dostoevsky, Sigmund Freud, and B. F. Skinner believed otherwise—that (as we next see) the contemporary Darwinians believe something quite different?

BIOLOGICAL NATURE AND ETHICAL EDUCATION

Just what is the connection of human rationality with moral decisions? How far are humans biased by self-interest or genetic forces? Or sin? Are the convictions we can hold embedded in nature, as well as culture? While the biology classes and values clarification programs are underway in the high schools, some experts “upstairs” in discussions at the university claim that altruism is and must be—so far as we have evolved by natural selection—disguised self-interest. Michael Ghiselin, an evolutionary theorist, insists of each person that, “Given a full chance to act in his own interest, nothing but expediency will restrain him from brutalizing, from maiming, from murdering—his brother, his mate, his parent, or his child. Scratch an ‘altruist,’ and watch a ‘hypocrite’ bleed” (Ghiselin 1974, 247).

Richard Dawkins concludes, “We are survival machines—robot vehicles blindly programmed to preserve the selfish molecules known as genes.” “Let us try to *teach* generosity and altruism, because we are born selfish” (Dawkins 1976, ix, 3). If so, perhaps eighth graders (and adults) need more than an invitation to make their own free, rational decisions with a radically open mind.

Philosophers and biologists once were inclined to say that ethics was independent of biology. Some say that still. Richard D. Alexander, another evolutionary theorist, exclaims, “What does evolution have to say about normative ethics, or defining what people *ought* to be doing?” “Nothing whatsoever” (Alexander 1979, 276). However, E. O. Wilson,

Pulitzer prize-winning Harvard theorist, demurs. "What . . . made the hypothalamus and limbic system? They evolved by natural selection. That simple biological statement must be pursued to explain ethics and ethical philosophers, if not epistemology and epistemologists, at all depths." "Scientists and humanists should consider together the possibility that the time has come for ethics to be removed temporarily from the hands of philosophers and biologized" (Wilson 1975, 3, 562).

Michael Ruse, an expert witness in the Arkansas trial, concludes that "the good is simply that which evolution through selection has led us to regard as good" (Ruse 1984, 93). That truth, if it is a truth, will certainly be relevant in the values clarification class. Unlike Dawkins and Ghiselin, Ruse thinks that genuine altruism evolves consistently with natural selection. Meanwhile, we do want to know what power and options eighth graders (or adults) have in deciding good and evil, in clarifying their own values, or at least we might be cautioned about what we do not yet know.

Ruse, Dawkins, Ghiselin, Wilson and the others would no doubt consider all this too unsifted as yet to teach dogmatically in the eighth grade. Even if these debates do not trickle down into high school classrooms, they reveal profound issues hovering in the background of science education and moral education. Far from assuming that, left to their own free choices, students will on average choose what is best, a real possibility is that biologists and theologians (joined by Freudian psychologists) have more in common against liberal humanists than first appears. Paul, in his New Testament letters, found a perennial brokenness in human life that must be redeemed before humans are capable of doing the good.

Donald T. Campbell, who considers himself a hard-nosed Darwinian, holds that, left to their biological nature and enlightened self-interest, humans would not move beyond a thirty percent mutually beneficial cooperation. Cultures in the form that we know them would be impossible. The ethical preachings of the classical cultures move this thirty percent cooperation over to a biosocial optimum at sixty percent cooperation, curbing our biological drives enough to make civilization possible. Traditional religious moralizing inhibits innate selfishness; it lifts us from nature and sustains culture. Indoctrination by the tradition makes us nobler humans (Campbell 1976, 193).

An invitation for eighth graders to question parental authority with a radically open mind, to choose what they think best for themselves, might bring social reform and a better society. However, if culture has evolved over millennia to constrain and enlighten nature, this might be an invitation to become less human and act like beasts.

REFERENCES

- Alexander, Richard D. 1979. *Darwinism and Human Affairs*. Seattle: Univ. of Washington Press.
- Campbell, Donald T. 1976. "On the Conflicts between Biological and Social Evolution and between Psychology and Moral Tradition." *Zygon: Journal of Religion and Science* 11:167-208.
- Dawkins, Richard. 1976. *The Selfish Gene*. New York: Oxford Univ. Press.
- de Beer, Gavin. 1973. "Evolution." In *The New Encyclopedia Britannica* 15th ed., *Macropedia* 7:7-23. London: Encyclopedia Britannica.
- Eger, Martin. 1988. "A Tale of Two Controversies: Dissonance in the Theory and Practice of Rationality." *Zygon: Journal of Religion and Science* 23:291-325.
- Ghiselin, Michael. 1974. *The Economy of Nature and the Evolution of Sex*. Berkeley: Univ. of California Press.
- Graham, Loren R. 1979. "The Multiple Connections between Science and Ethics." *Hastings Center Report* 9, no. 3 (June): 35-40.
- Kitcher, Philip. 1982. *Abusing Science: The Case against Creationism*. Cambridge, Mass.: MIT Press.
- Mill, John Stuart. [1859] 1961. "On Liberty." In *The Philosophy of John Stuart Mill*, ed. Marshall Cohen. New York: Random House.
- Ruse, Michael. 1982. *Darwinism Defended*. Reading, Mass.: Addison-Wesley.
- . 1984. "Review of Peter Singer, *The Expanding Circle*." *Environmental Ethics* 6:91-94.
- Scheffler, Israel. 1965. *Conditions of Knowledge*. Chicago: Scott, Foresman.
- Simpson, George G. 1949. *The Meaning of Evolution*. New Haven: Yale Univ. Press.
- Wilson, Edward O. 1975. *Sociobiology: The New Synthesis*. Cambridge, Mass.: Harvard Univ. Press.