Chapter (V)

VALUES AND VALUING: (Adapted from Carl Mitcham, ed., Encyclopedia of Science, Technology, and Ethics (New York: Macmillan Reference, 2005).

The concept of value is more complex than it might initially appear. By extension, values range from personal preferences as indicated by pleasures، desires, wants, and needs to more objective goods such as health, efficiency، progress, truth, beauty, and more. Values can be negative as well as positive, in which case they are commonly termed "disvalues," with examples being pain or illness. Values in all these senses both influence and are influenced by science and technology.

The intension of the term, however, is more difficult to indicate. The concept of value, its manifestation in values, and the process of valuing (and evaluation) have been subject to diverse economic, social scientific, and philosophical analyses, each of which introduces numerous distinctions of relevance to any description and assessment of values in and resulting from science, engineering, and technology. Because of such difficulties, the present review will attempt no more than a general introduction to three types of discussions and a briefly annotated bibliography to mostly philosophical texts.

Economic Perspectives:

The term "value" is derived from the Latin valere, to be worthy or strong، the root as well of "valiant," "valor," and "valid." It can be used as a noun (" Science is one of the primary values in

modern culture") or verb ("We value modern technology"), or turned into a modifier ("Engineering is a valuable activity"). The term first emerged during the rise of the modern period to refer to the monetary worth of some commodity. Eighteenth century economists conceptualized value as dependent on humans, and as such value was subtly opposed to premodern notions of goodness as a transcendental manifestation (along with truth and beauty) of being as such.

In the labor theory of value, commonly referenced to John Locke (1632-1704), value is created by humans when they technologically appropriate nature .

In classical economics the market price of a commodity was thought to reflect the objective value contributed to it by human labor. But criticism of this view argued in favor of price reflecting almost wholly the value that consumers attribute to a product in the competitive marketplace. Exchange value replaced use value as the primary form of value. In economic science the basic concern has thus become to analyze interactions between human values and market behavior.

Social Scientific Perspectives:

A different theory of values developed in the social sciences, where the concerned was more with how values are rooted in or related to the self and how values constitute society or influence political behavior. One mid-twentieth century effort to promote the scientific study of social values was advanced by the pragmatist philosopher Charles Morris (1901-1979).

Extending earlier work، Morris (1956) distinguished between operative, conceived, and object values; did an empirical, cross-cultural analysis of value preferences among college students in Canada, China, India, Japan, Norway, and the United States who completed a "ways to live" inventory; and then speculated about the social, psychological, and biological determinants of values. The results of this psychometric research, which revealed both stability in structures among thirteen different ways of life and differences between national samples, were not especially profound. They nevertheless promoted the idea that values are amenable to empirical investigation.

This was in opposition to the prevailing assumption that the fact/value distinction would exclude values from scientific examination.

On a more personal level, one of the most widely referenced psychological analyses of value is that of Abraham Maslow (1908-1970). According to Maslow (1971) human beings try to satisfy needs or pursue values in the following priority: physiological needs (air, water, food), safety (security, stability), needs of belonging and love, esteem needs, and self-actualization. The need for self-actualization was further associated by Maslow with the pursuit of what he called B(eing)-values such as truth, goodness, beauty, and more.

An observation by Langdon Winner bears on the implications for science and technology of many psychological (and even some economic) approaches to values. Once values are

subjectivized, "[r]aising the question of value is no longer so much an occasion to think about the qualities of things or conditions outside us [as it is] an opportunity to look within, to perform an inventory of emotions" (Winner, 1986, p. 158). Persons no longer purchase objects as much because the objects themselves have value as they are likely to purchase objects to realize their own values.

In sociology and anthropology values are described not so much in individual or personal terms as dimensions of culture. Shared values create collective identity and solidarity in culture and society. Socialization is a process of inculcating values from one generation or group to another. Sociologists of science analyze what particular values are shared within communities of technical professionals and how the inculcation and reinforcement of such values takes place. Values are both expressive and functional more than cognitive.

It should also be noted that within modern societies as a whole, one of the features that defines them as modern is the shared value placed on science and technology. Some critics of technological society in turn argue that this shared commitment to and/or acceptance of science and technology may undermine other socializing values such as religion. Questions thus arise about the absolute value of scientific knowledge — and about the possibility of technologies configured by alternative values.

Philosophical Perspectives:

In philosophy the examination of values is closely linked to ethics. The philosophical examination of values and valuing as distinct from ethics came of age in the mid-twentieth century in different ways in the pragmatic, analytic, and the phenomenological traditions.

Pragmatic Tradition; In the pragmatic tradition work by John Dewey (1856-1952), Ralph Barton Perry (1876-1956), Stephen C. Pepper (1981-1972), and C. I Lewis (1883-1964) has been central. For Perry (1926), value is defined as "any object of any interest" (1926, p.?), so that to say that X is valuable means that Y takes an interest in X. Pepper sees Perry's definition as too narrow and argues more generally that values are constituted by "all selections by a selective system that are relevant to human decisions" (Pepper, 1958, pp. 690-691). Dewey and Lewis continued the pragmatic empiricism of Perry and Pepper by arguing the foundational character of the human creative act of valuing. For Dewey, values are ends-in-view, that is, always provisional and able to become means to another end-in-view. Going beyond sheer animal impulses or appetites that produce effects, human interest, desire, "having ends-in-view, and hence involving valuations, is the characteristic that marks off human from nonhuman behavior." Moreover, when science is put to "distinctively human use" its knowledge about the nonhuman world is utilized to assess such ends-in-view in terms both of whether they are likely to be achievable by the proposed means or capable of becoming means themselves for further provisional ends. "In this

integration not only is science itself a value (since it is the expression and the fulfilment of a special human desire and interest) but it is the supreme means of the valid determination of all valuations in all aspect of human and social life" (1939، p. 66).

Like Dewey, Lewis sees evaluations as forms of empirical knowledge related to courses of human action. Values have empirical content, although this content bears solely on personal preferences and courses of action, which makes values subject to democratic choice and scientific assessment. The general study of values, which can involve more than ethical values, is for pragmatists more properly termed theory of value or axiology than ethics.

Analytic Tradition; In the analytic tradition, the early leaders were Charles L. Stevenson (1908-1979), A. J. Ayer (1910-1989), and R.M. Hare (1919-2002).

According to Ayer, the philosophical analysis of values was better described as meta-ethics than as ethics, since its goal was more the clarification of the meaning of terms than normative argumentation. Adopting a positivist interpretation of science as the paradigm of knowledge, Ayer and Stevenson then argued that ethical and value statements were simply noncognitive expressions of likes and dislikes.

Hare subsequently merged meta-ethical analysis with ordinary language philosophy to undertake a critical examination of the "language of morals." Linguistically، value statements were

argued to entail a universalization of likes and dislikes. This is a view that has been argued by Donald Davidson to imply the objectivity (as intersubjectivity) of values.

Another even more abstract meta-ethical approach to values can be found in the work of G.H. von Wright (1916-2003), a student of Ludwig Wittgenstein. Von Wright (1963) subjects a particular value, goodness, to extended conceptual analysis. For von Wright it is not so much the value of goodness that is a creative projection of human action as a human commitment to a specific value that establishes that value as a norm. Von Wright and others such as Sven Ove Hansson (2001) have further sought to develop a formalized logic of values and norms reasoning.

Phenomenological Tradition; In the phenomenological tradition the defining work was done by Max Scheler (1874-1928). Whereas pragmatism focused on the process of valuing and analytic philosophy on the meaning or logic of value propositions, Scheler sought a conceptual elucidation and critical assessment of the substantive value feelings people experience. Scheler in particular undertook his phenomenological descriptions of experienced values in opposition to Kantian formalism and universalism — a formalism echoed in meta-ethical formalism. For Scheler it is pre-rational or intuitive preferences that are at the basis of substantive ethics. These feelings can be grouped into five basic types: sensible values، pragmatic values, life values, intellectual values, and spiritual values. For Scheler (and most subsequent

phenomenologists) technology is constituted by pragmatic values and science by intellectual ones.

Implications:

The philosophical study of values yields a number of distinctions used in reflecting on relations between science, technology, and values. Such distinctions include those between instrumental and final values (means and ends), between extrinsic and intrinsic values, and subjective and objective values. Although related, these distinctions differ. For instance, instrumental or use values may be extrinsic or designed into technological artifacts so as to become intrinsic values that have subjective and objective dimensions.

In relation more specifically to science and technology, there are three interrelated issues with regard to values: What sort of property is involved with having a value or being valuable? (That is, are values primarily aspects of things or of knowers and users?) Is this property subjective or objective? (That is, to what extent is value subject to scientific study?) How might this property be designed into products, processes, or systems? (That is, can values be part of engineering design and technological invention?)

By and large values are taken in economics and in philosophy to be second-order properties that arise in interactions among human beings (markets) or depend on human beings (their interests). Values are thus not determined by science though they are certainly manifested in science, and science can study

values in at least three ways: inventorying what values people express, analyzing structural relations among values, and criticizing specific values as likely or not to be able to be realized given the way the world is. The engineering design of products‹ processes, or systems is always undertaken with some values in view both with regard to process and project termination. That is, questions are increasingly asked about whether certain values such as user-friendliness, gender equity, or democratic participation can be designed into technologies. But the degree to which such a question can be answered in any systematized manner remains problematic.

The problematic character of the values-science relation is another continuing issue. One of the most persistently defended distinctions in science and technology is that between facts and values. Although widely criticized — since it is not clear whether the distinction is itself a fact or a value or both — one continuing difficulty is to figure out how best to relate the two once they are distinguished. Even those who want to defend the difference also want to argue that values should have some bearing on what kind of science gets done, how it is done, and which kind of technology gets created, and how it should be used.

One general effort to address such questions is Loren R. Graham's Between Science and Values (1981), who distinguishes between restrictionist and expansionist relationships. In the restrictionist view, science and values are strongly separated, and science is argued to be autonomous with no univocal influence on values. According to Graham, this

is a view that is more defensible in physics than in biology, especially once biology begins to do research on human beings. In the expansionist view, science is argued to be have either direct or indirect implications for values and vice versa. This is the view that Graham thinks most reasonable, but also one he admits is both difficult to determine the boundaries for and dangerous. Indeed, as his historical case studies in physics and biology across the twentieth century reveal, almost any effort to deal with the science-values relation has weaknesses as well as strengths. Values and valuing are as much a challenge to science as science is to values.

In conclusion, it is worth observing that discussions of science, technology، and values have become in the 2000s less central than in the 1950s or 1960s. Were Jacob Bronowski's widely read Science and Human Values (1959) to have been published in the 1990s it would more likely have been titled something like "Science and Ethics".

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