

Objective Probability

tribution to a vital sphere of activity. Dantzig ushered in a new era in decision-making and brought forth the term *objective function* as a numerical mathematical expression for the *objective* that was to be achieved by the program.

Thus, an objective function measures the “goodness” of a feasible vector, that is, a vector whose coordinates satisfy all the imposed side conditions, if any. To illustrate, in a linear programming problem,

$$\begin{array}{ll} \text{maximize} & p_1x_1 + p_2x_2 + \cdots + p_nx_n \\ \text{subject to} & a_{11}x_1 + a_{12}x_2 + \cdots + a_{1n}x_n \leq b_1 \\ & a_{21}x_1 + a_{22}x_2 + \cdots + a_{2n}x_n \leq b_2 \\ & \vdots \\ & a_{m1}x_1 + a_{m2}x_2 + \cdots + a_{mn}x_n \leq b_m \\ & x_j \geq 0, \quad j = 1, 2, \dots, n \end{array}$$

the objective function is the linear form $p_1x_1 + p_2x_2 + \dots + p_nx_n$, which might, for instance, measure the total revenue resulting from sales in the amounts x_1, x_2, \dots, x_n at unit prices p_1, p_2, \dots, p_n . The inequalities in this illustration represent side conditions (or constraints) on the variables x_1, x_2, \dots, x_n .

This is not to say that all objective functions (or all constraints) are of this type. They may be linear or nonlinear, depending on how goodness is defined in the applied context. The function being minimized in a parameter estimation by the “least-squares” criterion is an example of a nonlinear (actually quadratic) objective function. In problems of this sort, the “variables” in question may be “free” (unconstrained) or constrained. In the nonlinear case, convexity (or lack of it) becomes an important issue from the optimization-theoretic standpoint.

The underlying concept of an objective function—under a different name or no name at all—had existed for centuries before Dantzig introduced this particular terminology. One has only to recall the method of multipliers devised by Joseph-Louis Lagrange (1736–1813) for equality-constrained optimization problems. Many synonymous terms are in use. Among the more abstract ones are *maximand* for maximization problems and *minimand* for minimization problems. These terms can be used in the respective optimization problems no matter what the application may be. In applied areas such as econometrics, one finds the term *criterion function*. Still others with an obvious connection to economics are *social welfare function*, *economic welfare function*, *loss function*, and *profit function*. Further examples coming from other fields are *distance function* and *flow value*; the point being that the term used in place of *objective function* might refer to what it is measuring.

SEE ALSO *Koopmans, Tjallinging; Maximization; Preferences; Preferences, Interdependent; Principal-*

Agent Models; Programming, Linear and Nonlinear; Rationality; Representative Agent; Social Welfare Functions; Utility Function

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Richard W. Cottle

OBJECTIVE PROBABILITY

SEE *Probability*.

OBJECTIVE VALUE

SEE *Value, Objective*.

OBJECTIVISM

Objectivism is the philosophy enunciated by the Russian-born American novelist and philosopher, Ayn Rand (1905–1982).

Rand’s philosophical system begins with a realist premise: Reality is what it is, independent of what people think or feel. The concept of “objectivity” is central to Rand’s theory of knowledge. A knowing subject can acquire objective knowledge of reality only through reason, a distinctively human faculty, which integrates the inductive evidence of the senses, in accordance with logical principles.

Because reason is a basic means of acquiring human knowledge and, hence, a basic tool of human survival, Rand places it at the center of her conception of ethics. In Rand's view, reason enables human beings to discover those principles and practices necessary to their sustenance as rational animals. Rand's ethical egoism proclaims the "virtue of selfishness," that it is morally right for individuals to pursue their own rational self-interests, voluntarily exchanging spiritual and material values.

Rand argues that the only social system consonant with this "trader principle" is laissez-faire capitalism, wherein individuals constitute free-market relationships. These relationships depend upon a structure of individual rights to life, liberty, property, and the pursuit of happiness. Rights can only be violated, Rand maintains, if an individual or group of individuals initiates force against others.

Rand supports a libertarian nonaggression principle that allows for the retaliatory use of force against those who initiate it. This principle informs Rand's defense of government as an institution with a monopoly on such retaliatory uses. In keeping with a classical liberal or libertarian conception of politics, Rand restricts government institutions to the role of defending individual rights, through the police, the armed forces, and the judiciary.

RAND'S LIFE AND WORK

That such a defender of capitalism and limited government was born and raised in Russia during the period in which the Bolsheviks came to power is ironic. Rand would publicly reject what she saw as the mysticism of Russia's religious culture and the collectivism and statism of its politics. But some scholars have argued that aspects of her approach to philosophical and social problems echo some of her early Russian influences. Born Alissa Zinovievna Rosenbaum in Saint Petersburg to a middle-class family, Rand witnessed a reign of Communist terror that led her to a virulent rejection of totalitarianism in all its forms. She was educated, however, during a cultural period known as the Russian Silver Age. Central to Silver Age thought, and to Rand's thought as well, is a rejection of conventional dichotomies: mind versus body, fact versus value, theory versus practice, and so forth. During this period, the influence of Friedrich Nietzsche (1844–1900) was also substantial; Nietzsche's writings had a significant effect on the young Rand's early thinking. Having graduated from the University of Leningrad in 1924, Rand had been exposed additionally to the teachings of prominent professors in both the dialectical idealist and Marxist traditions—those who emphasized, like Rand, the importance of grasping the full context of any problem as a prerequisite to its resolution.

In 1926 Rand immigrated to the United States, fully committed to pursuing a career as a writer. Her first novel, *We the Living* (1936), details communism's violent subjugation of social life. Rand said that this novel was as close to an autobiography as she would ever write. Its focus is on the individual versus the state, that is, how an oppressive state ultimately creates an "airtight" environment that must destroy individual human lives. The novel was later adapted by Italian filmmakers, who produced an unauthorized, though largely faithful, film version during World War II (1939–1945).

Rand also wrote a novella called *Anthem* (1938) that projects a primitive collectivist society of the future in which personal pronouns—and independent thinking—are prohibited. Despite that society's best efforts to stamp out individual identity, the protagonist (known as Equality 7-2521) rediscovers the "I" and, in so doing, heralds the rebirth of individualism.

In *The Fountainhead* (1943), Rand tells the story of architect Howard Roark, a trader, entrepreneur, and creator, who is a man of integrity struggling mightily against the collectivist culture and statist politics of the age. The novel enabled Rand to explore the soul of the individualist, those qualities of rationality, productiveness, independence, and authenticity that are essential to people's survival and flourishing. Adapted for the screen in 1949, directed by King Vidor (1894–1982), and starring Gary Cooper (1901–1961) as Roark, the novel was Rand's first major commercial success.

But it was in *Atlas Shrugged* (1957) that Rand first presented the philosophy of objectivism. With three parts named after the Aristotelian laws of logic—it was Aristotle (384–322 BCE) whom Rand credited as having had the greatest impact on her thought—the novel is an epic mystery, part science fiction, part fantasy. With the world on the verge of collapse, strangled by political interference with economic and social life, the productive "men of the mind" go on strike. By refusing to sanction their own victimization, and by withdrawing from the world, the strikers bring down the system of exploitation. It is only with their return to the world that a free society becomes possible.

In this novel, Rand presents her image of ideal men and women, people who are "new intellectuals," men and women of thought, who are also men and women of action. Such individuals reject the mind-body dichotomy and all of its insidious consequences—reason versus emotion, thought versus action, morality versus prudence—which fragment human existence.

This stand on the integrated individual also underlies much of the work that Rand wrote during her years as a public philosopher. Her nonfiction works, such as *The Virtue of Selfishness* (1964) and *Capitalism: The Unknown*

Ideal (1966), repudiate all modernist “false alternatives,” including idealism versus materialism, rationalism versus empiricism, religious conservatism versus welfare liberalism, fascism versus communism, anarchism versus statism, and so forth. Though her political stance is libertarian, insofar as it rejects any government intervention in the economy or in people’s personal lives, Rand was profoundly critical of contemporary libertarianism because many of its adherents focused on economics without regard for the larger philosophic and cultural context that would nourish the triumph of human freedom. In Rand’s view, though human freedom entails free trade, it can only be fully achieved when people are free to think and to act on the basis of their own rational, independent judgment. This requires their psychological and moral liberation from exploitative ideologies that demand human sacrifice. As Rand argues in *For the New Intellectual* (1961), “*intellectual* freedom cannot exist without *political* freedom; political freedom cannot exist without *economic* freedom; *a free mind and a free market are corollaries*” (p. 25).

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Chris Matthew Sciabarra

OBJECTIVITY

Objectivity in the sciences, especially the social sciences, is paired implicitly or explicitly with its opposite, subjectivity. Less obvious yet commonplace pairings with the term *objectivity* are *partiality*, *relativity*, and *the arbitrary*. This entry deals primarily with objectivity in opposition to subjectivity. Subjectivity is associated with the modern concept of the self. The shift to the notion of the modern self occurred concurrently with the scientific revolution of the seventeenth century.

DESCARTES AND HIS CRITICS

René Descartes (1596–1650), who is considered the father of modern philosophy, claimed to be able to doubt systematically the existence of anything except the fact that he was doubting. Because doubt is a species of thought, he asserted, “*cogito ergo sum*,” which usually is translated as “I think therefore I am” or “I think therefore I exist.” Even Descartes’s body did not survive his systematic doubt; only his mind—“a thinking substance”—did. He argued that upon this rationally defended certainty rested all other claims regarding the existence of objects outside the mind. In that absolute divide the mindful inside became the subjective state and anything on which the mind exercised its cognitive power was an object. Thus, objectivity came to refer on the one hand to the subject’s ability to consider or represent external objects without being influenced by subjective feelings, opinions, or prejudices and on the other hand to the description of those mind-independent objects. Despite Descartes’s many detractors, modern philosophy made bringing subjective thought into concordance with objects of external reality its signal challenge.

Descartes’s critics in his day and soon afterward could be divided into two camps: the idealists and the empiricists. Despite their differences, they held in common with Descartes the idea that the senses play a part in objectivity. The idealists described sensation variously as a species of thought but one that is unclear and indistinct, inferior, and unreliable or merely as confused thinking. Among those critics were Benedict Spinoza (1632–1677) and Gottfried Wilhelm Leibniz (1646–1716).

Conversely, British empiricists reinstated the sensory perception of objects in experience as the source of all reliable knowledge and the basis of objectivity. Thomas Hobbes (1588–1679) described thought as merely the faint remains left behind by sense impressions, and John Locke (1632–1704) argued that all ideas about the external world arise from sensation and reflection; if not for the sensory input made available by the senses in experience, the mind would be a blank tablet. For David Hume (1711–1776) thought was nothing but the faint copies of “impressions” left behind by the senses. In Hume’s under-