There is really only one type of graphical display for bivariate data: the scatterplot. But careful attention to the details is critical for optimizing the information conveyed by this type of display. For example, the plotting symbol used to represent individual observations must be visually prominent and resistant to overplotting effects. And the plotting region should be fully enclosed by the scale rectangle, with none of the data points colliding with any of the axes. Grid lines should not be included within the plotting region. And if the objective of the graphical display is to assess the relationship between two variables, then there is usually no need to include point labels. Finally, a scatterplot smoother (i.e., a curve that traces out the conditional mean of the variable plotted on the vertical axis across the range of data values on the horizontal axis) can be used to summarize the relationship between the variables plotted in the display.

Multivariate data pose particular challenges for statistical graphics. While it is possible to draw a three-dimensional scatterplot, using an oblique orientation on the data space to simulate a perspective view, such displays are generally not very effective. Instead, other devices have been employed to represent multiple dimensions of variability in a two-dimensional display medium. For example, a scatterplot matrix is the graphical analog of a correlation matrix, showing scatterplots between all possible pairs of variables arranged in a regular, square layout. Conditioning plots and trellis displays show one- or two-dimensional graphical displays for subsets of a data set, where the subsets are defined by intervals of values on other variables. And finally, there are a number of related strategies for “touring” high-dimensional data, by taking projections of the data points into a smaller dimensioned subspace that can be visualized directly.

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See also Data Visualization; Quantitative Methods, Basic Assumptions

Further Readings


Greek Philosophy

Greek philosophy is often taken as synonymous with ancient Western philosophy, or as thought in the age of classical Athens, represented by Socrates, Plato, and Aristotle. Strictly speaking, however, it means the thoughts expressed and transmitted in Greek before the Byzantine period, except for Christian writings. It covers the period from the early 6th century BCE to 529 CE (the year of the closure of the Academy [a school founded by Plato around 385 BCE] by Justinian I). In a long tradition, it has formed our ways of thinking about the world and human beings and is therefore regarded as the basis of Western civilization. This entry first examines the essence of Greek philosophy and then reviews the development of Greek philosophy from its origin to the classical period, particularly the political philosophy of Plato and Aristotle.

Greek philosophy has four stages: (1) early Greek (or so-called Presocratic) philosophy (early 6th to mid-5th century BCE), (2) classical philosophy (late 5th to 4th century BCE), (3) Hellenistic philosophy (3rd to 1st century BCE), and (4) the philosophy of late antiquity (1st to early 6th century CE). In the first two stages, philosophers were active mainly in the Eastern Mediterranean region (Asia Minor, Greece, and southern Italy), and in the latter two, their activities were extended to the Near East and the whole Mediterranean region. It should be remembered that many philosophers living in the Roman Empire wrote their works in Greek (e.g., Plutarch, Epictetus, Marcus Aurelius, Plotinus, Galen, and Sextus Empiricus).

What we possess is the transmitted body of Greek philosophical texts, mostly of the classical
and the Roman periods. While a large portion of the ancient books were lost, some have been transmitted to us first in manuscripts (earlier in papyri and later in codices) and then in printed books. Quotations or references included in those books are also edited as “fragments” or “testimonies” of Greek philosophers, for example, the Presocratics (Die Fragmente der Vorsokratiker by Hermann Diels) and the Stoics (Stoicorum Veterum Fragmenta, by Hans von Arnim). Luckily, a few important texts are also preserved in papyri, inscriptions, and so on. Therefore, studies of Greek philosophy consist of the intellectual excavation of original thoughts and the reexamination of their heritage.

Greek philosophy is by no means monolithic, but rather, it is characterized by variety and competitiveness. Greek philosophers provided polar ideas such as “monism versus pluralism,” “materialism versus idealism,” “absolutism, relativism, and skepticism versus agnosticism,” “free will versus determinism,” and “eudaimonism and hedonism versus asceticism.” Nevertheless, they shared some essential features: inquiry into nature and being and open debate between different positions. Their philosophical inquiry was based on experience and reason—that is, the pursuit of truth through argument (logos). By pursuing rationality and universality, Greek philosophy achieved systematization of science and knowledge and thus participated in shaping political science. This feature dissociates it from the preceding cultures of Egypt and Babylonia and from the other cultures outside Europe. Therefore, Greek philosophy is often evoked as a source of the cultural identity of Europe and the West.

The Beginning of Philosophy

Philosophy (Greek philosophaia, meaning “aspiring for wisdom”) is generally thought to have started in Greece in the beginning of the 6th century BCE, with Thales of the Ionian city Miletus, whom Aristotle calls “the founder of philosophy.” Although Thales, one of the Seven Wise Men, probably left no writings, he and his compatriots, Anaximander and Anaximenes, started a philosophical inquiry (historia) into nature. The early philosophers were interested mainly, but not exclusively, in natural phenomena, such as celestial motions and the structure of the universe. They asked what the “origin” or “principle” (arche) of the world and all things is and presented different candidates: water (Thales), fire (Heraclitus), air (Anaximenes, Diogenes of Apollonia), the unlimited (Anaximander), and the unchanging One (Parmenides). In the mid-4th century BCE, Empedocles from Sicily established the four-element theory (fire, air, water, and earth) and thereon explained the cycle of change of the universe, in terms of mixture and separation, by means of the two powers, love and strife. As Empedocles composed the religious poem called Purifications and the cosmological one called On Nature, arguably in a single work, inquiry into nature and moral thinking came together in the early philosophers. They often used metaphorical expressions, but the first crucial step can be clearly observed: They sought one or the smallest number of principles to explain the whole world.

The Ionian tradition of inquiry developed both natural sciences (astronomy, mathematics, and medicine) and social sciences (geography and history). Herodotus, in the investigation into the causes of the Greco-Persian Wars, collected a wide range of geographical and cultural information about the regions of Egypt, Asia, and Europe. His Histories (Historiai, meaning “inquiries”) provided ample examples of the conflicting ethical and legal values adopted by different peoples and societies and thus introduced a multicultural and relativistic way of looking at the world, which was further developed by the Sophists.

The first stage of Greek philosophy is often characterized as a progression from mythos (myth) to logos (reason). This means that the way of understanding the world changed from mythical stories based on Greek religion to more rational or scientific explanation. Yet the actual development was not so straightforward. Philosophical theories and explanations still contain many mythical or irrational factors but philosophers at least share interest in the program of rational inquiry, and on this basis, they compete with each other to attain the truth.

The Sophists and Socrates

In the mid-5th century BCE, when Athens experienced democracy and prosperity under Pericles, professional thinkers and teachers called Sophists
appeared and became influential in the society. These intellectuals played an important role in the democratic society, where free citizens sought power by cultivating their own ability and the Sophists taught young people how to succeed in society.

The greatest Sophist, Protagoras of Abdera, propagated the famous “Man measure thesis”: “Man is the measure of all things: of those which are, that they are, and of things which are not, that they are not.” This thesis, which bases moral values not on gods but on human beings, promoted a radical relativism fitting for democracy. Protagoras was successfully teaching virtues—that is, political excellence.

What the Sophists actually taught was rhetoric—the art or skills of speech—for it was crucial in the court or the assembly to speak persuasively in front of a large audience. Gorgias from Sicily developed the technique of public speech and reflected on the power of speech (logos), noting that it can move people and the country and therefore becomes a source of political power. The Sophists’ appeal to the power of speech attracted people but was regarded as radical and dangerous to traditional morality.

The Sophists investigated the basis of society and the political system. One of their inventions was the contrast of nomos and physis (law or custom and nature), and based on this contrast, they put forward a social contract theory. This theory initially tried to explain how and why social and moral systems differ in societies, but it was later used to attack the current customs and morality. Antiphon, the Athenian politician, teacher of rhetoric and Sophist (though there is a controversy over his identity), wrote a treatise called On Truth (of which three large fragments have been preserved in papyri), where he insisted that while it is human nature to do harm to others in order to get more, laws and customs prevent one from doing so.

The work of Herodotus and Thucydides in their Histories contains the origin of Greek political thought. Their description and comparison of Persia, Sparta, and Athens reflected the serious discussions and controversies over the different political systems in the late 5th century BCE: monarchy, oligarchy (also called aristocracy, i.e., rule of the best), democracy, and tyranny. Several comparative studies on the Athenian and Spartan constitutions (politeiai) were written and circulated in this period. It is noteworthy that in democratic Athens, the oligarchic system of Sparta was popular among the intellectuals, including Socrates, Critias, Xenophon, and Plato.

Critias was an oligarchic politician and political thinker influenced by the Sophistic movement. A fragment of the tragedy Sisyphus, attributed to him, claims that gods were invented by a clever man to deceive people into obeying laws. The Sophist Prodicus expressed a similar rationalistic view on the origin of religion—that gods are personifications of the useful things and heroes. By casting radical doubts on traditional values, the Sophistic enlightenment movement contributed to re-forming the ideas of politics and ethics as distinct from those of traditional religion and to considering them objectively and scientifically.

Socrates belongs to the same generation as the Sophists and was regarded as a major Sophist by his contemporaries (as depicted in Aristophanes’s comedy Clouds). It was his pupils, above all Plato, who distinguished him from the other Sophists and natural philosophers. Since Socrates did not write anything, it is difficult to determine his original thought, but a few philosophical contributions are generally ascribed to him. First, Socrates raised questions on moral issues, such as courage, justice, and goodness. He often began his inquiries with a request for a definition, and in doing so, he often revealed his interlocutors’ ignorance. Second, he often drew a conclusion from a series of examples, thus making use of the logic of induction. Third, by this cross-examination, he urged people to take care of the soul (psyche)—that is, one’s own self. However, his radical way of questioning was seen as dangerous and subversive of ordinary beliefs and traditional morality. Socrates was convicted of impiety and for corrupting youth and was executed in 399 BCE. But his way of life became a major subject of the later philosophers, and Socrates was made the model philosopher for Cynics, Stoics, Cyrenaics, and skeptics of the Academy.

Plato

Plato was born in a famous Athenian family, and in his youth, he wished to be active in politics, as was usual in his society. His life was changed by his encounter with Socrates, and particularly after
seeing the trial and death of Socrates, he kept his distance from Athenian politics and concentrated on philosophy and scientific research in the Academy. It is reported that Plato visited Syracuse a few times to convert the despot Dionysius to philosophy, but in vain. Plato wrote some 30 works in the form of dialogues, most of which feature Socrates as the main speaker.

Plato made full use of the dialogue form. The author himself never appears or speaks in the dialogues. Readers are urged to think for themselves about the issues discussed in the dialogue. While it is often assumed that the main character, Socrates (or a few others), speaks for Plato's position, the opposition often has a good point to make. For example, when in the Gorgias, Callicles, the young Athenian, challenges Socrates and defended the life of politics by an appeal to “natural justice,” some readers strongly sympathized with Callicles's position, despite Socrates's eventual refutation. Friedrich Nietzsche is an obvious example of a later philosopher whose work reflects with Callicles's position, despite Socrates's eventual refutation. Friedrich Nietzsche is an obvious example of a later philosopher whose work reflects the perspective taken by Callicles. Nietzsche openly defended the “will to power” and tried to overturn Platonist morality. It is sometimes suggested that Plato himself experienced such a tension and conflict between the life of philosophy and the life of politics as depicted in the dialogue.

Plato's dialogues put forward several paradoxical arguments of Socrates—for example, that no one willingly does wrong and that it is better to suffer injustice than to do injustice. His emphasis on the need for a thorough examination of moral concepts and values appeared to ordinary men to turn their lives upside down. In urging people to take care of the soul, Plato makes a sharp distinction between the soul and the body and its desires. Then, the soul in itself is able to contemplate the essence of each thing—what it essentially is, or what Plato calls its “Form.” The Forms are distinct from sensible things, and cause their being, while the sensible things partake of the transcendent Forms. For example, “Beauty” itself is different from beautiful things but makes things beautiful. This is Plato's theory of Forms, presented in the dialogues, including the Phaedo, Symposium, Republic, and so on.

Socrates himself was probably not interested in politics and lived a nonpolitical life as a private citizen. However, Plato's dialogues understand his life as engaging in true politics and present him as the ideal statesman. The trial of Socrates is reinterpreted as fundamentally political. His cross-examination of his accusers at his trial and his constant advice to his fellow citizens to take care of the soul and virtue, instead of the body, money, and reputation, constituted a true political activity to make the polis better, but they gave rise to misunderstanding and hatred toward Socrates and eventually led to his death.

Through the Socratic dialogues, Plato explores the tension between politics and philosophy and expresses the principle that justice in all its forms can be understood only through philosophy. In this way, the famous idea of philosopher-kings or philosopher-rulers is conceived and proposed in the Republic (the Greek title Politeia meaning the being of a state or a constitution). The main question of the dialogue is what justice is and whether a just person lives a happy life. The Sophist Thrasymachus first raises a radical claim of justice as the “advantage for the stronger”—that the stronger people exploit the weaker in the name of law and justice. Following him, Glaucan and Ademnatus (Plato’s older brothers) reformulate this claim into a formidable challenge to morality: that people obey the law and do justice only because they think it necessary (while wanting to avoid it) on the basis of the social contract. Against this, Socrates has to demonstrate that justice is good both in itself and for its results. To consider justice and injustice more clearly, Socrates then suggests that they construct a state (polis) in argument and compare its justice with that of the soul. The basic principle of founding the state is that everyone does one's own work (labor division according to one's nature). If each class, namely, rulers, warriors, and producers, does its own work, the state is just. On the other hand, when someone transgresses this boundary, various types of injustice occur. The just state is discussed to show by analogy the justice of the soul. When the three parts of the soul, namely, reason, spirit, and appetite, harmonize to make a single whole, the soul is just. Thus, the Republic deals with political philosophy in the context of discussing justice.

The conditions of the ideal state are a focus in the central books of the Politeia (Books 5–7), where some original proposals are discussed, such as equality of men and women in ruling, abolishment of (c) 2012 Sage Publications, Inc. All Rights Reserved.
of the family, and a common property system. Socrates’ most challenging proposal for realizing the ideal state in this world is to unite philosophy and politics by either making the philosopher a ruler of the state or making the present ruler a philosopher, since the philosopher, who has knowledge of “Justice,” “Goodness,” and the other Forms, alone can make a state just and good in the proper way. To become a philosopher, however, one needs a long course of education and hard training, first in general education in literature and physical training and second in the mathematical sciences. The final stage consists of training in dialectic (the art of dialogue), which is said to deal with the reality or the Forms by logos (reason) alone.

Plato’s idea of political science was criticized by his contemporaries and by later philosophers. Isocrates, Plato’s rival teacher of rhetoric, insists that sound judgment is more important than the theoretical sciences, such as mathematics, in making one a good citizen and politician. Aristotle also criticizes Plato’s idea of unity in Book 2 of the Politics. A state should not seek a strict singleness as proposed in the Republic but should be realized in a harmony of diverse elements. This echoes the modern criticisms of Plato as totalitarian. According to Karl Popper and other critics, Plato’s notions of dictatorship, the “noble lie,” eugenics, and censorship resemble the modern totalitarian ideologies of Nazism and Stalinism. Whereas in the 19th century Plato’s Republic was read as a “utopian” work, in the 20th, there was greater emphasis on its political implications. However, it should be noted that Plato’s main aim lies not in the political blueprint but in the ethical contrast between the tyrant, who rules for his own interest and greed, and the true philosopher.

Plato places the Form of the “Good” in the highest position in the realm of reality. This implies that the natural world and human activities have a common basis. This idea is developed in his later dialogue, the Timaeus, in which the origin and structure of the universe are explained as the god’s (Demiurge’s) creation by means of mathematical principles. Goodness and beauty are regarded there as the foundation principles of the universe. Plato’s cosmology (which he called “a likely myth”) was influential in late antiquity and the Middle Ages as a part of his political thought.

Plato wrote two other dialogues that deal with political philosophy: the Statesman (Politicus) and the Laws (Nomoi). The Statesman defines the art or knowledge of statesmanship as the interweaving of different elements in a state, particularly courage and temperance. Plato’s last work, the Laws, discusses the principles and laws of a new colonial state. Although the differences between Plato’s ideas in the Republic, Statesman, and Laws are matters of much debate among modern scholars, it is clear that Plato examines political science as a major subject in his whole system of philosophy.

Aristotle

Aristotle was born in Macedonia, the son of a medical doctor. Probably because of this background, he was more interested in biology and other natural sciences than in mathematics (which Plato ranks high as a more abstract and academic science). He joined Plato’s Academy as a youth to study philosophy. After his master’s death, Aristotle founded his own school, the Lyceum, and led scientific projects in biology and political science. Although he tutored the young Alexander the Great for some years, it is uncertain what influence he had on the prince.

While all his published works were lost, his lectures fortunately survived and were edited by Andronicus of Rhodes, the Peripatetic philosopher of the 1st century BCE. The Corpus Aristotelicum (Works of Aristotle) is the transmitted body of texts from this edition, and it is normally assumed that the order of treatises more or less represents Aristotle’s original scheme of sciences: namely, logic, physics (natural philosophy), metaphysics, ethics, politics, rhetoric, and poetics. On the other hand, one must be cautious in using the lectures, since they are often sketchy and may seem to contradict each other. Modern scholars have tried to distinguish the different layers of composition within the Corpus, but no agreement has been reached so far.

Aristotle founds the logical system of syllogisms and discusses epistemology as the basis of the whole of science. In the Posterior Analytics, he defines the scientific demonstration as necessary reasoning from the true and primary premises. Whereas it remains controversial how much of this principle he applies to particular sciences, such as physics and ethics, the idea of a demonstrative and
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deductive system lays the basis for all scientific disciplines. Another important method in use is dialectic. In the academic fields where we cannot secure true premises, we should collect common opinions and reputable views of experts (called endoxa) first. Then, by examining the exdoxa, we can hope to find truth in them. The method of dialectic is applied in several places, mainly to provide the starting points for establishing his own theories.

While physics deals with the world of changing things and their unchanging causes, human practice and morality should be treated differently. As distinct from the causally necessary phenomena, human issues cannot be reasoned about or proved with the same strictness. Therefore, in studies of ethics and politics, we should be content with something true “for the most part.” This clear distinction between the theoretical and practical sciences is one basic divergence from Plato’s thought.

The aim of lectures in ethics and politics is practical, namely, to make the listeners good human beings and citizens. Every person seeks the good—that is, happiness (eudaimonia, not in the sense of modern “happiness” as a subjective feeling)—but its conceptions differ among people. Aristotle argues that since the eudaimonia of human beings is the realization of their natural activity, and since their essence lies in rationality, the human eudaimonia is sought in the activity of contemplation (theoria). Ethics is included in politics, which is the highest science for the human good. Aristotle again bases his inquiry on human nature: Since a human being is by nature a political animal (i.e., animals that form a polis to live together), which is equivalent to the rational animal (the animal that has logos, i.e., reason and speech), the polis (political community) is the first completion of self-sufficiency of this political nature of human beings. In Politics, Aristotle then examines family, slavery (which he notoriously favors), citizenship, various constitutions, and education.

Aristotle is also said to have engaged in joint research on some 158 constitutions (politeiai) of Greek and foreign states. Perhaps the most important one was the Athenian Constitution, which was discovered in 1880 in the Egyptian desert. This work provides essential reports of the political system of Athens, collected in his school.

The philosophies of Plato and Aristotle spread throughout the world and formed a basic way of thinking about the world and life. The most important legacy of Greek philosophy is perhaps the whole system of our scientific and philosophical inquiry, which we now take for granted.

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See also
Normative Theory in International Relations; Political Philosophy; Political Theory

Further Readings

Green Parties
Green and alternative movements first emerged in several Western European countries in the 1970s accompanied by a more general generational change toward postmaterialist values. They were mostly concerned with environmental issues, such as the antinuclear movement, but also with peace and women’s issues. Since then, the electoral as well as the parliamentary performance of green parties has improved remarkably in many democratic societies (mostly, however, in European countries). Thus, green parties were not just a temporary phenomenon—as many political observers had suggested in the early 1980s—but have developed into a stable element of many party systems around the world. In 2001, the green parties created a “global network” that consists of 61 member parties: