

Remote Learning Module for 17 April 2020

Lecture Notes for Fernando Espinoza's *The Nature of Science*, Chapter 6

— Origins of Modernity —

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Last time we examined some of the main intellectual and cultural currents of that marked the transition from the Ancient Period (Hellenic, Hellenistic & Roman traditions) into the Mediæval and early Renaissance Period (Hebraic, Christian, and Islamic traditions). We noted how these two traditions generated distinct paradigms for conducting philosophical and scientific investigation—paradigms that first met one another in the Alexandrian Empire before spreading into Northern Europe and Northern Africa, eventually giving rise to a series of tensions in thought that we placed under the broad headings of Reason vs. Revelation (in the sphere of theoretical inquiry) and Proportion vs. Covenant (in the sphere of practical inquiry). Today we'll turn our attention to beginnings of modern science and philosophy as the Renaissance came to a close, and the tensions between Hellenic and Hebraic thought reached a point of crisis that so overwhelmed Western culture that new foundations for both natural and moral philosophy emerged in the wake of the Copernican Revolution and the Protestant Reformation.

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What Is Modernity?

One way to characterize the modern period is to inventory the conceptual transfigurations that distinguish Modernity from Renaissance thought. Somewhere between 1550 and 1750, the intellectual horizons of modern thought shifted in seismic proportions as follows.

I. Logic and Mathematics.

- ❖ From synthesis to analysis (including analytic geometry and calculus)
- ❖ The development of number theory and theories of mechanical computation
- ❖ The emergence of probability theory
- ❖ Foundations of the propositional calculus (sentence logic) are rediscovered

II. General Grammar.

- ❖ Shift from designation by resemblance to designation by representation
- ❖ Distinctions are drawn between naming and asserting
- ❖ Distinctions are drawn between showing and saying

III. Theory of Perception.

- ❖ Distinctions are drawn between physical and sensory qualities
- ❖ Puzzles of the interior and the problem of scale arise (microscopes & telescopes)

IV. Terrestrial Physics.

- ❖ From teleology to mechanism
- ❖ Galileo's law of free fall
- ❖ Galileo's law of inertia
- ❖ Galileo's principle of relativity
- ❖ Newton's laws of motion: Inertia, $F=ma$, and Action/Reaction

V. Celestial Physics.

- ❖ The Copernican Revolution
- ❖ Kepler's Empirical Laws of Planetary Motion
- ❖ The Newtonian Synthesis: *Universal Gravitation*

VI. Chemistry.

- ❖ The Chemical Revolution: quantitative analysis of chemical phenomena
- ❖ Models based on attraction and repulsion replace essential natures

VII. Biology.

- ❖ Natural history: the rise of enumerative, continuous, ordered tabulations
- ❖ Medicine: from essences to autonomous disease entities
- ❖ The rise of epidemiology

VIII. Politics.

- ❖ Contract theory, and therefore new problems of the public and the private
- ❖ Revolution: breaking the *apriori* character of class distinctions
- ❖ The reinvention of democracy

IX. Economics.

- ❖ Double entry book-keeping
- ❖ The invention of investment capital
- ❖ The new world and the exploitation of natural resources
- ❖ The new world and the development of export markets
- ❖ The statistical analysis of wealth
- ❖ Money as a sign for work done rather than having intrinsic value

X. Jurisprudence.

- ❖ From inquisitorial to adversarial models of justice

XI. Literature and the Arts.

- ❖ From allegory to symbol
- ❖ From essential "everyman" to the individual (the accidents of circumstance)
- ❖ From depiction to expression (plastic arts)
- ❖ From the didactic to the ironic
- ❖ Dance: from ritual meaning to symbolic gesture
- ❖ Music: from polyphony to counterpoint
- ❖ In sum: the invention of "open interpretation"

XII. Religion.

- ❖ Reformation and Counter-Reformation, and therefore
- ❖ The rise of religious persecution *within* Christianity
- ❖ The slow deterioration of ecclesiastical authority
- ❖ The emergence of demythologized interpretations of scriptures

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— **Reconfigurations** —

(1) Recall from last time how we presented the essential tensions between the Hellenic and Semitic paradigms for understanding the natural and social worlds:

	Cosmological Paradigm	Socio-Ethical Paradigm
Hellenic Spirit	REASON	PROPORTION
Jewish, Christian, Islamic Spirit	REVELATION	COVENANT

(2) After the Copernican Revolution and the Protestant Reformation, these tensions were resolved by way of two reconfigurations—reconfigurations that reshaped the entire framework of philosophical speculation and scientific investigation, and thereby ushered in the Modern Period.

	Cosmological Paradigm	Socio-Ethical Paradigm
Hellenic Spirit	REASON	PROPORTION
Jewish, Christian, Islamic Spirit	REVELATION	COVENANT

A. Natural Philosophy: Largely due to the work of Galileo Galilei and René Descartes, the notion arises that divine revelation is to be found not in scriptural traditions, but in the “Book of Nature” (Galileo) and the “Natural Light of Reason” (Descartes). On this view, the old tension between Reason and Revelation is resolved by thinking of God as the Author of the World, whose language is neither Hebrew, nor Latin, nor Arabic, but the language of Mathematics. Galileo, for example, went so far as to say that the divine ideas are “circles, triangles, and squares.” He is also famous for asserting that the purpose of Scripture is “to show us how to go to heaven, not how the heavens go.” With Descartes we find the assertion that human rationality is sufficient to demonstrate not only the existence of God, but the nature of the external world as created by God in accordance with the laws of geometry.

B. Moral Philosophy: Largely due to the work of Thomas Hobbes, who was mightily influenced by Galileo, the notion arises that human affairs are indeed regulated by covenant, but a covenant not based on the Revelation but on Reason. On this view, both the organization of cities and states into political units as well as moral obligations among individual people derive from a rational analysis of the human condition, so that the dictates of reason *constrain* human fears and appetites, enjoining us to form civil societies wherein our natural liberties and inclinations are transformed into civil and moral rights and responsibilities.

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Next time, we'll continue our exploration of how the Modern Worldview came to displace Mediæval and early Renaissance problems and projects in science and philosophy. We'll examine what the Early Moderns called the "New Science" (*Scientia Nuova*) of Nature, first by a consideration of advances in Methodology, and then by a quick tour of how these advances played out in the history of astronomy. Be well everyone, and, although I imagine you are probably quite tired by now of my continuing to say so, do remember: social distancing continues to save lives, which is presumably why we are still not in JUB 202 presently.