

Philosophy of the Human Person

Lecture #18

Democritus' Legacy

(NB: not three distinct points, but three closely related ways of looking at his legacy)

1. Materialism—no non-material things exist
perhaps in general—no God or angels
but especially as components of ordinary objects (e.g., man)—no non-material souls

2. Reductionism—ordinary objects are nothing but collections of atoms
what reduction is

complete explanation of things at one level of being in terms of things at another level

example—the Kinetic Theory of Gases

gases interpreted as collection of molecules in constant random motion

molecules are small relative to their distance apart

molecules engage in frequent elastic collisions

observed properties of a gas (e.g., temperature and pressure) & behavior (e.g., diffusion) explained in terms of standard physical properties of molecules (mass, momentum, energy)

temperature = the mean kinetic energy of the gas

pressure = momentum imparted to the walls of the container

how it is used here—living things can be completely explained by reference to physical and chemical laws

another way of putting this—the sufficiency of structural explanation—the powers (or activity) of ordinary objects can be fully explained on the basis of the arrangement, motion, and interaction of their parts

example of structural explanation from chemistry

why does neon not combine with other elements?

because of its structure—its electrons fill its outermost shell

examples of non-structural explanation

appeal to history—vestigial organs explained in terms of use by organisms ancestors

appeal to goals—why did John stay home from the party?

because he wanted to do well on the test

the sufficiency claim

- all other kinds of explanation are merely matters of convenience
ultimately, *everything* is explained by appeal to matter (including its arrangement) and motion
3. Mechanism—there is no fundamental difference between organism (or, living things, including man) and machines
- the concepts defined
- organism
- a being made up of organs
 - so plants, animals, and man—these are heterogeneous
 - their parts are organs
 - they work together for the good of the whole
 - but not minerals, gases, etc.—these are homogeneous
 - what about ...
 - one-celled animals?—they are heterogeneous
 - their “organelles” are organs for this purpose
 - rocks (such as granite)?—they are heterogeneous
 - but their parts do not work together or interact
 - so they are not organisms
- machine
- an assemblage whose operations can be fully explained by reference to the operation of its parts
 - (NB: there are other definitions that might be offered for other purposes)
- simple machines
- the standard list of six
 - lever (also pulley, wheel & axle)
 - inclined plane (also, wedge, screw)
 - (one might add more to accommodate pneumatic, hydraulic, electrical, and electronic machines)
 - each in its own way transmits or modifies motions
 - once one understands how its parts contribute to that transmission or modification, one understands everything that there is to know about these machines
- complex machines
- e.g., a crane
 - their operations can be completely explained on the basis of the simple machines that make them up
- automata
- machines that include a power generator

- e.g., an engine that transforms chemical energy (in fuel) into mechanical energy
- one might develop a similar account of machines that detect features of their environment and respond to it
 - from electric eyes to computers
- so the question is whether the principles that suffice for analysis of machines (including automata and computers) will be sufficient to give a full explanation of the behavior of living things, including man
 - whether both can be analyzed on the basis of the same principles
 - not only the arm as a lever
 - but also the brain as a computer (with the mind its program)
 - organisms as machines
 - the arm as a lever—focussing on the skeletal structure
 - multiplication of force
 - the arm as lever plus motor—adding the musculature
 - conversion of chemical to mechanical energy
 - the body as lever plus motor plus “control device”
 - senses plus brain as mediating between environment and muscle movement
 - relation to reductionism & structural explanation—machines are nothing but carefully organized collections of parts
- the controversial character of the legacy
 - consider four kinds of phenomena
 - non-organic events (e.g., erosion, chemical reactions)
 - why won't neon combine with other chemicals?
 - why does sandstone erode more easily than granite?
 - structural explanation is most plausible here
 - “vegetative powers” (reproduction, nutrition & growth)
 - why do some zygotes develop into rabbits and others into frogs?
 - “animal powers” (perception, emotion, locomotion)
 - structural explanation in biology [see Appendix I]
 - plausibility of structural explanation (arguably) weakens
 - “human powers”—thought & choice
 - [see upcoming lectures]

Appendix I Explanation in Biology

(1) is structural explanation sufficient to explain perception?

“Though the specifics of sensory processing vary among senses, the principles of sensory function are always similar. Specialized neurons called receptor cells transduce such natural phenomena as light energy and sound waves into graded receptor potentials. Receptor potentials are converted—either by receptor cells or by interneurons—into action potentials that are processed by the CNS [central nervous system], where perception occurs.”

—Levine & Miller, *Biology: Discovering Life*, p. 857

is occurrence of perception in the CNS just more of the same?

(2) is cognition (if so, in what sense?) necessary to explain animal behavior?

“It is indeed difficult to know if animals can think. But the prevailing approach has been to treat animals as though they respond to the environment through reflex-like behaviors. Nevertheless, serious attention has recently been given to the question of animal awareness. The central question is: Do animals show **cognitive behavior**—that is, do they process information and respond in a manner that suggests thinking?”

“Animal thinking?

- A. This chimpanzee is stripping the leaves from a twig, which it will then use to probe a termite nest. This strongly suggests that the chimpanzee is consciously planning ahead, with full knowledge of what it intends to do.
- B. This sea otter is using the rock as a tool to break open a clam, bashing the clam on the rock “anvil.” Often a sea otter will keep a favorite rock for a long time, suggesting that it has a clear idea of what it is going to use the rock for. Behaviors such as these suggest that animals have cognitive abilities.”

—Raven & Johnson, *Biology* (3d ed.), pp. 1195–6