To know them, remove their information: an outer methodological approach to biophysics and humanities

Arturo Tozzi

Center for Nonlinear Science, Department of Physics, University of North Texas, Denton, USA

The old-fashioned Aristotelian concept of active and potential intellects (henceforward AI and PI) has a viable counterpart in the modern-day concept of information. Alexander of Aphrodisias, Al-Farabi, Avicenna suggest that the whole human knowledge, past, present and future, is included in the omniscient, divine, angelic/supralunar, immortal AI, that is external to the body and shared by all the individuals. Every human individual is equipped with his own PI, i.e., the skill to grab parts of the AI's fixed cosmic knowledge. Translating the account of AI into the field of information, we achieve the concept of total cosmic information (henceforward TCI). TCI is eternal, since can be neither created nor annihilated, and could be either finite is the Universe is closed, or infinite if the Universe is open. Take a scientist studying an object. Powered by technological devices, he extracts chunks of the total information endowed in the object. The more the available technology, the more the scientist explores every possible feature (e.g., the emitted infrared light), the more he increases his knowledge of the object under investigation. One might ask: what does a rather analogical comparison between AI/PI and Shannon's/Wheeler's information bring on the table? Indeed, AI and TCI have problems with the principle of individuation: how are apparently homogeneous things identified as distinguished from other things? In the information field, we might ask: if two files contain the same number of bits, what is the difference between their available information? For example, two 1GB Drive flash USBs might encompass either a Depeche Mode album or Shostakovich symphony. This leads to biological questions. Even though the human cells have the same DNA, hepatocytes and osteoblasts are markedly different: does it mean that their principle of individuation depends on their phenotype, or by the different bodily environment in which they are embedded? Do they encompass the same amount of information? In sum, the same fixed bits quantity does not lead to the same available qualitative (we could use the term "semantic") content. This raises doubts as whether the tenet of TCI as an unlimited, immortal whole extracted by the human mind holds true. The comparison between AI and information has paradoxically two opposite consequences: by one side it eradicates the divine concept of knowledge and leaves just the quantitative concept of information; by another side, it reintroduces a metaphysical component, i.e., the presence of a vague, eternal substance permeating the universe and devoid of scientifically recognizable meaning. When we, in touch with AI, define TCI as the largest amount of bits, we are only allowing the metaphysical concept of God to sneak in the back of scientific matters.

When scientists take information from the object, are they extracting the information endowed in the object, or are they building information not existing inside the object? Is our qualitative mental information discovered, or is it invented? An alternative account runs as follows: what is believed to be extracted from an object is not really extracted, rather is produced by our minds. Could we state, paraphrasing Aristotle, that the semantic information is not actually any real thing before being thought by human individuals? Is the mind potentially whatever is thinkable, though actually is nothing until it has thought?

Is active knowledge identical with its object? Is potential knowledge prior in time to actual knowledge? Is the knowledge alone the cause that produces the action? Does time exist without a clock? Here you are a reply from a forgotten past. In 1335, Nicholas of Autrecourt wrote that two points can touch one each other retaining its own different position. This weird statement matches with the quantum concept of bosons' superposition. Bosons are not subject to the Pauli exclusion principle: any number of identical bosons can occupy the same quantum state. For Autrecourt (and the current paraconsistent logics), a transition occurs from one state to the contradictory one in the absence of a real intrinsic change of any of the terms: connectives such as "¬" mean nothing, being syncategorematic terms lacking denotation and ontological status. The Ockhamist Autrecourt suggests that we have no knowledge of things, but only of terms, such that God, creatures (and information) become nothing. In accordance with this claim, recent approaches interpret quantum mechanics as a reference-frame theory pertaining to observer-dependent relational properties. Amazingly, such extreme relational formulations of quantum mechanics have been experimentally supported by recent papers: contrary to the tenets of local realism, the properties of the physical world are dependent from the observer. In terms of information and AI/PI, we can just finish our *pars destruens* with a slogan: *without a thermometer, an object does not have a temperature*.

And now a *pars construens* is strongly required. Let's start with set theory, which faces two difficulties: formal definitions of sets/subsets are incapable of assessing biophysical issues; formal axiomatic systems are complete/inconsistent or incomplete/consistent. To overtake these problems reminiscent of the old-fashioned principle of individuation, we provide formal treatment/validation/operationalization of a methodological weapon termed "outer approach" (henceforward OA). The observer's attention shifts from the system under evaluation to its surroundings, so that objects are investigated from outside. Subsets become just "holes" devoid of information inside larger sets. Sets are no longer passive containers, rather active structures enabling their content's examination. Consequences/applications of OA include: a) operationalization of paraconsistent logics in terms of advanced truth theories of natural language, anthropic principle and quantum dynamics; b) assessment of embryonic craniocaudal migration in terms of Turing's spots; c) evaluation of hominids' social behaviors in terms of evolutionary modifications of facial expression's musculature; d) treatment of cortical action potentials in terms of collective movements of extracellular currents, leaving apart what happens inside the neurons. Also, OA provides an outer view of a) humanistic issues such as the enigmatic Celestino of Verona's letter, Dante Alighieri's "Hell" and the puzzling Voynich manuscript; b) historical issues such as Aldo Moro's death and the Liston/Clay boxing fight. Summarizing, the safest methodology to quantify phenomena is to remove their information from our observation and tackle an outer view, since mathematical/logical issues such as selective information deletion and set complement are able to rescue incompleteness/inconsistency of biophysical systems.