
Mechanicism vs. Organicism: Two Views of the Cell

Daniel Nicholson^{*†1}

¹Tel Aviv University – Israel

Abstract

Double Session: The Nature of Cellular Complexity (Kupiec, Gandrillon, Paldi, Ojalvo, Nicholson, Matlin) In accordance with the mechanist tradition in experimental biology (inaugurated by Descartes in the seventeenth century), it has become customary to regard living systems as intricate pieces of machinery, different to man-made machines only in terms of their superior complexity. Today, this mechanist ontology serves to justify the belief in the sufficiency of explanatory reductionism in molecular biology, and it also lies at the heart of the theoretical appeal to design charts and circuit diagrams in systems and synthetic biology. In cell biology, mechanist conceptions have been buttressed by the traditional methodologies used. Much of what we know about cells was derived from static snapshots of fixed or stained biological structures generated by conventional microscopical techniques. The interpretation of these snapshots favoured an understanding of subcellular architecture in terms of clockworks and molecular machines. However, the introduction of novel methodologies, such as fluorescence-based *in vivo* imaging techniques, is leading to the accumulation of experimental data inconsistent with the machine conception of the cell. In this talk I argue that a new view of the cell is emerging which calls into question our intuitive adherence to mechanist tenets like determinism, reductionism, and the reliance on design as an explanatory principle. This new view of the cell requires us to adopt an alternative ontology of living systems, such as organicism, capable of making theoretical sense of the self-organizing nature of the cell and the inherent stochasticity and non-linearity of subcellular processes.

*Speaker

†Corresponding author: dan.j.nicholson@gmail.com