

Tami I. Spector, "From the Molecular to the Machine." *Representations* 117.1 (2012): 1-29.

Objectivity can be a shady matter. More so when it supposedly arises from the "shadow images" portrayed by nanoscopy. Starting from a specific molecule, benzene, and the story of its discovery, Tami Spector builds an account that entwines the micro-world of nanomolecular studies with more general philosophical concerns for the representation of non-visible objects: "We had seen the unknowable. Or had we? Can we?" (1). Problems with negotiation of meaning between the object and its structure are the underlying leitmotifs of a story that spans from Friedrich August Kekulé's epiphanic discovery of benzene's structure in 1865, to the 2001 STM (Scanning Tunneling Microscope) image of C60 (buckminsterfullerene).

Spector's article begins by presenting Kekulé's depiction of benzene as an historical marker for molecular representations. She argues that Kekulé's idea of portraying benzene's cyclic valence structure in the form of an "uroboros," transformed a chemical formula into an enduring symbol and into a powerful signifier "where structure begets properties and properties recapitulate structure" (3). Images of molecules, like Platonic solids, which synthesise the quintessence of the objects from the tangible world, are but "imperfect simulacra" (5) of a reality that escapes our senses. Spector claims that, very much like those solids, such representations can operate on a metaphorical level stimulating productive connections and generating new understanding. It is within this framework that she presents the case of buckminsterfullerene ("buckyball" for brevity), a "carbon-based polyhedral structure" (5) imbued with a "primal Platonic essence" (9). According to Spector, however, the resemblance of this molecule with an everyday object such as a soccer ball, gives it an adjunct value in respect to Platonic solids. Its ball-like nature reflects its function in real life as a potential vehicle for delivering drugs to a specific target in the body: "not only does it look like a real-world object; it theoretically acts like one too" (9). For Spector, Buckyball also marks the passage from molecules to more complex switch-like functioning systems called molecular machines: organised aggregates of molecular components that produce kinetic responses to specific stimuli, mimicking their macroscopic homonyms. These idealised mini-machines represent one part of that "machine" mentioned in the title of Spector's article, the other part being the actual machines, such as the STM or the SPM (Scanning Probe Microscope), used to detect them. The symbolical union of the object of study and the recording device, registered in the title under one single all-encompassing word, hints at Spector's main argument that the real substance of nanotechnology consists of nanomicroscopy images rather than the actual nanoscale objects (17).

Spector shows how SPM images, omnipresent in scientific literature, derive their authority from the photographic-like way in which they depict atoms and molecules, hiding human mediation behind the idea of a "neutral knowledge" (22) achieved through the misleading objectivity of the snapshot. Their "narrative of neutrality and authority" (23) is further supported by a caption that always accompanies them. For Spector, the caption has a double function: it invests the picture with meaning, calling on the specific knowledge of the viewer for interpretation, and, at the same time, derives its own authenticity from the charismatic power of the photograph. SPM creates new kinds of aesthetical scientific entities that appear to have finally satisfied the craving for visualizing the unknowable and for

synthesizing the noumenon. Our expectations, Spector concludes, are fulfilled. These pictures confirmed theoretical predictions: “buckyballs look like buckyballs and benzene like benzene, an uroboros of representational continuity; we are ‘at home amongst appearances’” (25).

The open ending of the article is a call for interpretation. Spector’s clear emphasis on the role of “language” (be it a structural formula, words or pictures) in the construction of knowledge, suggests that the quest for meaning has to be a shared effort between humanities and science. New scientific proceedings demand a constant reassessment of the concept of objectivity (historically considered a stronghold of the sciences alone) in the process of negotiation between different fields of study. There is a high level of correspondence between the topic of the article and the narration itself: it advocates connectivity while showing how connectivity works. Almost like the majestic truncated icosahedron dome of the buckyball, Spector’s narrative gives rise to a number of metaphorical connections hosted under a cohesive structure that merges on the surface with a common question: what do we really see?

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