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Video material



Every year there is a competition sponsored by Novartis called *Visions of Science*, which judges the best scientific photograph under several categories such as 'action', 'close-up', and 'concepts' (www.visions-of-science.co.uk). There are also several other competitions held by journals and magazines such as this one, which promote scientific images as art. Much as I like these wonderful images, I can't help but wonder if the photograph is really the best contemporary format to communicate scientific beauty.

At different stages in history, certain scientific images have become more than scientific illustrations. Johannes Kepler's astronomical drawings, Robert Hooke's microscopic sketches of fleas, and D'Arcy Thompson's illustrations of mathematical biology can all claim a place in the history of art. In each case, the format was contemporary and, besides being used to convey scientific knowledge, these images often characterized a particular type of scientific aesthetic.

Modern formats, such as photos, have a different aesthetic, an important part of which is the ability to catch a moment in time. Harold Edgerton's famous picture of a milk drop splashing in the shape of a crown is beautiful because we know that milk is a liquid and that this beautiful shape is rare, transitory, and, for a moment, saved from the tyrants of surface tension and gravity. We all know about these forces because we live with them everyday, and it is a thrill to see them caught napping. This is the essence of a great scientific image: it encapsulates more than just shape and symmetry, it encapsulates theory. One of the challenges for modern scientists and artists is to do this for the nano and quantum worlds, and the right format may not be the photograph.

Consider scanning electron microscopy (SEM) images of microelectromechanical systems (MEMS). The tiny silicon cogs and levers usually have a retro-classic feel, lent in part by the fact that they are photographed in black and white. The image quality of that characteristic SEM grey scale says something else; it speaks of the machine essence. Great as these still images are, they are inadequate next to the movies of MEMS taken by Sandia National Laboratories, www.sandia.gov/mstc/technologies/micromachines/movies/index.html.

Including motion communicates the eloquence of the precision of these MEMS mechanisms. Movies, by imposing time, tend to demand a narrative, and the Sandia MEMS movies brilliantly exploit this by introducing organic costars, such as spider mites and aphids, who frequently trample like micro-tourists across the silicon landscape. This instantly conveys not only a sense of scale but also captures the revolutionary aspect of this technology – that it is starting to challenge biology's domination of microscopic world.

Silicon is not the only material movie star. Sugar glass performs brilliantly in *Blade Runner*, shattering as Zhora runs in slow motion through a series of plate glass windows. The scene is a visual poem to glass, evoking its brilliance, fragility, and lethal beauty. An award should go to polyurethanes for their portrayal of ice in movies. But my nomination for a lifetime achievement Oscar® goes to plain old wood, for that quintessential moment in every fight scene where a chair is smashed over someone's head, without which almost every action film from spaghetti westerns to kung fu movies would be so much poorer.

Digital video is bringing science and the entertainment industry even closer together. The increasing use of computer-generated special effects means that more sophisticated models of materials behaviour are required to render realistic effects. So far, these have been mostly empirical, such as those employed in *The Matrix*, but they are likely to be theory-based in the future.

The worlds of cinema and materials science are set to collide, possibly resulting in a new fusion of art and science. This may benefit science in the creation of a format to explore the scientific aesthetic. In the process, scientists may also make contributions to the special effects industry, not least because our exposure to the strangeness of reality can be such a rich source of fiction (e.g. liquid memory metal in *Terminator II*). In the words of Michael Caine in the classic film *The Man Who Would Be King*:

"How many people have seen what we've seen? Bloody few and that's a fact."

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