FROM ABSTRACT DATA MAPPING TO 3D PHOTOREALISM: UNDERSTANDING EMERGING INTERSECTIONS IN VISUALISATION PRACTICES AND TECHNIQUES

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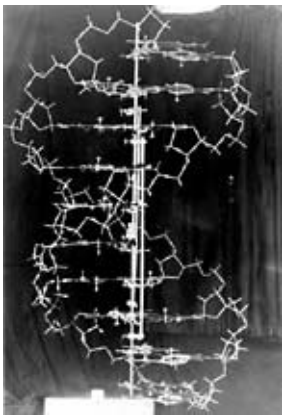
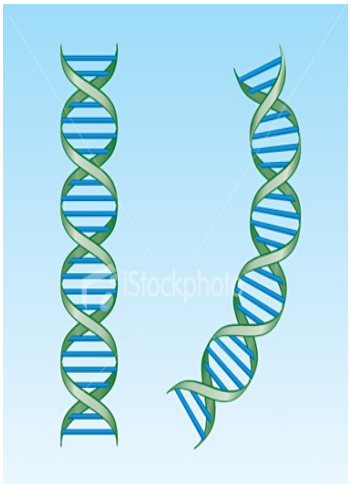
Visualising and Reality

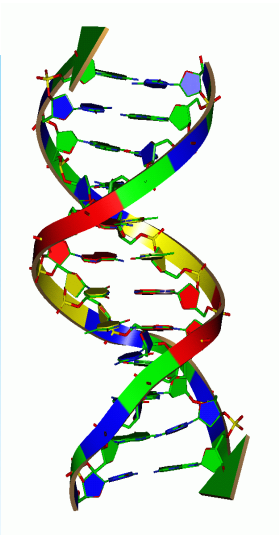
'Visualisation' (or 'visualization') is, it seems, a difficult and problematic word. It is worth clarifying the meanings that have developed in various research contexts because of the potential for confusion in its application, and also to note a distinction in how this word is applied differently in different research environments. This is important because of the increasing overlapping of disciplines for which this word is a frequent verb and sometimes a noun, but also because the different methods of inquiry of some of these areas is intellectually incommensurate, however visually satisfying or apparently adjacent the supporting technology may be.

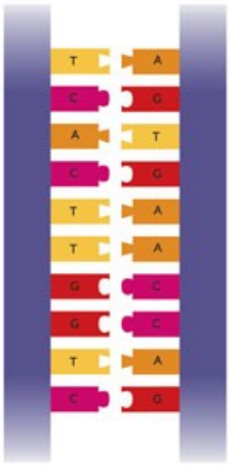
For a start, it is difficult to spell. 'Visualization', an Americanism that appears to mean the same thing, is somewhat rampant in its application by British-based colleagues whom I hope will excuse my use of the English spelling. There may, however, be a case for developing a distinction that we might base on the spelling if only clarify our intentions when invoking it as a concept. This is because of the crude duality of its meaning to scientists and artists. For artists, whether they work in digital technologies or not , 'visualisation' suggests the reification of a vision, to visualise an idea or a thought according to their expressive needs. Artists refer to 'visualisation' or 'visualising' as a verb, the act of art-making or image creation. For those using the word in this way, the assumption of a visualisation practice is to bring into being something new and original. Their concerns are based on whether the resulting image, or the successive approximations they are developing, contain the spirit of their idea, and genuinely represent their 'vision'; the motivation for making the art or image in the first place.

In the scientific world the word is used quite differently. The 'visualisation' process is also a product, given that 'visualisation' in the domain of science often seeks to create a comprehensible model of an otherwise complex subject. 'Visualisation' becomes the way in which scientific information can be communicated, sometimes with dramatic consequences or in crucial situations. The purpose of 'visualisation' in this context is less to do with originality and more to do with fidelity to a research concept or a body of evidence. 'Visualisation' technologies are employed at the point where the data is too complex for users to grasp or master quickly without support, or where the conditions are too unstable or remote to allow for the proper time for contemplation. Given the impressive data volumes that can now be extracted from a single molecule for example, 'visualisation' is an important tool in presenting research outcomes and making them accessible. The most famous of these examples remains the DNA double helix, extrapolated from Watson & Crick's stick and ball models in their famous 1953 paper. It is interesting to note the differences between Watson & Crick's original physical model and any of the vast number of visualisations made of DNA since, of which a few examples are illustrated.

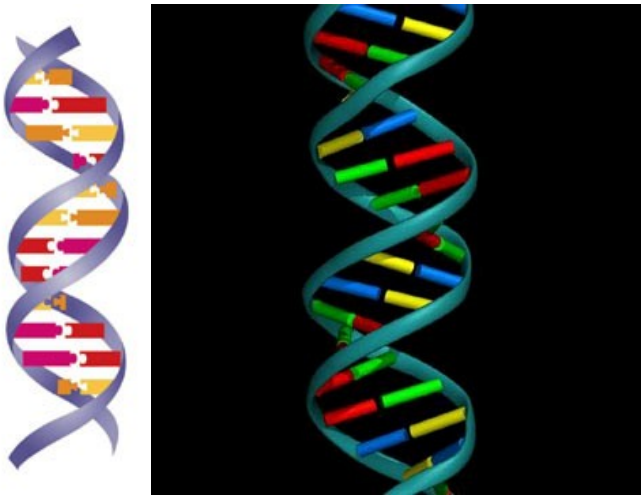








The original DNA model by Watson and Crick.
Photo: Cold Spring Harbor Laboratory Archives



Subsequent 2D models freely available online.

A 'visualisation', using the word as a noun, is intended to clarify the research process by accurately rendering something into visual form. It is meant to provide a model of reality, and when it fails in this task it is thought to be thoroughly useless. For the scientist then, the reliability of the visualisation depends on the accuracy of the data that supports it and the fidelity of the translation of that data into a visual form.

These two applications of this word in the research environment lead to some questions about what and how we make 'visualisations', in either definition. The most pressing appears to be something well known to artists about the visual world and where their expertise can be of significant value to the 'visualisation community'. The capacity to be deceived by what we see is a quality exploited in the visual arts for some time. However, the very portability of visual systems to a large number of paradigms creates an illusion of usefulness. The accuracy of the DNA model cannot be assessed by recourse to the beauty of its structure or it's use of colour (normally the satisfying primaries plus green) to validate how things are in reality. In this I am reminded of the excellent model of the Melnikov House, made by ParallelGraphics and available to view at:

http://www.parallelgraphics.com/products/isb/examples/melnikov/

This demonstration of the 3D graphics that can be developed with Cortona is hugely impressive, and must have seemed an excellent subject for demonstrating Cortona's utility in bringing understanding to an otherwise obscure, yet deserving, architectural monument. Konstantin Melnikov's famous house in central Moscow is not particularly accessible, has suffered from lack of maintenance and is squeezed between other apartment blocks all around, and on a narrow little street. In the Cortona version, the viewer can manipulate the building at will, or change their own perspective of the site, flying through walls and floors, looking down ceilings and tilting the building in all kinds of ways. The problem with this usage of visualisation technologies is two-fold. First, they are convincing enough in detail and experience to appear to render a site inspection obsolete, and secondly that they suggest a way of experiencing the building that is simply not possible. In the first case, many of the details are actually incorrect or based on supposition. Even if the data source can be given a proper provenance, and thus authority to represent, the representation suggests a finite state to Melnikov's building, and we know from his writing that this simply is not the case, with the inclusion of moveable windows and floors. One of the issues is that unlike the pristine presentation of the model, a building must exist in a physical location that is effectively changing it. The relative instability of this, in relation to a representation of an absolute state in a visualisation, suggests the misrepresentation of the building as an entity. Secondly, the problem with visual representations without the constraints of the physical world is that they can mislead us about what it is like to stand there in front of a building, or walk its stairs or see it from the angles it's architect anticipated when he designed it. Melnikov's visualisation of an architectural concept gives rise to misinterpretations through the technology of visualisation, an especially dangerous situation should the visuals be quite so convincing as they are here, replacing the complicated experience of actually going to Moscow and getting to see it in person.



In all these approaches, it is striking to note the authority of digital technology in determining our view of the world in general and of the visualised one in particular. The complexities of the technologies and their flexibility in application lead us, as viewers hopelessly well trained by television, into believing that what we see is a more accurate representation of the world than the world itself might present. Visualisation is invariably used as suggested above, when the data is too complex or the situation too remote for our first hand assessment of the reality that it purports to represent. When it does so, it creates a plausible argument in and of itself that it has been capable of capturing the data that can give us a model of reality. As has been suggested here, this is sometimes not quite what it seems, and that what we really have is the reality of the model and the model-making process in front of us. The visual arts, with its rich experience of understanding the impressions made by visuality, has much to offer the complex practices of 'visualisation', in terms of helping to apply a critical eye to the representations of the world around us as they manifest in the powerful and persuasive technologies of visualisation.

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