

The more manipulations, the better...



Bruno Latour, Sciences Po
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NEW REPRESENTATION IN SCIENTIFIC PRACTICE

Focusing attention of researchers on the visual aspects of various scientific practices has been of great import because it has brought down to earth many philosophical claims about objectivity. And yet, focusing on the visual *per se* might lead in the end to a blind alley. The reason is that image making in science is very peculiar, so peculiar indeed that following its odd ways offers an excellent way to define what is 'scientific', after all, in science.

At first, the temptation is great to treat the visual aspects of so many scientific instruments, papers, posters and displays in the same ways as art historians have considered visualization in their own fields of practice. But if it is true that paintings, photographs, engravings, installations refer many times to other works of art by practicing a form of overt or hidden citations, allusions, parodies or displacements, in science the connection between visual documents is completely different. Every image refers to another image—or better an inscription—that comes before it and that is itself transformed, yet again, by another inscription down the road thus forming long cascades of successive traces. Those traces are separated by *gaps* that the evolution of instruments allied to that of interpretative skills try to narrow down as much as possible. But this narrowing down, that's what is so odd, is obtained by multiplying yet again the number of steps along those cascades of transformations.

It is fair to say that the degree of objectivity of a scientific discipline may be defined by the width of those gaps and by the number of transforming steps necessary to fill them up. The referential quality of a discipline, that is, its ability to reach objects inaccessible otherwise and to transport them into a site where they can be evaluated by peers is entirely dependent on the quality of those chains. The more steps there are *in between* the objects and those who make judgments about them, the more robust those judgments will be.

Such visualization practices remains very paradoxical when considered from the point of view of art history or iconography since its degree of 'realism' is entirely different from that of works of art or any other type of illustrations. First because it never relies on the relation between one copy and one model as if it could be limited to only *two* steps: the gap would be much too wide to allow for a robust judgment about the exact connections between two inscriptions. The idea of science as a 'mirror of the world' is a spurious import of the history of figurative paintings into epistemology. In science, the mirror shows something on the condition of being situated at the very end of long series of transformations between traces none of them is 'an exact replica' of the former. In other words, scientific imagery is never mimetic. If it were, there would be no gain of information between one step and the next. It is the *difference* between each step that allows the reference to move on. As indicated by the etymology of the verb 'to refer', it is the only way to *bring back* some state of affairs in order to handle it.

If the extension, complexity and cost of those referential chains are taken into account, one could easily see why *isolating* one inscription from the flow in which it is taken would make one lose its referential quality. An isolated scientific image, strictly speaking, has no reference. The possibility to refer is given by what an inscription inherits from another one, upstream, and what it transfers —by transforming it— to another trace, downstream. Reference is a movement, a deambulation, a trajectory, not a property of a 'realistic' image. This is why the number of transformations undergone along a chain, number that shocks common sense so much because it could be taken as so many 'manipulations', makes a lot of sense for practitioners. (Harris' drawing is right on target when he has the scientist say: 'Makes sense'. No irony is indeed intended).

White coats know fully well that, without those long series of manipulations, they could not narrow the gaps and that they would have to rely on too many arbitrary judgements to jump over them. What for common sense is manipulation —'Please state the matters of fact as directly and as naturally as possible'— is exactly what, for practicing scientists insure the quality of the reference —'I can't obtain objectivity without multiplying the transformations'.

Of course, as soon as scientists leave their laboratories, they fall back on the common sense version of science as the mirror image of the world. They suddenly are more than happy to display *one isolated* image extracted out of the chains as 'the definitive proof' of the phenomenon they wish to describe. Then, but only then, and only for pedagogical or public relations purposes, are we requested to see *one* image as the copy of *one* phenomenon. But no matter how convincing this display might seem, other practitioners know fully well that in order to judge the quality of such isolated image, one should not try to compare it to its 'model' out there,

but to check what it has retained from another inscription, before, and what it can send to another inscription, after.

One could even argue, that this ‘model’ for which this displayed image is a ‘copy’ is actually an *after image*, a mere replication of the interrupted inscription. The mystery of its ‘realism’ would seem less mysterious if this replication were taken into account: of course it is ‘realist’, since it is twice the same thing... Many a quandary of epistemology would be dissipated if those two different positions of the same image could be documented. But in order to do so, one should not isolate the scientific imagery and shoehorn it into the types of questions raised by iconography. There is nothing visual in scientific visual imagery. Literally, there is nothing to be ‘seen’.

Now that there is a vast literature on scientific image making, the next frontier is probably to understand what is *not* visual in those chains that comes from the gap situated in between two successive inscriptions; a topic that has been hidden by the flood of disputes about the degree of ‘resemblance’ between an image and its copy. Of course, we know that this gap is made of two contradictory features: what is kept from one trace to the next; what is changed from one to the next *so that something* at least is kept constant. But the study of those ‘immutable mobiles’ —that is how much mobility can you obtain by regulating those two opposite traits— requires a different take than the one obsessed by the ‘scopic’ regime of so much philosophy of science. A philosophy just as much interested in realism, but where realism is generated by moving along the referential chain — ‘the more mediations the better’— and not jumping out and interrupting the flow of images —‘if only there was no mediation at all, how much more accurate our knowledge would be!’.

What is needed to fathom scientific image making process is probably the equivalent of what Gibson started to study for ordinary vision: an ecological interpretation that manage to focus not on vision *per se* but on the deambulation of active bodies registering features of the landscape by judging the relative proportion of what changes and what is transformed. ‘The extracting and abstracting of invariants are what happens in both perceiving and knowing. To perceive the environment and to conceive it are different in degree but not in kind. One is continuous with the other.’ (p. 258). The research program Gibson proposed many years ago so radically, has not yet been completed: ‘The very notion of an image as a flattened-out object, a sort of pancake of a solid body, is shown to be misleading. It begins to appear that most of what has been written about pictures and images over the centuries is misleading, or hopelessly vague. We should forget it all and start fresh. The information for the perception of an object is not its image. The information in light to specify something does not have to resemble it, or copy it, or be a simulacrum or even an exact projection. Nothing is copied in the light to the eye of an observer, not the shape of a thing, not the surface of it, not its substance, not its color, and certainly not its motion. But all these things are specified in the light.’ (p. 304). Only once the mimetic and scopic obsession for an image as a copy has been put aside, will it be possible to study scientific imagery. Then, the magnificent body of work done over the years by so many scholars on so many aspects of the joint history of art, science and

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perception in order to foreground the visual in scientific practice will really have come to fruition.