

light seemed to suggest that classical space no longer could be taken *a priori* as a changeless medium. Einstein responded to this by *empiricizing* three-dimensional space, treating it, in effect, as a variable *object* in a new, more abstract, *four*-dimensional medium. In quantum mechanics, even greater heights of abstraction were reached in responding to the challenge of discontinuity posed by the phenomenon of light. The *n*-dimensional array of subspaces that constitute the Hilbert space is certainly a far cry from the singular Cartesian continuum.

Closely related to the discontinuity intimated by the investigation of light was the fact that what was being observed could no longer cleanly be separated from the act of observation itself, which meant that the subject could no longer maintain its detached anonymity. The response of modern physics was to treat the Cartesian subject as an object (an “observational event”) cast before a new, even more abstract, still anonymous subject. Thus, in order to maintain the formula of object-in-space-before-subject, what had previously constituted space and subjectivity were now being treated as *objects* in a more abstract space, before a more abstract order of subjectivity. When these novel objects were fashioned, what became of the *old* sense of the object? When attention was withdrawn from the relatively concrete objects of the Mechanical Age and re-invested in the more abstract spatial and observational “objects” emergent in the Age of Light, what happened to the Cartesian sense of perceptual depth and perspective? The answer is that it collapsed. Pre-Einsteinian differences—differences in perspective that did not explicitly take into account the observer and his space as higher order objects—no longer made a difference. To the eye of the modern physicist, the old world of depth thus looked distinctly flat. In sum, we may say that, in attempting to meet the challenge of *apeiron* in the Age of Light, a more abstract mode of experience arose in science, one in which attention shifted from the concrete objects perceived to the act of perception and its space as new kinds of objects; in the process, there was a flattening of Cartesian depth as the earlier sense of perspective was relinquished.

Just such a transformation of experience was also witnessed in the field of *art*. Art historians Paul Vitz and Arnold Glimcher (1984) identify these very same features—abstraction, flattening of perspective, the shifting of attention to the act of perception itself—as primary characteristics of modernist art.

According to Vitz and Glimcher, abstractness is expressed in modernist art by the reduction of recognizable content to formal geometric elements (Mondrian’s fields of vertical and horizontal lines, for example), and, in the extreme, by the complete elimination of content, leaving only the blank painting surface itself (as in the ultra-minimalism of Malevich). Regarding the second feature of modernism, its flatness, the authors observe that the

effect of a flattened, non-perspectival picture plane arises from the artist's recognition of "the painting's surface and in turn the canvas as a real object rather than an illusionistic 'window'" (1984, p. 5). Of course, treating the canvas itself as the reality is an act of abstraction, so the flattening of the picture may indeed be said to result from this tendency to abstraction. And both of these characteristics may be related to the third essential trait of modernism: its "perceptual character" (Vitz and Glimcher, 1984, p. 7).

Beginning with Impressionism, art became a subjective, self-conscious endeavor. In the work of Claude Monet, Pierre Renoir, Camille Pissarro, and others, the interest of artists no longer was wholly invested in the objects they perceived, but was concerned with their own impressions of those objects, their own perceptual processes. This withdrawal of interest from the classical object contributed to the flattened appearance of even the earliest Impressionist works (see, for example, Vitz and Glimcher's comparison of Manet's *Olympia* with Titian's *Venus of Urbino* [1984, pp. 48–49]). But modernism did not limit itself merely to exploring perceptual process; in advancing from Impressionism to Cubism, it went on to *objectify* perception. We might say that, whereas Impressionism raised the *question* of subjectivity, with Pablo Picasso and Georges Braque that question was "resolved" by transforming the subject into an object.

I propose that the Impressionist experiment with subjectivity is related to Cubism in a way that parallels the relationship of the Michelson-Morley experiment to Einsteinian physics. It was in the same decade in which the work of Michelson and Morley posed its implicit challenge to Cartesian subjectivity and classical space that a corresponding challenge was being issued in the field of art. I will take a painting by Edouard Manet as my case in point: *Bar at the Folies-Bergère*, exhibited in Paris in 1882 (see next page).

Vitz and Glimcher state that Manet's *Bar* is an example of *fractured space*: "two or more discrete lines of view [are] present at the same time in a given portrayal of space: these separate but simultaneous views break or fracture what was once (seen as) homogenous" (1984, p. 118). In *Bar*, the left two thirds of the picture give a view of the woman from a frontal perspective, whereas the mirror image of the woman's back and the top-hatted gentleman shown in the right third of the painting suggest an angle of vision that is displaced to the left of center. Vitz and Glimcher observe that this juxtaposition of opposing perspectives leaves the viewer in an ambiguous state. The undercurrent of visual tension that accompanies the viewing of *Bar* arises from the fact that when attention is occupied by one perspective, the pull of its overlapping opposite is subliminally felt. A significant effect of this perceptual uncertainty is to disrupt the viewer's involvement with the object perceived and shift his or her attention to the act of perception itself.



**Figure 3.** Edouard Manet's *Bar at the Folies-Bergère* (1882)  
Courtauld Institute Galleries, London.

As with the Michelson-Morley experiment that was to take place five years later, Manet's fracturing of classical space brought subjectivity out of the background and into the open, creating the ambiguous blending of subject and object. To be sure, earlier Impressionist experiments had already produced a shift in attention to perceptual process. With Manet's *Bar*, this tendency was reinforced in a radical and decisive way.

From Manet, Vitz and Glimcher proceed to consider Paul Cézanne, observing that the work of the latter entails an even greater fractionation of classical perspective. Yet modernist art evolved in such a way that it did not merely challenge the classical outlook by introducing more and more ambiguity. In the transition from Manet and Cézanne to the Cubism of Braque and Picasso, there was an implicit move toward *resolving* the uncertainty. It is true that, in Picasso's *Card Player* (1913) and Braque's *Musical Forms* (1918) (Figs. 4a and 4b; see next page), ambiguous relationships can be observed. With respect to the Braque, for example, art theorist John Richardson notes that "we can't settle upon the true relationships of the paper to the cardboard. Are the forms cut from the paper or are they the result of the cardboard overlaying it?" (quoted in Vitz and Glimcher, pp.149–151). Yet the subtly disturbing quality of Manet's *Bar* clearly is absent from the more analytical-looking Cubist works. Gone is the sense of participating in a visual mystery. How can this "demystification" be explained?