Monge's maths, Hummel's highlights

The type of perspective favoured in technical drawing was first used by military draughtsmen to ensure accurate fortifications. It was developed geometrically by Gaspard Monge and drawn to perfection by Johann Hummel.

Martin Kemp

Linear perspective is about the portrayal of the position of objects in space. Yet in its pictorial mode, it creates an illusion which can only be used to provide measured definition of the dimensions of forms if the diminutions are reversed through a knowledge of the parameters of the construction. It was the special mode developed for technical drawing, above all for fortifications, that both presented spatial effects and retained dimensional accuracy. It became the speciality of military draughtsmen, engineers and stone-cutters in the eighteenth century.

What was known as *perspectiva militaris*, and is now called orthographic or isometric perspective, set the vanishing point at a notionally infinite distance, in such a way that parallels do not converge, and distant forms can be measured on the same scale as adjacent ones.

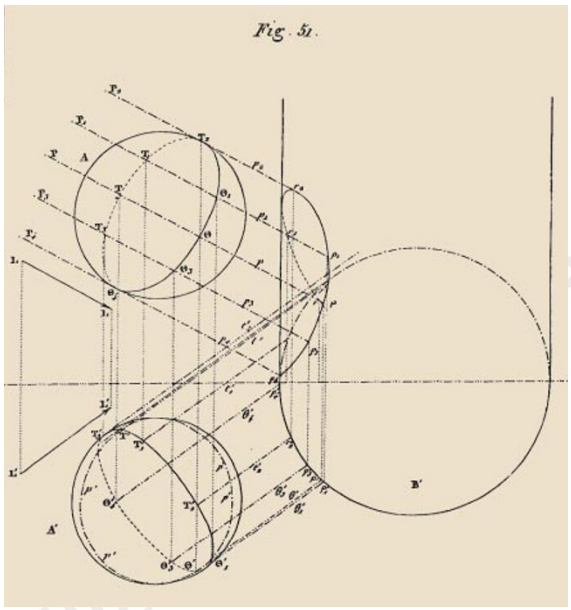
Gaspard Monge, the founder of descriptive geometry, was educated in this tradition at the French military academy at Mézières. During the Revolutionary era, he reshaped mathematics teaching in the newly reformed school system.

His *Descriptive Geometry* of 1799, edited from his lectures at the Ecole Normale, zealously advocated his method "to define the position of a point in space" by reference to "those other objects that are of known position in some distinctive part of space", most directly by two intersecting planes. His procedures, closely related to shadow projection techniques in the more technical books on artists' perspective, revived the power of drawn geometrical procedures after years of dominance by algebraic analysis.

Monge himself extolled descriptive geometry as "a means of investigating the truth [that] should necessarily be introduced into the plan of national education", and as a prime tool for the artist, for whom "nothing is arbitrary" with respect to formal definition — even when complex, curved surfaces are involved.

His methods had a huge impact on technical drawing in Europe and America, but few artists were predisposed to follow the demanding letter of his law.

A striking exception was the professor of optics at the Berlin Royal Academy of Art, Johann Hummel. A rather graceless draughtsman of figures, Hummel excelled in perspectival views. His *pièce de résistance* is a series of paintings on the making and erection of the huge granite bowl installed on the Lustgarten in Berlin in 1831. The complex curvature of the bowl in itself set a stiff task for any conscientious perspectivist, but the geometry of the reflections presented problems that only the most dedicated and well-informed investigator would attempt to resolve.



"Projection of a shadow cast by a sphere on a cylindrical surface", from Monge's *Descriptive Geometry*, 1799.

Hummel's *Polishing of the Granite Bowl*, 1831, Berlin.

STAATLICHE MUSEEN PREUßISCHER KULTURBESITZ, NATIONALGALERIE, BERLIN/J. P. ANDERS

Well aware of the most technical accounts of geometrical projection, particularly of shadows on convex and concave surfaces of complex curvature, he used his pictures of the bowl, most strikingly in its inverted position while being polished, as virtuoso demonstrations of the intriguing configurations of geometrical forms 'morphed' by reflection.

As Jonathan Miller shows in "Mirror Image", his fascinating exhibition at the National Gallery in London (on until 13 December), the artist relies upon our perceptual ability to read the shapes as highlights through our grasp of context. Hummel moulds the reflected contours of the leaded windows like a musician shaping a phrase. The result is both precise and dazzling. □

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