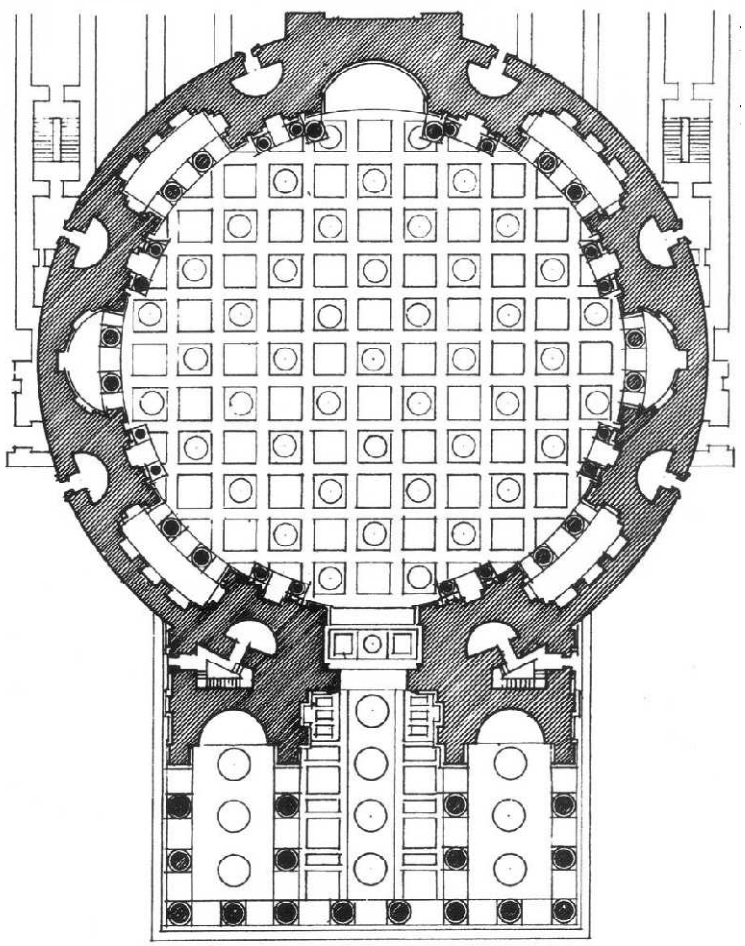
The Pantheon

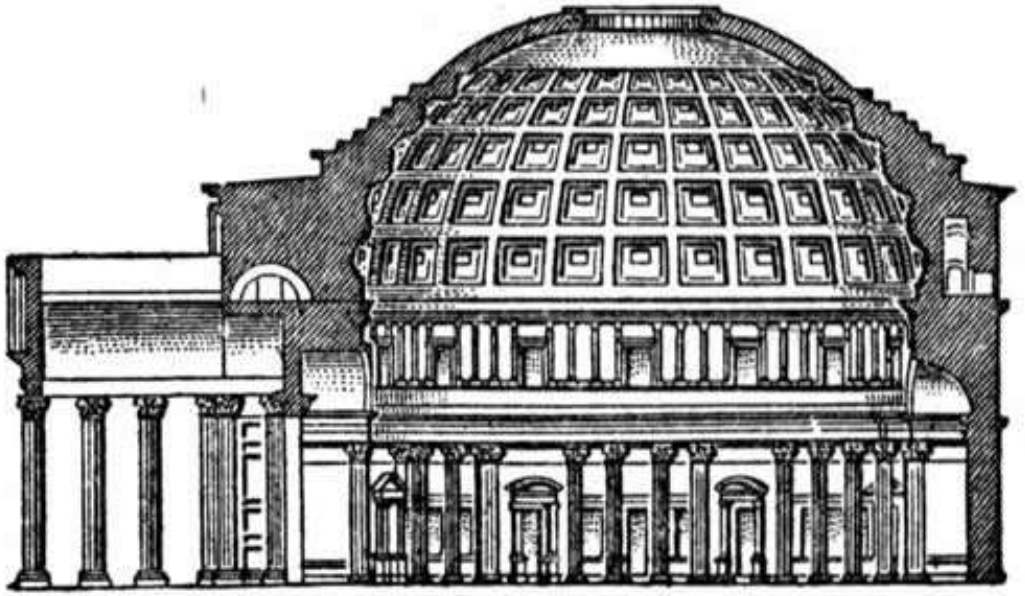
When a picture can look more realistic than any photograph

Built around 125 C.E., the Pantheon (*temple to all the gods*) is one of the best preserved structures of the ancient Roman Empire. Here is a photograph of its exterior in year 1910.



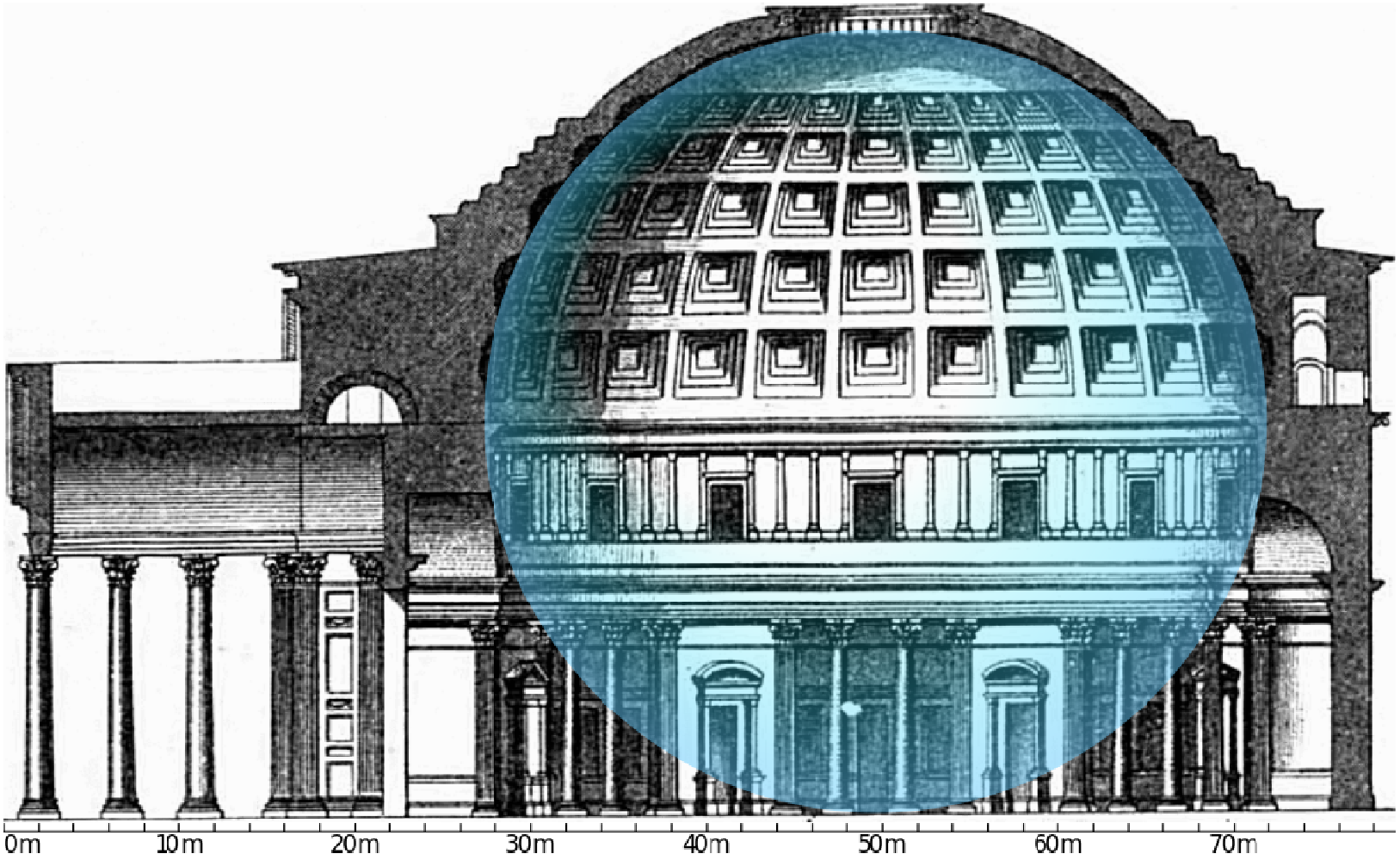
Floor Plan

The interior of the Pantheon is a single giant circular room. Various niches are recessed behind a row of huge columns surrounding the room's perimeter.



Section View

The ceiling of the Pantheon's interior is a great circular concrete vault. At its peak, a circular window opens to the sky.



The height of the circular vault equals the width of the circular room –
a perfect sphere would snugly fit inside the Pantheon's interior space.

A visitor inside the Pantheon is encircled by curving walls and vault.

With the space's width and height being nearly as great as the farthest possible distance to mount a camera, it is impossible to illustrate the complete breadth of the interior in a single 'standard' Perspective drawing or photograph.

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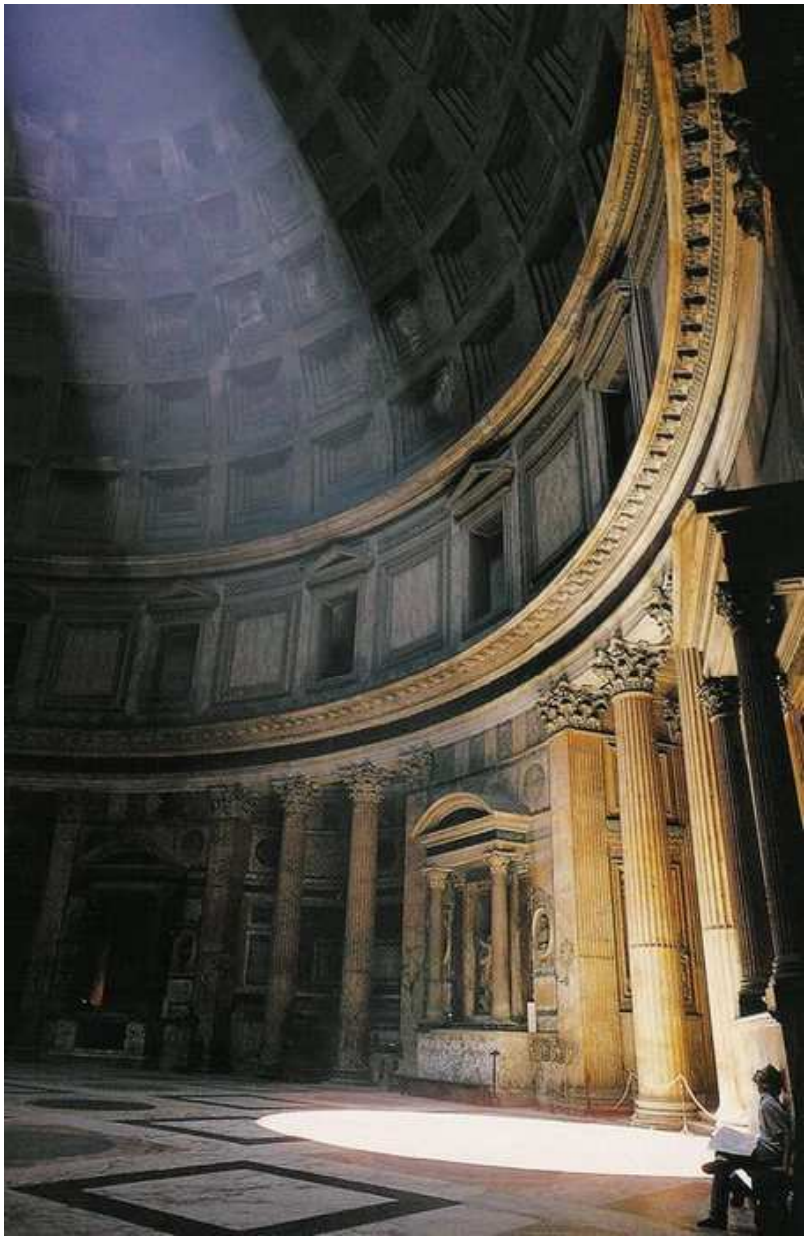
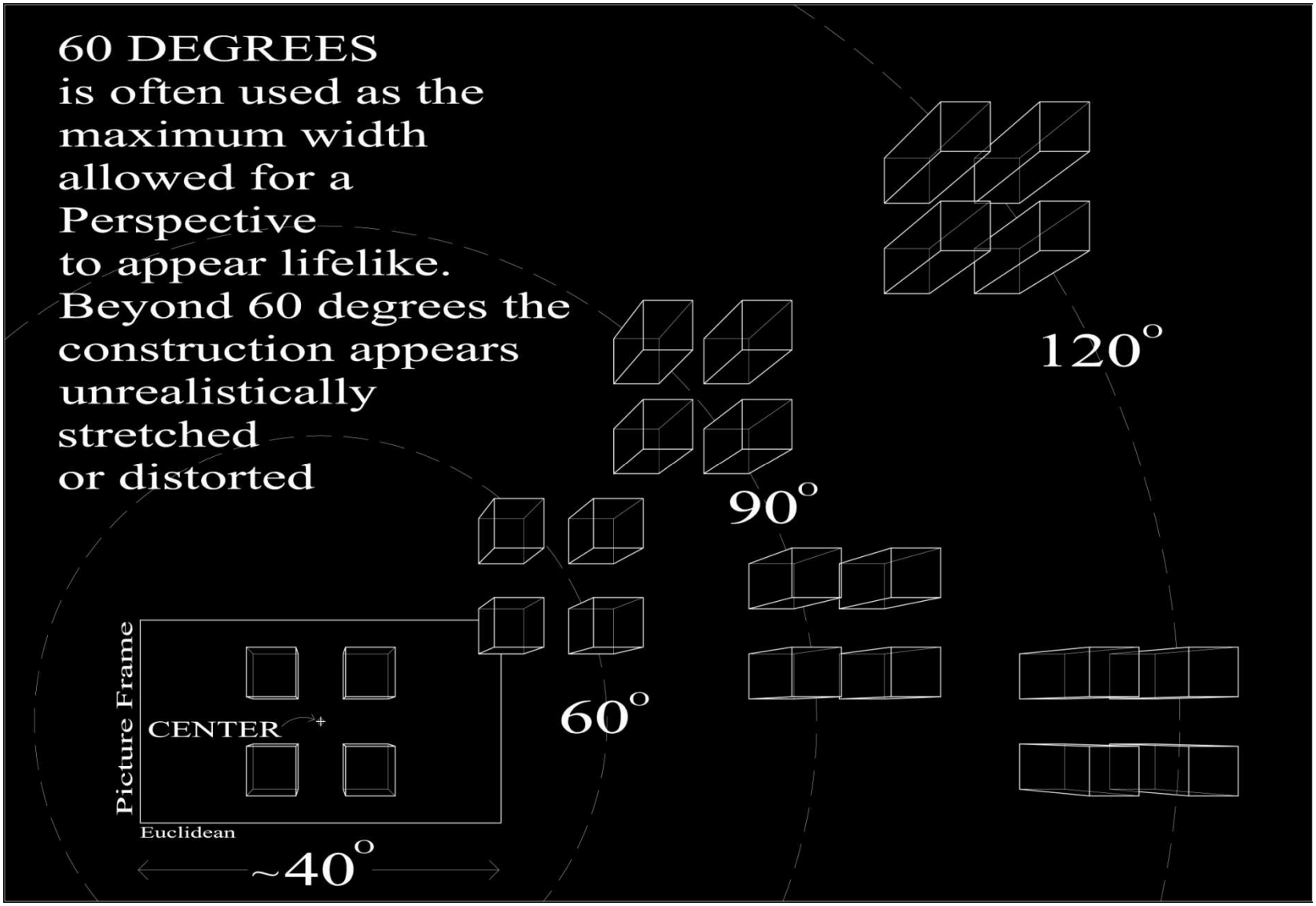
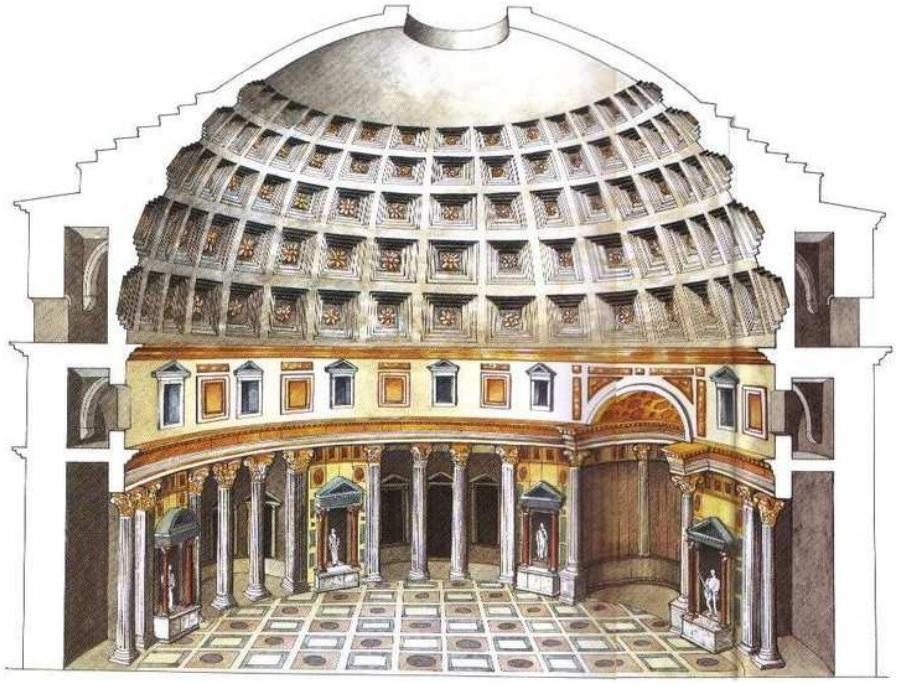
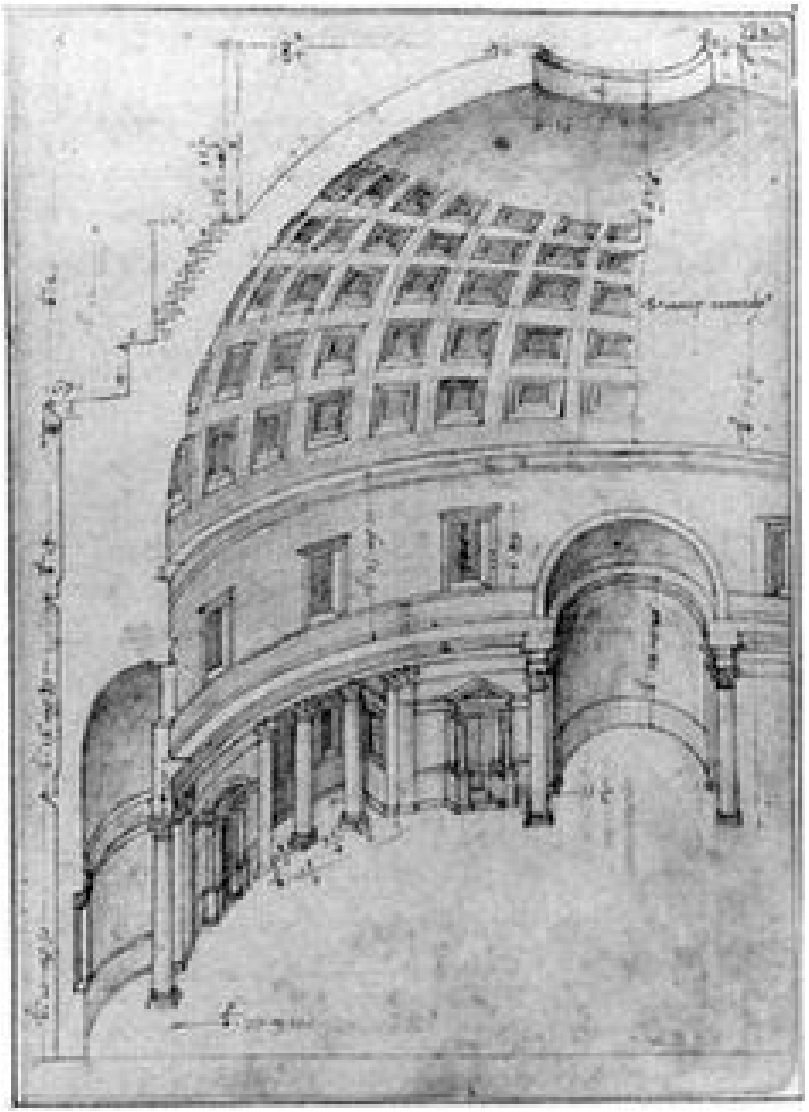
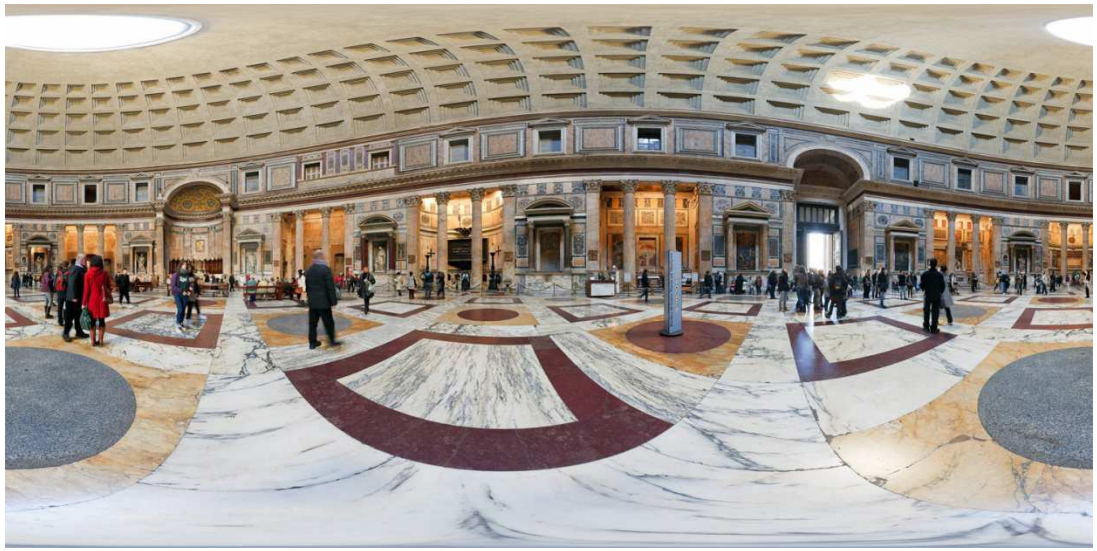



60 DEGREES
is often used as the
maximum width
allowed for a
Perspective
to appear lifelike.
Beyond 60 degrees the
construction appears
unrealistically
stretched
or distorted
120°
90°
60°
Picture Frame
CENTER
Euclidean
~40°

In order to illustrate the entire width of the Pantheon's interior, Perspective illustrators often chose a position for their drawing's 'Eye' (*Vantage Point*) outside of the building – constructing an imaginary "cut-away section view" which can than span the full interior within a 60 degree wide cone of vision.





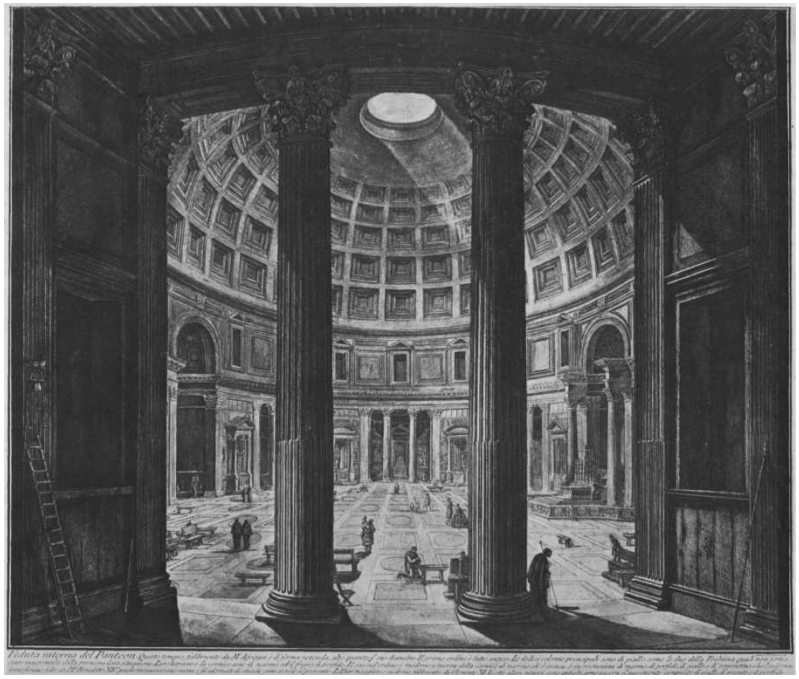


“Wide-angle lens” can photograph views inside the Pantheon wider than the standard Perspective image’s 60 degree limit, but their geometry begins to look distorted and unnatural.

Yet paintings and drawings made in the 18th century show us the complete width and height of the interior of the Pantheon captured inside a single view.

How do these Perspective illustrators do it?

They “cheat” their Perspective construction. They “adjust” their Perspective’s geometry to fit with the Pantheon’s interior.



Giovanni Battista Piranesi - 1756

Giovanni Paolo Panini -1735

The realism of these images is very slightly “off” (to me), still they show the full width of the Pantheons interior better than any photograph is able.

Interior of St. Peter's -- Giovanni Paolo Panini -- 1730

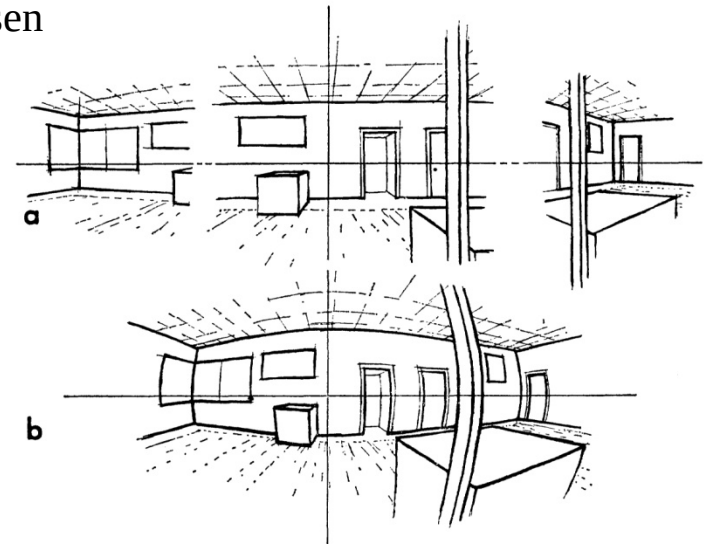
In his 1983 book ***Perspective in Perspective*** (pp. 168-170) illustrator Lawrence Wright examines how Panini's view of the Pantheon's interior was constructed. He also explains how Panini used multiple vanishing points to achieve a realistic wide-angle view of the interior of St. Peter's Basilica, a seemingly quite realistic image no camera lens can match.

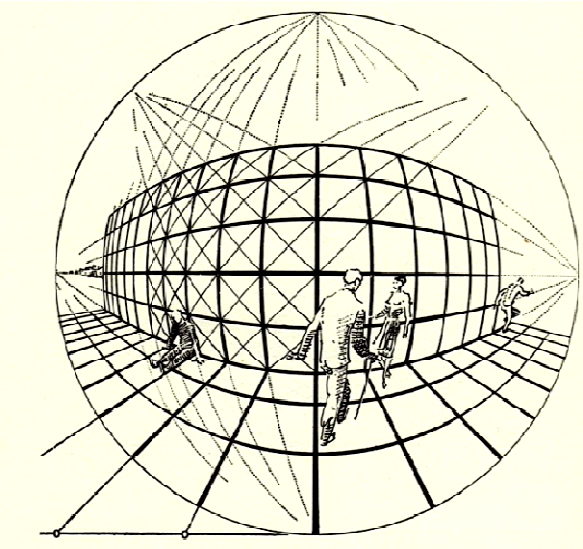
Interior of St. Peter's -- photograph

Wide-angle views of interior spaces are a typical illustration task. Perspective artists have, for centuries, been experimenting with ways to "adjust" Perspective geometry to render wide views in a realistic manner.

Theory for this problem is currently neither well understood nor fully developed.

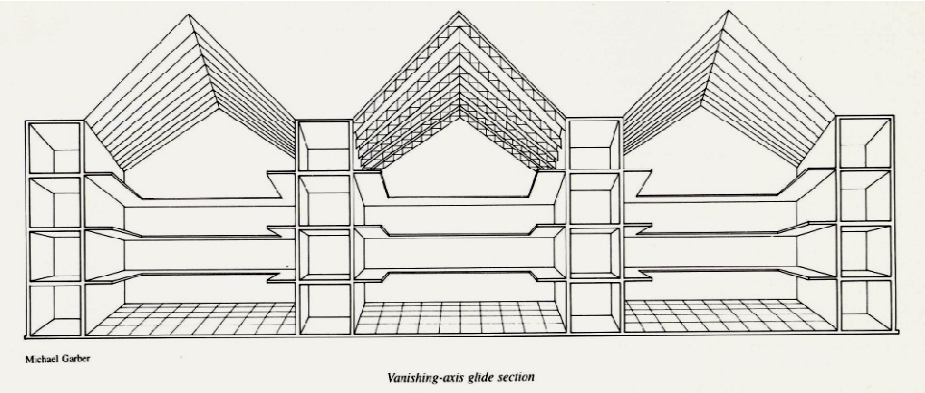
In a 1973 art journal article, artist Robert Hansen proposed that straight lines in a human eye's wide-angle view appear as curves (similar to hyperbolas).





In their 1968 book ***Curvilinear Perspective*** (translated by Robert Hansen in 1987) Flocon and Barre proposed wide angle views using a spherical image plane, flattened by innumerable reverse-cartography methods.

In his 1984 book ***Glide Projection***, Kevin Forseth proposed quasi-Perspective methods using multiple "vanishing points" (which seems to me to have been the method of Piranesi, Panini, and Saenredam). If done artfully, this is barely seen. It preserves the appearance of straight lines as straight on the picture surface.



I think it is fair to expect that simple standard Perspective will endure as the single most popular method for making acceptably realistic pictures. As it is natural for humans to want to see accurate natural views of people, places, and things, Perspective will grow and flourish in our culture.

But in the more general question of how to render realistic images, I think we might be cautiously optimistic that a clearer understanding of how the human eye sees differently from Perspective could help us to invent new techniques of Fine Art image-making – systems capable of producing pictures more life-like and more natural to the eye of their beholders than any of the past.

The End
8th September 2019

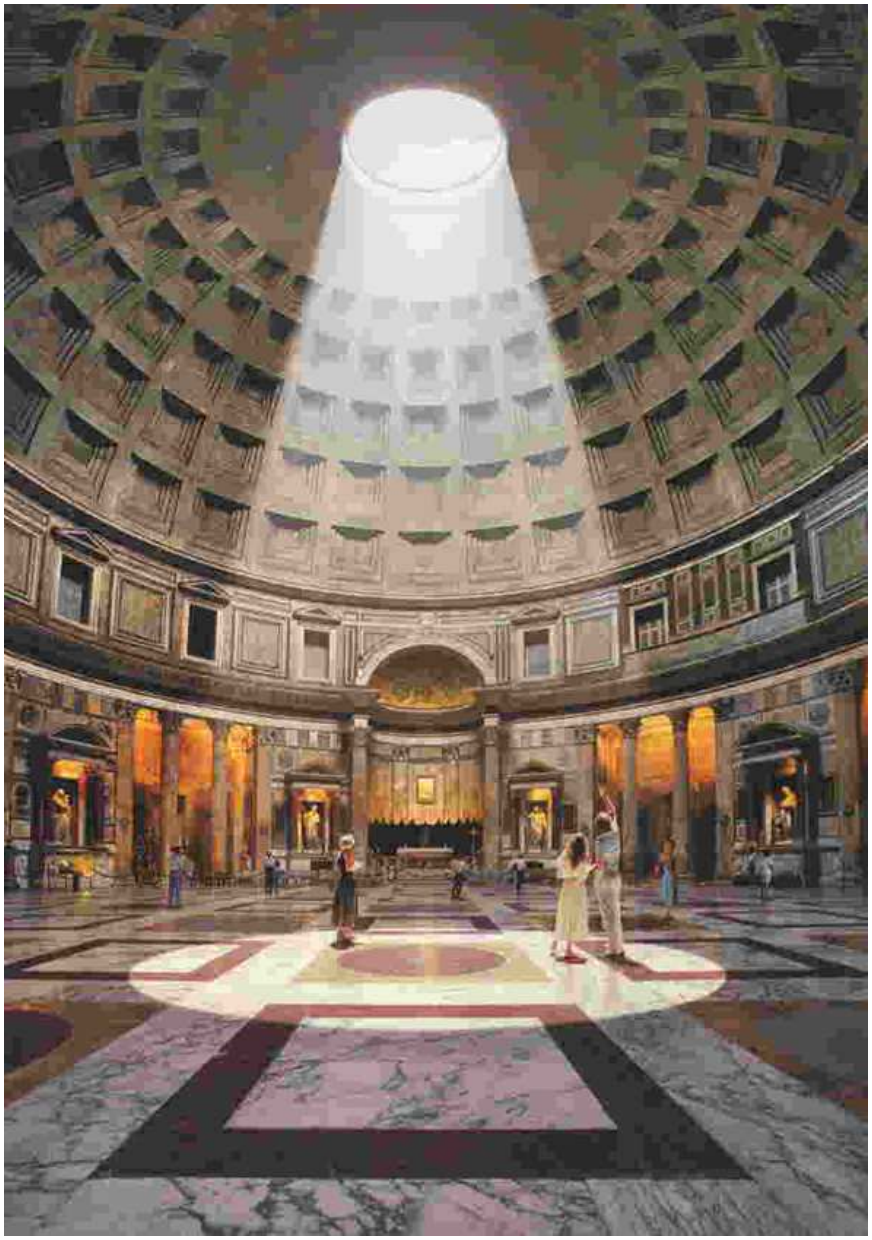


photo by Kim Mason