The Parallel Projection, as Flights of Fancy

Mary Nixon

University of Pennsylvania

2002

Let us know how access to this document benefits you.

Follow this and additional works at: http://pdxscholar.library.pdx.edu/arch_design

Part of the Architecture Commons, and the Art and Design Commons

Recommended Citation

http://pdxscholar.library.pdx.edu/arch_design/37

This Article is brought to you for free and open access. It has been accepted for inclusion in Proceedings of the 18th National Conference on the Beginning Design Student by an authorized administrator of PDXScholar. For more information, please contact pdxscholar@pdx.edu.
The parallel projection, as flights of fancy

Mary Nixon
University of Pennsylvania

The poet's eye, in a fine frenzy rolling, Doth glance from heaven to earth, from earth to heaven; And as imagination bodies forth The forms of things unknown, the poet's pen Turns them to shapes, and gives to airy nothing A local habitation and a name. 1

William Shakespeare, through Theseus, beautifully describes this creative method of the poet. The architect too possesses a poet's eye. And where the poet will use words to compose imaginary places, the architect's efforts will result in drawings. Both the poet and architect rely on sight capable of seeing from above and below, from heaven to earth and back again. For a student of architecture, developing imaginative points-of-view and drawing acumen, is a must. The parallel projection is one such drawing type that aptly addresses point-of-view. Its three-dimensional properties and simple methodology make it a standard of beginning designers. Its inclination toward aerial adventures is an especially important feature to understanding its use. This paper examines the long history and sometimes-parallel track to architecture the parallel projection has enjoyed. I will address the period, late in the 19th century and early in the 20th, when there were great strides in mathematics, science and technology. With these developments the world-view changed. To illustrate the shift from practicality to philosophical intent, I will center on the American architect Claude Bragdon, a follower of Emerson and an advocate of Louis Sullivan. Bragdon is among those credited with reintroducing the parallel projection to the Modernist Movement.

In our modern age, as in ages past, drawings are the currency of architects. We communicate to ourselves and to others through this medium of exchange. We take our imagined three-dimensional worlds and do our best to project those thoughts onto two-dimensional surfaces. The age-old problem is how to do this. Do we describe our thoughts in a series of images or multi-views, or do we tell the story in one image or single-view? Or is it necessary to combine the two? Plans, sections and elevations are multi-view drawings known as orthographic projections. Orthographics, meaning right-angled or straight image, are a “fragmented series of distinct but related views”, while “single-view drawings illustrate the three dimensions of form simultaneously and...show form relations in a more realistic manner.” Parallel projections and central projections, or what are more commonly known as perspectives, are single-view drawings. “Single-view drawings express volumetric forms by combining the parameters of length, width and depth.” Parallel projections, used here, includes the families of axonometrics, isometrics (having identical standard measurement in all three axes), dimetrics (in two axes), trimetrics (in none of the three axes), and obliques. They are all variations on the same theme. “Parallel lines remain parallel in parallel projections, while they converge to vanishing points in (central projections or) perspectives.”

“Axonometric drawings show three dimensions simultaneously...one sees the x, y and z planes at the same time.”

“There are no vanishing-points and consequently no diminishments, a thing does not change its size or dimensions by reason of position or distance, because the vanishing-points are at an infinite distance and the eye of the observer at all places at once.”

“The construction is spatially non-hierarchical.” This difference is a difference in methodology and result. However, given that they are both single-view drawings, the word ‘perspective’ has been attached to both through time. Parallel projections have been designated as cavalier (or saddle height) perspectives, military perspectives, isometric perspectives, fast perspectives, more common perspectives, spherical perspectives, and axonometric perspectives, among others. Parallel projections, like linear or vanishing-point perspectives, are single-view drawings, portrayed in two-dimensions, showing a three-dimensional realm.

In The Frozen Fountain, Claude Bragdon compares “three different methods of representing the same architectural subject” with the aid of a small illustration. (Fig. 1) Here we see the three methods of projection mentioned above: parallel, central and orthographic. The first two are single-view drawings, while the last, a multi-view. Bragdon also gives three reasons why the “isometric perspective” has advantages over the other two methods:

First, as an easily achieved projection of the mental image, conveying the sense of three-dimensionality without going through the tedious process of point perspective; Second, as an interpreter of working drawings to the artisan, an isometric drawing being a realistic working drawing-plan; elevation, and section all in one; and, third, because of its being true to scale in all three dimensions it becomes in some cases a more clear and effective working drawing than any other kind.

As testimony to the above illustration, most parallel projections involve aerial views. Although some drawings may be executed with a view from below, most often it is the view from above, the bird's-eye view that distinguishes this drawing type. It is this aspect that I wish to address. By paying attention to the major shifts in history concerning our attitudes
toward flight and our view from above, we can better understand the use of the parallel projection as a representational tool. These thoughts are supplements to the histories of this drawing choice already published by Yve-Alain Bois and Massimo Scolari.11

The parallel projection views as a bird views. It hovers or flies above its object.12 The bird’s-eye-view is a privileged one and as an everyday occurrence it is foreign to us. We are bound by gravity. Because of this we have watched from an early age creatures that have mastered this reality and we have wondered what it is like. We climb trees for that high advantage and swing on swings for that thrill of flight. There is “the conviction of many children that they can fly; a conviction often felt so strongly that they cannot resist throwing themselves from walls and windows.”13 Underlying this childhood conviction are the desires to escape the bonds of gravity and venture out into the world. This is something Jimmy Stewart’s character in the movie It’s a Wonderful Life knows all too well. George Bailey longs to see the world, go to school, and to “build things, design new buildings, plan modern cities.” When his plans for school are dashed, he still dreams of travel. Mid-way in the movie he tells us “the three most exciting sounds in the world are...anchor chains, plane motors and train whistles.” And just as these sounds are emblems for adventure so are certain sights, like the expansive ocean, the distant horizon, or the flying bird. They are reminders “the world is vast, beyond this speck of a place, and there’s a way out.”14

But has the desire to fly always been universally welcome? Clive Hart in his book The Prehistory of Flight answers no. “In premodern times, psychological unease was increased by associations of flight with the idea of inescapable judgement and vengeance.”15 Although they do not form a simple linear sequence, Hart lists three broad groups in which the ideas about the air explored fall:

One is the notion of an animated cosmos, beginning at least as early as Hesiod (probably eighth century B.C.) and repeatedly reinvigorated by Platonising writers until the eighteenth century. In such a concept of the world not only is the air, along with everything else, in some sense alive and active, but it stimulates the imagination because of its invisibility, its unpredictability, and its special position between heaven and earth. A second is the set of Aristotelian tenets about the physical structure of the world which, although often modified and sometimes vigorously questioned, remained generally dominant until the seventeenth century and was especially important in European natural philosophy from about 1100 A.D. While not necessarily incompatible with the notion of an animated world, Aristotelian physical concepts were more readily associated with the idea of a self-governing, self-sustaining, deanimated universe; the earlier world view was gradually supplanted by the more mechanical model. Deprived, by this evolutionary process, of its own personality, the air nevertheless long remained inhabited by truly aerial creatures—demons and fallen angels—which made it a hazardous region for man to explore. The remaining group of ideas emerged with the so-called New Science of the seventeenth century, during which knowledge of the nature of the air expanded rapidly.16

In premodern times the air was the providence of the gods and their minion, and it was through the air that the gods made contact with man usually in the form of spectacular weather phenomena.17 This was a long held belief. We can witness the perceived hazards of flight in an Italian engraving of 1710. (Fig. 2) It is entitled “Democritus laughed” and shows the Greek philosopher pointing to three attempts at
flight. Democritus (460-370 B.C.) developed one of the first atomist theories of the universe and he felt sense perception yields only confused knowledge, telling us merely how things affect us. Thought alone can apprehend the nature of things. It is said that he put out his eyes so that he might think more deeply. He was known as "the laughing philosopher" of Abde'ra and should rather be termed the "deriding" philosopher, because he derided or laughed at people's folly or vanity.

In the upper right-hand corner of the engraving, we see "Francesco de Lana's well-known scheme of 1670, which called for the use of four evacuated copper spheres to carry a flying machine aloft." This is followed by "Laurenco de Gusmao's famous Passarola of 1709, for many years thought to have been a fanciful design for a heavier-than-air (bird-shaped) flying machine, may actually have been a proposed balloon car." And finally, Icarus, the poster boy for the hazards of flight. This engraving addresses the moral, spiritual and practical matters of flight and "the presumptuousness of any intention to force one's way towards the heavens."

In earlier times the skies were scary and bad things happened there, but bad things were not always imagined and having an aerial view grew out of necessity. Yve-Alain Bois lists the many sciences that "axonometry" has invaded (military strategy, architecture, painting, descriptive geometry, stereometry, cartography, mechanical drawing), and considers military art one of its high points. Although there are recorded incidences of parallel projection, military strategies are an important source. These drawings, with views from the air, anticipate danger from the air.

For Vitruvius, as for the Early Renaissance, fortification and the science of siege-devices and defense machines formed an integral part of architecture. (But) the technological revolution in artillery at the end of the fifteenth century, consisting in the systematic use of cannon fired by means of gunpowder, and the use of iron as opposed to stone cannonballs, necessitated a radical change in fortifications, the conventional forms of which no longer stood up to the new weapons.

The soldier-engineer had knowledge of ballistics and worked out calculations of trajectories. "He favoured the axonometric over the perspective because in war...the whole has to be shown...He used parallel representation because he needed to see the whole, distinct, clear, and be able to find the truth precisely with compasses." He chose "a system which would eliminate dead zones, standardize foreshortenings, and simplify calculations." Those whom added to the theories of fortification often addressed theories of town planning as well, because of their interdependence.

Jacques Perret de Chamberry is one such person. The fifty-four plates of his treatise are almost all military perspectives. (Fig. 3) Perret described and illustrated the central high-rise building of Fig. 3. It was not buildable. It is said he was "more interested in the view, and in the fireworks that (could) be set off from the roof terrace."

This fascination with flight, views from above and exploring the middle region was made attractive through kite flying "at festivals and ceremonial processions;" theatrical productions and spectacles.

Adding an unusual vertical dimension to the more nature horizontal movement on stage or in ceremonial processions, such spectacles readily captured the attention and imagination of audiences. Although they did not normally involve flight in any real sense, they were sometimes performed with the help of equipment-especially wings and kites-having some ancillary aerodynamic function. There is no doubt that their growing familiarity in the sixteenth and seventeenth centuries influenced the visual imagination of many...Cords, wires, pulleys, moving platforms, and sliding panels were in common use for assisting the creation of lifelike spectacles at late mediaeval and Renaissance banquets and other ceremonial occasions. Angels, classical gods and goddesses, winged dragons, and a variety of other fantastic creatures were caused to pass overhead or to make startling descents into the centre of the arena. Arranged both in and out of doors, such ceremonial entertainments, often costing high sums of money, were set up with meticulous care and great ingenuity.

The reality of flying like a bird, however, was another story. The closer the mechanical sciences got, the more fear grew. This fear was of "the likely practical misuse of an invention that society might find difficulty in controlling. From the seventeenth century...admonitory comment on the evils that might follow became a commonplace trope." Instead of the gods having the advantage over those below, now man would have the advantage and we "would always be in perpetual danger. Whose life would then be free from danger? What house would be safe from robbers? What city would be safe against the enemy?...The world would seem a thousandfold hateful
and more ruinous than from the...misuse of the compass, of
gunpowder; and of printing." These new fears of flight con-
tinued to echo the old ones, namely, there are dangers above.
Man did learn to fly however. Along with great fanfare in the
fall of 1783, two men in a hot-air balloon cut their tether and
were free to fly. The balloon was the invention of brothers,
the younger one trained as an architect. Although manned
balloon flights were used in the French Revolution, as well as
the American Civil War, the fears of earlier generations, in the
main, were put aside.

Advances in mathematics, science and technology continued
and in the later nineteenth century we entered the grand age
of exploration and travel. This "was the first age in which
almost all the cultures of the world had been made available
through writings, illustrations, museums, photography (later
film) and increased opportunities for safe travel itself." The
world was getting smaller: An interesting by-product of this
wealth of knowledge was the increased sense of separation
between man's physical world and his spiritual world.

Many of the avant-garde artists and architects of the late 19th
century and the early 20th, who embraced and championed
the parallel projection, were generalist. They were interested
in many things. Their interests included architecture, painting,
publishing, illustration, theatre, color, music and film. They also
had strong philosophical leanings, which stressed higher con-
sciousness, and preferred parallel projection for more than
just practical reasons. And whereas the premoderns feared
the above and used parallel projection in practical ways, the
modemns redefined the above as higher consciousness and
used the parallel projection in thoughtful ways. (Fig. 4)

The form as well as the process of the drawing spoke
about the form of their ideas. That is, the drawing con-
struction was important to them not just as a depictive
format but as a quotient of meaning as well. As symbol-
ic of their polemical position, it was opposed to the hier-
archical order of classicism and the emphasis on façade.
Instead, they strove for an architecture which could have
an equivalency of elements in space, no front, back or
sides, no near or far, top or bottom, major or minor, no
interior or exterior. Space was to be neutral, amor-
phous, infinite, and the axonometric drawing form rein-
forced this sense of infinite extension.

Yve-Alain Bois goes into greater detail regarding this period of
revival of the parallel projection in his "Metamorphosis of
Axonometry." He ends that paper by comparing axonome-
try to the flying horse Pegasus. He begins that paper with a
quote and two illustrations by the American architect Claude
Bragdon (1866-1946). Bragdon is seen as "enthusiastic" and
given credit for discussing "isometric perspective", but he is
dismissed by Bois. Epistemologically, Bois feels, "Bragdon bears
no relation to the modern architectural movement: A master of
Art Deco, his concern with axonometry grew out of his
occult and theosophic studies of the fourth dimension."

Bragdon I feel is an important contributor to the history of
this drawing type and represents the hinge between premod-
ern and modern attitudes. Bragdon's chapter on "Isometric
Perspective" in The Frozen Fountain of 1932, originally
appeared in article form in 1926. At this point in his life,
Bragdon had already given up his architectural practice,
moved to New York and was working in the theatre. He had
left his home in Rochester, New York known as Cro Nest
and relocated to a "single room in a cliff-like New York sky-
scraper," in his "high aerie in the Hotel Shelton." He had
"witnessed the inception of the telephone, the electric light,
the automobile and naturally-the airplane." He added to that
list the passenger elevator, calling it "a nine-days' wonder." Even
though Bragdon credits his theatre work for reempha-
sizing the advantages of the parallel projection, he had
already mastered its use. His earlier publications were pro-
fusely illustrated with diagrams and examples of this graphic
means. (Fig. 5)

The first reading of Bragdon's chapter may give the impression
of a how-to, step-by-step guide to developing isometric draw-
ings with theatre stage-sets presented as samples. On closer
inspection we can find the synthesis of practicality and philo-
sophical intent. According to Bragdon, "Isometric perspec-
tive...less faithful to appearance, is more faithful to fact, it
shows things more nearly as they are known to the
mind...there is no far and no near...and the eye of the spec-
tator everywhere at once...Isometric perspective is therefore
more intellectual, more archetypal, it more truly renders the
mental image-the thing seen by the mind's eye." Some of

Fig. 4. El Lissitzky, Tatlin working on the monument, 1921/22
Bragdon’s writings on the theatre also give us insights into his representational preference, which go beyond the practical:

"...if we think of the cosmos as God’s playhouse, the theatre becomes by analogy a microcosmos in which man disperses himself creatively in whatever way he wills... (it is) sheer fantasy and wish-fulfillment... the place is primarily the soul of man; the time is every moment... the true function of the theatre... will give us a vision of life... as seen from a height instead of from near at hand, thus revealing something of its pattern... The play is such a fusion of the ideal and the real... as to justify the attempt to create a mise en scene which should be the meeting-place of two worlds—no man’s and every man’s... the stage a place, luminous in a void, sculptured in light to reveal and to enhance the actors and the action... This "space stage..." a stage dedicated to the rendition of human life concentrated, intensified, detached from its surroundings; seen, as in a camera obscura—"in the mind’s eye... (as from) a mountain top from which life is viewed from "above" as in rare moments of divination." 45

Bragdon’s observations about the theatre echo his observations about parallel projection. The place of the theatre, which is drawn in parallel projection, is analogous to the place of the imagination, which sees in parallel projection. The view from above is primary. Place and time are neutral, amorphous, infinitely extended. The object of attention is detached from its surroundings and seen as in the mind’s eye. Bragdon’s transcendental, theosophical and fourth dimension interests did color his thinking. These same philosophical leanings were shared by many of the avant-garde artist-architects credited with the revival of the parallel projection. Bragdon’s chapter on the isometric perspective addresses the practical of the premoderns, and theoretical of the moderns. The parallel projection is still quick and easy, as well as "perceptively ambiguous." 46

Bragdon ends his chapter with a drawing entitled "Sinbad Finds That Man Is Isometric." (Fig. 6) Seen from above, Sinbad the adventurer is in a cube of equal measure. His up-standing body has four arms representing the six dimensions of man: above and below, ahead and behind, right and left. These are the same six dimensions that were compressed into the x, y and z axes of height, width and depth. It is a single-view drawing, on a two-dimensional surface, showing a three-dimensional place. It is a projection of a mental image. It is also emblematic of the modern approach to parallel projection. The moderns changed the perspective of this "perspective". They saw with the eye of the mind and not just with the eyes of the head. Their images of flight were images of transcendence. "Most dreams of flight take us, potentially, away from earthly bounds, set us free from earthly bonds..." 47 "We are flying in imagination; the earth is below us, the heavens are within reach..." The imagination, known as "the wings of the mind," 48 is our middle realm. The beginning designer sees ideas there and tests the validity of those ideas through drawings. The parallel projection, with its quick and easy method, its ability to see things whole and at a glance, and its propensity for aerial adventures, makes it a perfect choice. The poet and architect will always express that urge to fly, as well as fly away. For now, consider some parting words of John Keats:

"Let the winged Fancy roam,
Pleasure never is at home." 49

Notes:

1 William Shakespeare, A Midsummer Night’s Dream, Act 5, Scene 1.


3 Rendow Yee, Architectural Drawing, a visual compendium


7 Iain Fraser and Rod Henmi, Envisioning Architecture, pp. 54.


9 Claude Bragdon, The Frozen Fountain, pp. 60.

10 Ibid., pp. 59, 60.


16 Ibid., pp. xiii, xiv.

17 Ibid., pp. 185.


20 Dictionary of Phrase and Fable, 1898.


22 Ibid., pp. 23.


30 Hanno-Walter Kruft, A history of architectural theory, pp. 117.


32 Ibid., pp. 123, 124.

33 Ibid., pp. 116.

34 Ibid., pp. 117.

35 Tom Crouch, The eagle aloft, pp. 22.


38 Iain Fraser and Rod Henmi, Envisioning architecture, pp. 55.


44 Ibid., pp. 61.


49 John Keats, "Fancy," The poetical works of John Keats, 1884.