

**CLAUDE FAYETTE BRAGDON, ARCHITECT.
THE FOURTH DIMENSION EXPOSED**

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Abstract. At the beginning of the 20th century, in the United States of America, some treatises about the diffusion of scientific knowledge, about the notion of space and time and on the fourth dimension, were published. The authors were mathematicians only in some cases.

Claude Fayette Bragdon (1866-1946) [1], a valued architect and stage designer, quoted in the renowned book of American Architectural History “The Architecture of America: A Social and Cultural History” (John Burchard and Albert Bush-Brown, 1961), published a chain of essays, books and articles about the higher space geometries and related visualizations. The present paper investigates the connections and consequences among the issues that concern the understanding and construction of space in four dimensions and its application in Bragdon’s architectural projects.

Keywords: Architecture, fourth dimension, magic squares, magic cubes

Mathematics Subject Classification: Primary 00A67, 00A66, 00A65; Secondary 97M80

1 Introduction. Why architectural space should have only three dimensions?

The perception of the physical space in architecture is experiential. It means that, although the sense of sight is able to capture the geometric, figurative and aesthetic characters, ultimately the harmony of the shapes, the quality of the built environment is perceived with all the senses, in a dynamic approach, as a continuous sequence of space-events and at the same time in separate instants, as a cognitive act.

To quote Immanuel Kant, space is “a pure form of sensuous intuition”, and performing architectural space is something that can be perceived all at once, at an intellectual level, but always practicing it materially, in an empirical way, as an absolute necessity for our human nature.

A primer to the topic of architecture related to the higher dimensional space has to ponder about matters discussed within the phenomenological tradition, including the nature itself of perception, involving the so-called time-consciousness and self-consciousness, the awareness of the body and the consciousness of “others” and, in a way, could face some transcendental problems. First of all

the problem of “pure knowledge”, that actually in Kant's *Transcendental Aesthetic* [2], [3], [4]¹ is introduced by his analysis of cognition and by the concept itself of space and time, dealing with the way we acquire awareness of the objects.

In fact, at the basis of phenomenology there is the idea that any everyday object can become a knowledge engine. In this context, Architecture, as a constructed space inside which we live, represents the epitome of everyday life, and “lived space” represents the “object” to discover and to understand, either as a formal continuum in terms of geometry and physics, and like a sort of external theater, within which human beings are spectators and actors. In so doing, the center of the interest in modern architecture is no longer representative but in the hunt of atmospheres, no longer in search of an external figurative harmony or even perfection, but in a space-time experience in which memories and actions take place.

“In a fragment of a second you can understand: Things you know, things you don't know, things you don't know that you don't know, conscious, unconscious, things which in a fragment of a second you can react to: we can all imagine why this capacity was given to us as human beings. Architecture to me has the same kind of capacity. It takes longer to capture, but the essence to me is the same. I call this atmosphere. When you experience a building and it gets to you, it sticks in your memory and your feelings”²

It is time, therefore, together with memory, to become the main component of the architectural experience, to become a physical measure as well, inseparably tied to the spatial dimension.

One of the most important historians of Modern Architecture, Sigfried Giedion, considers architecture as a set of “phenomena of transition” [8], in which the present time is correlated with the historical development of the past. Therefore, he sets out three spatial conceptions. To summarize: “plastic and corporeal” is the first, from Greek Architecture, “close and compact” the second, characterizing ancient Roman Architecture and the third, as a fusion of the first two, belongs to Modern Architecture.

Starting from *Space, Time, Architecture* (1941) [7], to *The Eternal Present. The Beginning of Art* (1957) [8] and *The Eternal Present. The Beginning of Architecture* (1957) [9]³, up to *Architecture and the Phenomena of Transition* (1971)⁴ [10], the philosophical assumption of Giedion's space-time triad introduces and establishes an analysis of the organic space formation-transformation process, not only in a stylistic sense, but also as sort of character of the formative creative process itself. Moreover, the analysis of the way of perception in space and in time leads to deepen questions of phenomenological type and on multiple space and multisensory, which are directly related to the concept of higher dimension itself.

¹ I. Kant *Prolegomena* with enclosed editorial explanations by Jonathan Bennet (2004) [3].

² Interview with Peter Zumthor, Pritzker Prize-winning in 2009, *Seven Personal Observations on Presence In Architecture* [6].

³ In the field of the Mellon Lectures at the Washingtonian National Gallery of Art, Giedion presented two lectures entitled *The Eternal Present*, the first about art [8] and the second about architecture [9]. The common subtitle “a Contribution on Constancy and Change” well defines the topic of the lectures.

⁴ Giedion's last work, published posthumously, examines the fundamentals of modern construction, through the changings of the characteristics of architectural space in the different eves of the past.

The individual is in physical place and at the same time in his personal place of memory; he perceives the place in the instant, in continuity with the instant before, aware of being already in the next one.

This is a typical question intersecting the *general problem of setting and solving* in architecture, emblematic in music as well [11]. We are in an in-between⁵ place, we are here and elsewhere. In order to make some examples: where do we are when we listen to the music? How do pedestrians crowding narrow sidewalks not collide without “taking measurements”?

Those are the questions: whether space really possessed these properties or if it is our mind that owned this intuitive capacity and just for this reason could conceive space-time and many dimensions and at the same time, even if common people are not able to, succeed in rendering (at least formulating) a true visualization of 4d ambiances.

The phenomenological matter would require a long dissertation. Following a renewed interest in this field, Steven Holl⁶ in 2000 published a book entitled *Parallax* [12] which presents 15 projects as representative of the consequences in Architecture of the achievements of the scientific knowledge. The Parallax is both the fourth dimension of the space-time and that of the human experience itself; it is also the fourth dimension of the elementary particles of light (let's say photons or quanta of light), whose scientific empathizing through the Holl's watercolor contribution at the design process has been so important; it is, above all, the purely geometric astronomical parallax, which needs an angular measurement to calculate a dynamic distance. In this field too, the issue of visualization and light⁷ as a material of construction, provides a fundamental contribution to the understanding of architectural space.

Claude Fayette Bragdon (1866-1946), whose design method derived from the geometrical development of architectural elements conceived in a higher dimensional space, is the subject of the present study, anticipated the topic of visualization of the fourth dimension in architecture, fitting in the cultural debate of the time, that even in mathematicians' academic dissertations, frequently trespassed in dealing with cosmological matters.

2 Context. Charles Hinton, Henry Manning, Eric Neville, Cora Lenore Williams William Granville, Robert Reeves and the diffusion of scientific knowledge in the United States

In 1905, Einstein submitted the theory of Special Relativity and in 1915 that of General Relativity, making the concept of space-time and the fourth dimension in some way “official” although still not accessible to all.

⁵ It is a sort of place of no-where, the space of the experience, in which the opposites: natural/artificial, indoor/outdoor, insight/outside become physical place of the architectural experience.

⁶ Steven Holl (1947 -) is an American architect, Alvaar Aalto medal in 2000, whose philosophical interests in Maurice Merleau-Ponty studies on the foundational role of perception in all the arts (from literature to architecture, up to politics, as the ancient art of oratory) led to a unique compositional method and distinguishable architectural language, and to the important collaboration with the Finnish architect Juhani Pallasmaa, author of the book “The eye of the Skin”, a milestone in the New Phenomenology in Architecture. Holl previous interests in various implementation of topology in the conception of his architectures had a concrete realization, for example, in his “Experiments in porosity” (2005) and Open Architecture Sliced Porosity Block (Chengdu, China 2012).

⁷ whose measurement is in terms of luminous flux in which space (distance) and time (“vectorial transportation” from the light source to the illuminated object), in so consisting as a matter in the fourth space-time dimension.

The history of a fascination goes back to the Greek philosophers and to the lost Ptolemy's *On Dimensionality*, but at the beginning of the 1900's, some eminent mathematicians published treatises on the fourth dimension, and on projective-geometry problems. Some of them went quickly to literature with novels of science fiction that retraced the way open by Lewis Carroll and Edwin Abbott.

A still incomplete list of publications on this subject that has been a source of inspiration for Claude Bragdon, testified by the architect himself in his autobiography [28], is set forth here below:

- Alfred T. Schofield, *Another World; Or, The Fourth Dimension*, London 1888
- Charles Howard Hinton, *A New Era of Thought*, 1888
- Charles Howard Hinton, *The Fourth Dimension*, 1904
- Henry Edward Manning, *The Fourth Dimension simply explained*, 1910
- Henry Edward Manning, *Geometry of Four Dimensions*, 1914.
- Cora Lenore Williams *Creative Involution*, 1914
- Eric Harold Neville, *The Fourth Dimension*, 1921
- William Anthony Granville, *The Fourth Dimension and the Bible* 1922
- Robert Reeves, *Space and Fourth Dimension*, 1922

In particular Claude Bragdon payed explicit tribute to Charles Hinton's and Henry Manning's works [17][18][14][15].

This part of the research concerning the study of the space described in these treaties, is still ongoing.

3 Claude F. Bragdon's *A Primer of Higher Space* and other writings

Bragdon⁸, who was an insatiable reader and a writer, just like his father George, while moving the first step in architecture joining the Art Nouveau movement, was also involved in the field of editorial activities. In fact he published a conspicuous number of articles and seventeen books on architectural theory, fourth dimension, esotericism, and even yoga. The reason of the interdisciplinary approach is that fourth dimension, in Bragdon opinion, is a new way to rehabilitate symbolism in architecture and cosmic consciousness achieved as a common language speaking "mathematics": a kind of theory of everything that fully explains the physical aspects of the architectural space as our human microcosms encapsulated in a higher-dimensioned universe.

"Nothing new", he wrote, "mathematics has long been made to serve man's use" [27, p. 72]. What is new in the fall of the new century is that since the advent of non-Euclidean geometry the field of mathematics has been enlarged, and thanks to the theory of relativity, popularized. "Space-time, curved space, the fourth dimension having become catchwords" [27 p. 72].

Shown below the synthesis of the seven Bragdon's books concerning the fourth dimension and the relationships with Architecture.

⁸ A thorough biographical profile with detailed reports on Bragdon's buildings and professional and cultural activities can be read in Rochester History, October 1967 [15].

The Beautiful Necessity. Seven Essays on Theosophy and Architecture (1910) [21] is the first in which Bragdon introduced Mathematics as the common denominator of Nature, Music and Architecture. It consists of series of essays on architecture as “frozen music”. Goethe’s famous statement associated with the observation of the latent geometry of Nature and with the analysis of the arithmetic of beauty, became the *leitmotif* of his design research. In the late 19th-early 20th centuries Theosophy emerged in America due to the questioning of science and religion incongruity, finding a new point of view in the common search for a deeper meaning and new ways of creation and perception in the field of artistic production were introduced. Some American Historians stated that the development of modernity in America was coincident with an occultism that was paradoxically supported by various technological advances such as electricity, with its implication of invisible force enlightened according to the strong American Spiritualist interpretation of many scientists of that time. At the Columbian Exposition (1893), in fact, the popular use of electricity was presented, and pervasive. Theosophical atmosphere coupled science with religion, together with a sort of reconsideration of mental/spiritual relationships and a redefinition of space/time concepts.

Bragdon was active in the Theosophical Society in America in continuity with his father’s interests, whose collection of books on Buddhism, Induism, ancient Eastern Religions, as well as literary works by important Transcendentalist authors such as Shakespeare, Carlyle, Ruskin, Thoreau the young Claude attended with curiosity.

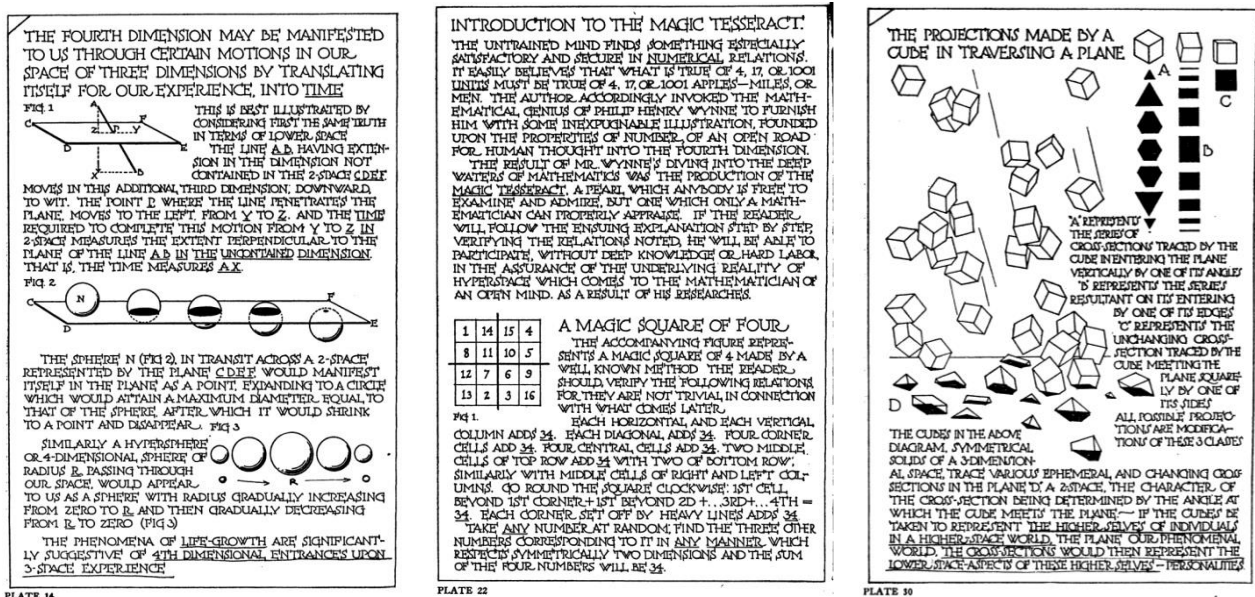


Fig. 1. Illustrated plates from the set of thirty, in Bragdon’s *A Primer of Higher Space*

In this contest, Bragdon’s studies and writings were born. Geometries, starting from the cube – on one hand – and from the organic metaphor – on the other hand - became a chain of books on Architecture and higher space dimension once developed as the construction of architectural elements, once as a sort of revelation of the human capacities, through which the concept followed a transversal logic, with repetitions and variations.

⁹ Johann Wolfgang von Goethe, *Conversation with Eckermann* (March 23, 1829).

Man the square: a higher space parable (1912) [22] opens with an abstract from Kepler's *Mysterium Cosmographicum* introducing the parable of the Man depicted as "a three-dimensional projection of a higher-space unity"

*Artful nature has given to the most perfect animal the same six limits as the cube has, most perfectly marked. ... Man himself is, as it were, a cube*¹⁰. Kepler

Like some contemporary treaties described in the previous paragraph, a sort of mystical truth corresponds to the fact that man is the cube. We can note in the illustrated plates in the book, interesting correspondences with Abbott *Flatlandia* graphic representation of vanishing volumes under plane horizons (fig.1, left) and with linguistic dramaturgical settings in an Ideal Heavenly City.

In the first edition of *A Primer of Higher Space* (1913) [23] the "parable" *The Man and the Cube* is re-edited, following 30 pages of graphic plates describing step by step the geometrical construction of the phenomenon of the fourth dimension. Of particular interest Plate 14 (see fig.1) entitled *The Fourth Dimension May Be Manifested To Us Through Certain Motions In Our Space Of Three Dimensions By Translating Itself For Our Experience Into Time* and Plate 22 *Introduction to the magic Tesseract* (fig.1, center), revealing the design method to derivate architectural patterns exposed in his last publication *The Frozen Fountain 1932 Being Essays on Architecture and the Art of Design in Space*. [27]

Bragdon annotates that, before dismissing the idea of fourth dimension as absurd just because we cannot have direct or sensory knowledge of it, we have to become aware of the analogy with astronomy, whose method is to proceed by hypothesis of the real presence of something that no one can see, but only suppose, and on the historical evidence of the developing of human knowledge, once convinced about the flatness of the earth and then forced to accept that human idea of space is partial and evolving, in the sense of the constant improving of knowledge.

The drawing opening the first chapter in *A Primer of Higher Space* represents the Man and the Hypercube, an identical image respect to Salvator Dali's *Crucifixion*. Dali utilized his theory of "nuclear mysticism" - a fusion of Catholicism, mathematics, and science, in a similar way to Bragdon's Theosophical approach - to create this interpretation of Christ's crucifixion in a geometric, multidimensional form.

¹⁰ We can find the same quote in Hinton's *The Education of the Imagination* (1898).

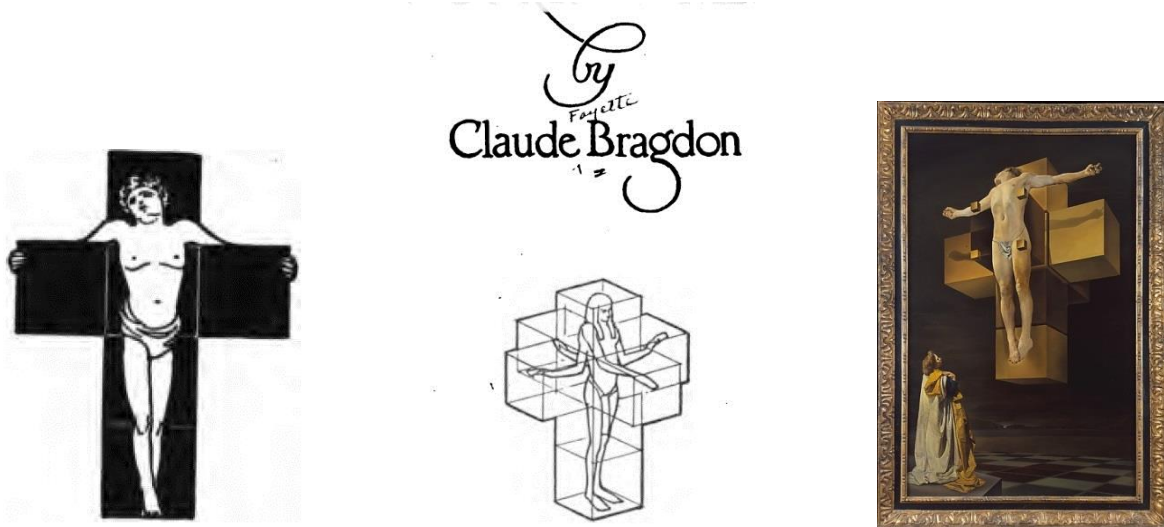


Fig. 2. C.F. Bragdon, *A Primer of Higher Space*, 1913, drawing opening the first chapter: “The Fourth Dimension”. Frontal view of a crucified man on a Tesseract

Fig. 3. Detail of the cover of C.F. Bragdon, *A Primer of Higher Space*, 1913

Fig. 4. Salvador Dali, *Crucifixion (Corpus Hypercubus)*, 1954, oil on canvas 194.3 cm × 123.8 cm

In *Projective ornament* (1915) [26] as well, Bragdon recommends geometry as an appropriately modern, scientific inducement to ornament, and explores the mystical mathematics of magic lines and magic squares, of tesseracts and hyperspheres, demonstrating their beauty and blaming the urban disconnect from the natural world.

In *Architecture and Democracy*¹¹ (1918) [25], Democracy is presented as condition of consciousness and in the chapter *Ornament from Mathematics. The fourth dimension* [25 pp. 104-120] Bragdon describes step by step the construction of the hypercube, so that each line is the genesis of patterns developed into ornamentations. We have to underline that, in his opinion, “four dimensional geometry yields numberless patterns whose beauty and interest could not possibly be impeached-patterns beyond the compass of the cleverest designer unacquainted with projective geometry” [25 p 117-118].

The book *Four Dimensional vistas* (1916) [24] is actually an essay on fourth dimension, without drawings or images. It begins with reference to the Theory of Relativity, to the overcoming of Euclide’s axiom of the parallels and on the nature of curved space. Chapter by chapter the Fourth Dimension is exposed passing through questions of symmetry and order, chemistry, electric current, astronomy, gravitation and transcendental physics, and finally border on mysticism and transcendence.

He presents the fourth dimension as a mystical hyperspace that explained some of the mysteries of life and the after-life. Bragdon based his new ornamental style on a complex system of projecting and manipulating two-dimensional shapes such as squares and triangles into four-dimensional

¹¹ Collection and re-edition of essays that Bragdon published in important architectural reviews such as “The Architectural Review”, “The Architectural Forum” and “The American Architect”.

shapes such as tesseracts and pentahedroids¹², deeply explained in his last book, *The Frozen Fountain. Being Essays on Architecture and the Art of Design in Space* (1923) [27].

3.1 Magic Squares, Magic Cubes, Nature's Geometry and Bragdon's Organic Architecture

Bragdon developed several methods of generating plan and façade settings, as well as ornaments, based on mathematical principles. In general, he derived his patterns either from the magic path of the magic squares and magic cubes, or referring his ideas on the platonic solids output, or even, as main topics of his figurative research on the hyperspace geometry of fourth dimensions. Mathematics is the common ground of these three source for architectural ornament drawings, because according to him “mathematical truth is absolute within its own limits” [27, pag. 73] and, following Keat's dictum “Beauty is Truth; Truth, Beauty”, he had only to find some method to translate mathematics as “truth-to-the-mind” into architectural “beauty-to-the-eye”.

By means of drawings with handmade texts he described his method of designing, previously exposed in *A Primer of Higher Space* (1913) [23], then in 1915 in the book *Projective Ornament* [26], and finally, in 1932, in one of his very last publications, *The Frozen Fountain* [27], with direct reference to Henry Parker Manning's *Geometry of Fourth Dimensions* [15], W.S. Andrews's *Magic Squares an Cubes* (1908), E. Jouffret's *Traité élémentaire de géométrie à quatre dimensions* (1903), and Matila Ghyka's *Le Nombre d'or. Le Rythmes* (1931)¹³.



Fig. 5a – 5b. Genesis and final drawing of the ventilation grille in Rochester Chamber of Commerce, in Bragdon *Frozen Fountain* pag 76

Fig. 6. A Celtic interlace derived from a magic square, of 5, in Bragdon *Frozen Fountain* pag 79

The book publishes numerous examples of stained glass, furniture, architectural elements, in which he tested this method, which consists in tracing the magic lines generated by the conjunction of the magic square numbers, in orderly sequence from 1 to X. The starting case study is the 3x3 magic square, both in the example of straight lines connections and in the example of curved lines (see fig.5). Particularly interesting are the variants derived from magic squares 5x5 e 8x8 (fig.6, fig.7.). We can follow the construction of different patterns generated as examples in eight different magic squares of 5x5, following cell to cell the numbers in their natural order, or tracking the lines

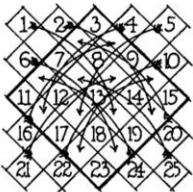
¹² The Pentahedroid is the 5-cell as described in H.P. Manning *The fourth dimension simply explained*, [14, pp. 33-34].

¹³ *Le Nombre d'or* was published just a year before the *Frozen Fountain*.

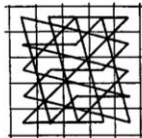
connecting odd numbers and even numbers, or with different intervals, as in the example with an interval of four.

The three mathematical sources from which I was able to derive ornaments were magic paths in magic squares, the Platonic solids, and the diagrammatic representations of regular hypersolids of four-dimensional space. My first experiments – he wrote - were with magic squares because they constitute such a conspicuous instance of the intrinsic harmony of number – of mathematical truth. [27 p. 74]

ONE METHOD OF FORMING ODD-NUMBER SQUARES



3	16	9	22	15
20	8	21	14	2
7	25	13	1	19
24	12	5	18	6
11	4	17	10	23



COMPLETED 5 X 5 SQUARE AND ITS MAGIC LINE

FORMATION OF THE 5 X 5 SQUARE BY MEANS OF DIAGONAL SQUARE. THE VACANT CELLS OF WHICH ARE FILLED BY TRANSFERRING NUMBERS FROM OUTSIDE TO INSIDE IN THE MANNER SHOWN



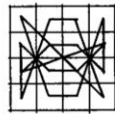
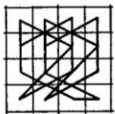
2	7	6
9	5	1
4	3	8



3 X 3 SQUARE AND ITS MAGIC LINE FORMED BY THE SAME METHOD

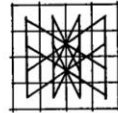
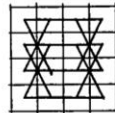
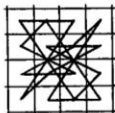
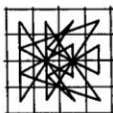
DIFFERENT MAGIC LINES IN THE SAME SQUARE

15	10	3	6
4	5	16	9
14	11	2	7
1	8	13	12



16	3	2	13
5	10	11	8
9	6	7	12
4	15	14	1

"VALIOL" AND "MELANCHOLIA" 4 X 4 SQUARES AND THEIR MAGIC LINES FOUND BY FOLLOWING NUMBERS IN SEQUENCE



THE TWO MAGIC LINES FOUND BY FOLLOWING THE ALTERNATE NUMBERS - AN ODD SERIES AND AN EVEN: 1, 3, 5, 7, ETC; AND 2, 4, 6, 8 ETC

THE FOUR MAGIC LINES FOUND BY FOLLOWING THE NUMBERS WITH AN INTERVAL OF FOUR: 1, 5, 9, 13, ETC; TWO ODD AND TWO EVEN.

41

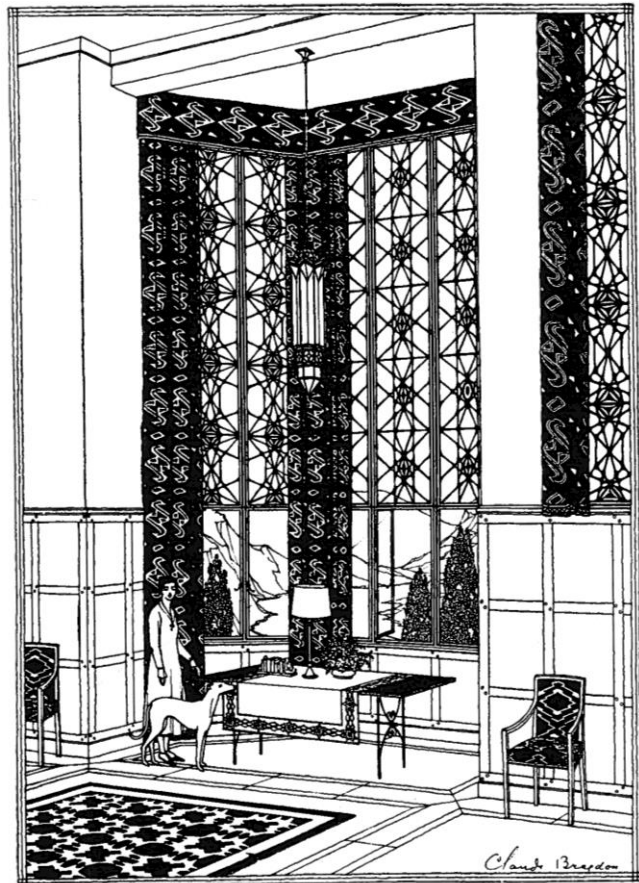


Fig. 7. Magic lines in magic squares in Bragdon *Frozen Fountain* pag 75

Fig. 8. Example of the use of textile patterns derived from 5x5 magic squares, in Bragdon *Frozen Fountain* pag 86

Moreover, Bragdon promoted regular geometry and musical proportion as ways for architects to harmonize buildings in the interior space and with their urban context.

The New York Central Station was by far my most important commission. I was anxious--over-anxious-- to make the building an illustrative example of architectural art. This was the cause of a false start: I had in mind to build a monument to the railroad, to the city, and incidentally to myself, (...) On a piece of paper I drew five equal, aligned tangential circles, like the driving-wheels of a locomotive engine. Of these the two end ones defined the height and width of the office divisions at right and left of the waiting-room, and the three remaining circles circumscribed the great round-arched windows which gave it light. The station was built in just that way. [28 pp. 163-164]

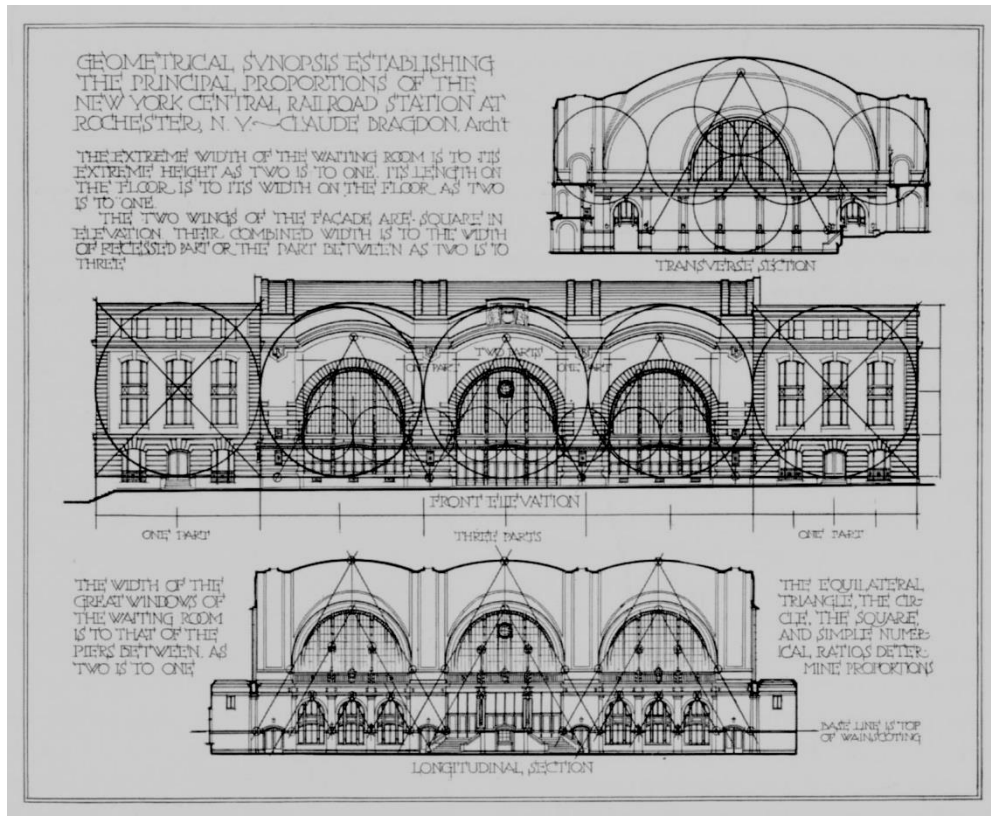


Fig. 9. New York Central Railroad Terminal, Rochester. Diagram of the harmonic proportions

<https://www.tumblr.com/search/claude%20fayette%20bragdon>

<http://ronisolomondds.tumblr.com/post/20310105290/new-york-centrail-railroad-station-rochester-ny>

The First Universalist Church (1907), New York Central Railroad Terminal (1909 – 1913) (Fig. 10), and Rochester Chamber of Commerce (1915 – 1917) exemplified his distinctive synthesis of Chicago School organicism¹⁴ with harmonic proportion, number symbolism, and Renaissance architecture.

In the Central Railroad Terminal building and in Rochester Chamber of Commerce as well, Bragdon applied the mathematical common denominator exposed in *The Frozen Fountain*, with particular reference to music. In the Central Station, the waiting room became a “resonant chamber” when a friend of him who actually was an Opera singer sang in the empty station, before the official opening, a diatonic scale, just as a test. Witnesses of the event referred that the entire building seemed “to cry aloud” [20 pag.12].

I made use of (...) those numerical ratio subsisting between the consonant intervals within the octave – namely: 1:2, the octave; 2:3, the fifth; 3:4, the fourth; 4:5, the major third; and 4:7, the subminor seventh. The waiting room is twice as wide as it is high and

¹⁴ Some of the distinguishing features of the Chicago School in Architecture are the use of steel-frame structures with masonry cladding (usually terra cotta), allowing large plate-glass window and limiting the amount of exterior decorations. Sometimes light elements of neoclassical architecture were used to reduce the effect of toughness and heaviness of the first tall buildings of the American History of Architecture whose character of regularity was the consequence of squared geometries and window grids which are the essence of American Architecture as we actually know it.

twice as long as it is wide – the interval of the octave; or, ... the proportions of a root-four rectangle of Dynamic Symmetry. [20 pag.11]

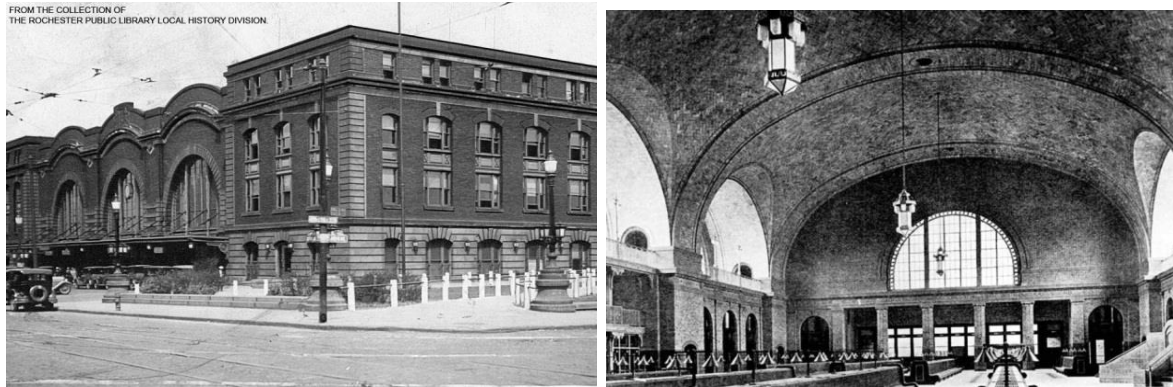


Fig 10. Claude Bragdon, Rochester Grand Central Train Station, 1914. Demolished in 1978

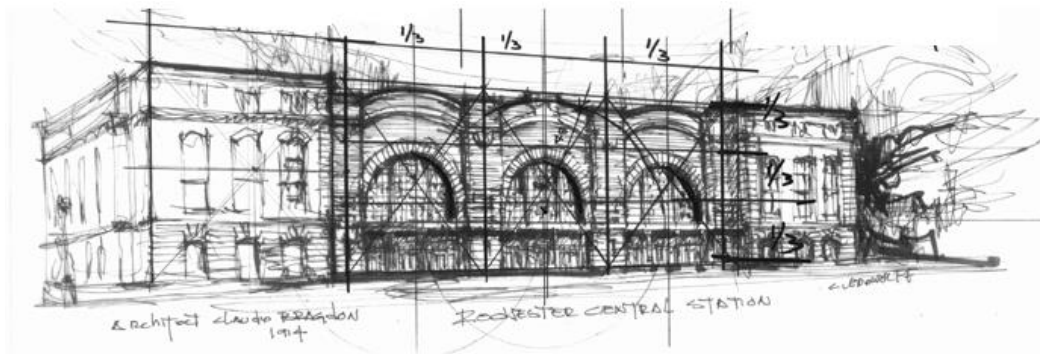


Fig. 11. DeWoff Partnership Architects, The study of Bragdon’s Rochester Grand Central Train Station submitted to the exhibition *The Arts & Cultural Council for Greater Rochester Architectural Design Showcase* as an example of Bragdon’s use of regular geometry and musical proportion, connecting art and mathematics, to harmonize buildings with their urban context

3.2 Festivals of Song and Lights. Sound and light in four-dimensional settings

In 1916 Bragdon began a collaboration with the Community music reformers and the Song and Light Festival of the State of New York organizers, to whom he proposed projective ornaments, exposed in his books of theories, as the main component for outdoor settings of the Festival, as a universal ornamental language applicable to all manner of designs.

Bragdon staged Festivals of Song and Light in four different cities between 1915 and 1918. In 1916 it took place in New York, at Central Park. It was one of eight staged, at the peak of Progressive Era reform activism. These nocturnal community chorus festivals materialized also in Rochester, Buffalo and Syracuse.

A central role for theatrical lighting as an aid to access the dimension “beyond the tyranny of appearances”, had ornamental lamps and decorations derived from the axonometric drawing method. Spotlights and screen, a system of color combination, together with music event, performed a four-dimensional cosmic vision where he believed all past and present consciousness

could merge, through an empathic involvement that gave to the participants the opportunity to project themselves into the performing space.

Lit by electricity, the space-time matter of the century, Bragdon's projective ornament designs created an otherworldly, weird, ethereal outdoor environment likened to a "cathedral without walls."



Fig. 12. C.F. Bragdon, Setting for sound, light screens, lanterns, and song, at Central Park, New York City, September 1916. Lakefront stage

In the Song and Light Festival at Central Park, adjacent to the Bow Bridge and nearby the Bethesda Terrace, he installed a temporary wooden stage with a podium at its center, bore a circular shield, and tall pylons at either side supported large hexagonal lanterns; similar lanterns hanging from trees. A sixty-five-piece orchestra seated on the platform.

Above, stretched cables carried an array of circular and rectangular shields decorated with unusual geometric patterns: kaleidoscopic visionary appearances in the form of colored lights evoking the Indian Mandala. The patterns originated from the center point of the circle in the square with four gates of the original ancient Mandala, generate interlocking figures – symbolic representation of cosmos – with remarkable similarity to the bi-dimensional graphic image of the 5d regular polytope.

4 Conclusions

The study of Claude F. Bragdon's writings and works is part of a research on fourth dimension in Architecture within which I am analyzing the treaties of the beginning of the twentieth century, that faced for the first time the problem of scientific popularization and the discussion on the visualization and the representation of higher order geometries.

“No one is able to show the fourth dimension, yet it surrounds us – is written on the cover lap of Rudy Rucker’s *The Fourth Dimension: A Guided Tour of the Higher Universes* – (...) It is food for thought in many disciplines”.

Bragdon’s work is aimed to do just that: to make visible the invisible and make it visible in terms of beauty. Just like in the past, when artists – whether they was painters, musicians, architects – searched for a formula for beauty results, exploring the magic of Nature through the discovering of its secret harmony. Bragdon’s research on the higher dimensions was deep founded into the exploration of the growth of consciousness and on the magic of geometry which carried him into unexplored path in a long-life journey through the fourth dimension.



Fig. 13. C.F. Bragdon, harmonic composition in projective ornament. Design for Decorative Lighting, 1920-1929 India Ink on thin board 16 1/2 in. x 11 5/8 in. (41.91 cm x 29.53 cm) part of the Memorial Art Gallery’s collection at the Ever Better’s University of Rochester. Also in *The Frozen Fountain* frontispiece

Fig. 14. C.F. Bragdon, ‘Study incomplementaries’. *Mathematical Abstraction* No.5 (ca. 1940) Watercolor, charcoal, ink and pen with red ink 28 3/8 in. x 20 5/16 in. (72.07 cm x 51.59 cm), sheet

Fig. 15. C.F. Bragdon, ‘The sun by day and the moon by night’. *Mathematical Abstraction* No.14 (ca. 1939-1941) Watercolor and graphite on four ply board 36 in. x 24 in. (91.44 cm x 60.96 cm)

Mathematical Abstraction are a set 15 of watercolor “Episodes from an Unwritten History: Claude Bragdon and Fritz Trautmann”, part of the Memorial Art Gallery’s collection at the University of Rochester

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