TWO AUTONOMOUS SPATIAL SYSTEMS + THEIR JUXTAPOSITION

Syntactic Grid + Pure Geometric Volumes

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This thesis explores the idea of two autonomous spatial systems and their interaction: a syntactic grid and a pure formal volume. The juxtaposition of these two elements allows for insight into and exploration of their autonomous ordering potentialities, as well as the potential relationships or consequences that can occur in the presence of both systems. The syntactic grid articulates structure and strength for the architectural project, while the pure volume translates the programmatic function and their distinction from the grid.
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Special Gratitude to Jamie Dean for your guidance in construction and your friendship, to Nicholas Wanket for your continuous push for something greater. To my sisters, who have taught me to stand as an individual, but most importantly, work for the whole.
There are many ways in which architecture is ordered, for example, material limitations, site specific constraints, or functional demands. However, in the ongoing search of how one might order architecture, syntax itself became the dominant systematic approach for ordering during the late 20th century. Thus, the thesis found a path through studying points and lines in space, where syntax could not only order these abstract architectural forces, but eventually the physical, material constructs, as well. Oxford English Dictionary defines syntax as the “A set of rules for or an analysis of the syntax of a language” Investigating syntactic ordering allowed for the development of a material-spatial system that operated autonomously, providing order and structure by following operations inspired by linguistic principles.
The grid transformed into a cohesive structural system of columns and beams.

Diagram of Spatial Ordering Grid

Developing Hierarchical Order

The syntactic possibilities in the perpendicular intersections of points by lines to manifest a grid was studied. A "pure" grid is defined by Cambridge Dictionary as a pattern of horizontal and vertical lines that cross each other to make a set of squares. The Oxford English Dictionary describes a grid in spatial terms, specifying uniformity with even spaced horizontal and perpendicular lines that can be used to locate one’s orientation. Springing from these definitions, one can create a uniform grid of points and lines, but it lacks any hierarchical order. Applying syntax developed from linguistic operations like: shift, rotate, compress, and extend results in hierarchy throughout the rhythmic grid. Syntax begins to bring cadence and varied order to the grid by the rhythm and repetition of elements as a continued means of measure.

Through precedent studies, we can find methods for a point-line grid system to become translated into architectural elements. Le Corbusier translated his gridded system into pilotis, a method he described in ‘Rappel a l’ordre’. Pilotes provides a continued horizontal measurement, offering support and order. This structural ordering principle, provided for the other advantages seen in Le Corbusier’s designs.

3URJUDPPDÀRRUSODQVFDQ now be arranged independently of the structure, allowing the structure to straddle the demands of structural load with harmonic proportion and thus provide a means of measure in which building components can achieve order within.

By abstracting proportions following linguistic operations, our grid begins to develop itself hierarchically. Through the application of architectural elements like pilotes the grid can be transformed into a structural system that can provide infrastructure to architectural works.
Using the column grid developed from syntax, a study of relations between the base grid and the structural grid can occur through a process of construction. The grid developed into a three-dimensional network which now serves as an ordered structural system.

The grid is comprised of a 24-foot bay column and beam structure that works autonomously. This trabeated structure gives little indication of site or material, instead it is tuned toward being an abstracted, proportional component in the architecture.
Following the order of a syntactic grid, organization can occur during all processes of construction. This provides a continued measurement of relationships from the base grid to the linear elements that are creating the spatial circulation system. Now that a structure has been born, fundamental elements of architecture can be inserted, giving a harmonious relationship between all components that act as servants to program.

Applying Critical Elements.

Rem Koolhaas’ 2014 Venice Biennale curated exhibit entitled Elements of Architecture, studies the fundamentals seen across all architecture: past, present, and future. If these critical elements engage with the syntactic grid, a systematic infrastructure can be formed to serve architectural program and volume. Using three elements that deal with human scale and movement, studies of ordering elements of architecture can begin. The stairwell, ramp, and elevator can be packed and organized by the spatial structure and inserted to create order and proportional relationships with the elements.

SYNTHETIC GRID HOLDS INFRASTRUCTURE

Rem Koolhaas’ 2014 Venice Biennale curated exhibit entitled Elements of Architecture, studies the fundamentals seen across all architecture: past, present, and future. If these critical elements engage with the syntactic grid, a systematic infrastructure can be formed to serve architectural program and volume. Using three elements that deal with human scale and movement, studies of ordering elements of architecture can begin. The stairwell, ramp, and elevator can be packed and organized by the spatial structure and inserted to create order and proportional relationships with the elements.
Pure, formal geometric volumes can disrupt the syntactic grid and the study of the geometry of a circle and the extrusion of that geometry with a pure cylindrical volume holding programmatic activity is placed within the syntactic grid.
To agitate the syntactic grid, one must utilize the opposite. Since the grid is regular and perpendicular, the geometry of a circle became a stark contrast. The syntactic grid maintains an endlessly extending, linear, perpendicular, and ordered system. A circle, and its volumetric form as a cylinder, is contained, with an in-side and out-side, and directional. Engaging with the geometry and replication of a circle created a variety of spatial conditions. The pure geometry of the circle results in the pure spatial volumes of cylinder and ellipsoid.

Overlaying the grid with pure geometry that disrupts the grid.
GEOMETRIC VOLUMES ARE QUALIFIED WITH ACTIONS (EMERGENCE OF PROGRAM)

The emergence of pure formal geometric spatial volumes indicates certain programmatic uses that may be well accommodated within them. Moreover, the geometric volumes do not need to share programs; rather, each volume can be considered as dedicated and autonomous. This approach is inspired by the idea of architectural lobotomy, coined by Rem Koolhaas, where programmatic volumes do not need to relate to one another; they can be served by a separate infrastructure (in this case, the syntactic grid). The formal expression of the volume is the only constant. Programmatic variation can occur because the form suggests ways of inhabiting it—and not just one but multiple ways of interacting within the articulated space.
The multiple vessels containing water.

Circles become vessels through extrusion and rotation. The spatial volumes indicate programmatic occupation.

Studying transparency caused by the reflectivity of the water and glass material.

PROGRAM 1: BATH HOUSE

The form of the cylinder was manipulated according to rules of translation (shift, rotation, compression, and extension) creating a variety of spatial volumes. A clear cylindrical shell indicates a contained space—perhaps also, a vessel. Activity that could be related to a cylindrical vessel include the containment of fluid—perhaps another clear element—water. Thus, a programmatic bathhouse develops within this volume series. A cylinder held vertically suggests a bath where one may rest and wade in a sacred program of bathing or ablation, while a cylinder held horizontally indicates a space where one may travel in a lap pool of athleticism. In addition to cylindrical geometries, the geometry of the circle is rotated to create a glass dome—this space, where one can receive a 360-degree view of the sky, suggests the use of a planetarium.

PROGRAM 2: TRACK

Two circles arrayed a more complex pure form—an ellipsoid. The curved line suggests movement, and indicates the programmatic function of a racing track. The track’s unique ellipsoid form enables it to be cut into a variety of sections, allowing its programmatic function to change based on human need and action. The oval section of the track implies a variety of track and field events (running, long-distance running, hurling, etc.). The ellipsoid also has a rectangular section that sits inside the track. This rectangular shape defines a court leading to specific athletic games to take place (basketball, squash, volleyball, etc.).
Charleston, South Carolina is the oldest and largest city in the United States, created by the joining of two rivers to form an inlet. Today, the geographic and topographic conditions of the city lead to questions of resiliency as frequent flooding has plagued the historical waterfront town, and future trends indicate even greater challenges related to water infiltration.

The site for the proposed Downtown Athletic Club is located in the historic district of Charleston. Its lot is adjacent to the location of the historic Charleston Market, which runs from Meeting Street all the way to the waterfront. Charleston itself provides the architecture, comprised of the syntactic grid and geometric test and reveal the potential in the systems' rules as, juxtaposed to the grounded, XQLTXHORFDWLRQ

The spatial systems, now being grounded to site, brings questions of how they could be situated within place. Place being defined as “a totality of concrete things having material substance, shape, texture and color.” (Norberg-Schulz, Genius Loci)

The block for the proposed intervention is between Church and State streets, which both terminate at the Charleston Market building, giving the site linkage to this historical building and place. Charleston itself provides the architecture, comprised of the two autonomous systems (a syntactic grid and geometric volumes), with situations that test and reveal the potential in the systems’ rules as, juxtaposed to the grounded, unique location. The spatial systems, now being grounded to site, brings questions of how they could be situated within place. Place being defined as “a totality of concrete things having material substance, shape, texture and color.” (Norberg-Schulz, Genius Loci)
Schematic design elevations show how the syntactic grid allows the formal volumes to rest above all potential flood zones. The grid regulates and measures the landscape and its natural variation. Since two levels of the grid are susceptible to frequent flooding, the grid's height must be five stories tall. Thus, only the upper three floors are designated to hold programmatic volumes. This is similar to the height restrictions around the historic district and its housing typology: the Charleston row house (5 storeys).
The ground of the city, its material, shape, and texture contribute to the environmental character of place. The ground of historic Charleston, South Carolina was constructed from local clay bricks and cobblestone. The cobblestone traces back to Charleston’s deep history as a port city. Cobblestone came to Charleston as ballast for trade ships, and later were used for paving of the streets. Charleston’s rich history and character is embedded in the ground’s materiality. Decorative wrought iron works define boundaries between public and private spatial conditions around Charleston. The use of ironworks became Charleston’s symbol of ornamentation through materiality. Since the site of the DTAC sits in the historic part of Charleston, the DTAC’s design uses this materiality to create four textures that allow the site to become interwoven with the fabric of the historic city.

TEXTUAL OBSERVATIONS

Charleston, South Carolina is full of linear paths developed by the occupants’ search for relief from the hot southern. These long narrow pathways are shaded by long vertical boundaries between public and private spatial conditions around Charleston. These pathways became so popular, entrances from these pathways became a common feature of houses and commercial properties and developed into a typological urban room situation—particularly to the site specific conditions of Charleston. These pathways are often heightened with character from the texture and materiality that create them. These pathways not only serve as access routes to destinations, but are also filled with the most scenic views of historic Charleston, navigating you through parks, cemeteries and other picturesque images of nature.

CHARLESTON’S PALETTE

- Local Clay Red Bricks
- Cobblestone once used as ships ballast
- Decorative Ironworks

IMAGE: Local Red Brick, Charleston
IMAGE: Cobblestone Road, Charleston
IMAGE: Decorative Iron Gate, Charleston
Current Flood Elevation Height

Current Stable Water Table

Stable Foundation Soil

Spatial condition during the natural variation. Kayakers can enjoy a view of the guns and bacterias during the flooding condition.

Normal spatial condition, showing the first floor material quality and the return of the ground to the city.
The Downtown Athletic Club was selected as the program for the combination of these two spatial systems as it is often idealized as the program that allows architectural freedom. Rem Koolhaas states in Delirious New York his infatuation with the activated use of program seen in the Downtown Athletic Club in New York. The Downtown Athletic Club is a cultural congestion of social activity. Koolhaas describes the programmatic variety as a vertical schism, achieved by the replication of floors and the possibility of one infrastructure serving a variety of programmatic needs and functions. Koolhaas’ analysis serves as precedent for the proposed Downtown Athletic Club in Charleston, SC. The apparatus for circulation and use and serving the variable programmatic volumes within allows for each autonomous spatial system to exist and create one condenser of social activity. The Downtown Athletic Club creates a situation in which the two autonomous spatial systems can be manipulated to create one unified piece of architecture while responding to consequences that arise from place. Questions of infrastructure and use occur when these two systems are juxtaposed. Infrastructure serves the geometric volumes while being regulated by the syntactic grid. Building infrastructure is defined as circulation, plumbing, roof, floor, and utilities. While the geometric volumes are being served by the infrastructure and as ruled by the syntactic grid, in which the grid intersects the geometric volumes creating a variety of interesting spatial conditions where these two systems negotiate. This thesis explores the relationships that occur within these two spatial systems as they come together to form the Downtown Athletic Club.
GROUND FLOOR, A MATERIAL RETURN TO THE CITY

The first floor is a forest of columns, returning the ground back to the city. Therefore, the floor is a palette of the city, brick and gravel, and allows the extension of Philadelphia alley, connecting the ground to Charleston’s historic streets and their past. The pilotis of the syntactic grid allows for the programmatic volumes to be lifted off the ground, allowing the first floor to recognize ground and site. The a-materiality of the syntactic infrastructure and its cold steel sharply juxtaposes the warmth of the city. The cool steel is a forest against the warmth of the brick.
The bath house stems from the geometric volume of a circle. The program becomes infused into this large cylindrical volume that serves more than the purpose of holding water. Its cylindrical volume suggests certain types of program, an idea seen in Bernard Tschumi’s Manhattan Transcripts. The largest cylinder (site in plan above) becomes more than a device for holding the bath water, but becomes a spatial volume—a glass room that serves multiple purposes. On the second floor, you can access the glass cylinder to enjoy a bath full of reflections from the water as well as from the glass material. This plays with the idea of nature and architecture with the materiality of nature and its reflections and the similar reflections and thickened material of glass.
Second Floor : Track

Paralleling the Bath House on the second floor is the geometric volume of the track. The track’s form comes from the intersecting geometry of two circles, creating an oval. This oval has not been perfected or altered for track use, thus it demands that human activity alter itself to inhabit the architectural space. The geometric volume is now qualified by actions that may occur within it. The material palette helps bring a material connection to the site. The brick hovers over the ground, implying the oval form while allowing a curated view of the runners in motion. The interest of kinesiology is not new to architecture. Le Corbusier often saw movement throughout a building as a choreographed measure. The track serves as a geometric volume of this choreographed measure, showing how runners must navigate a pure geometric track instead of one fine-tuned to the program of running.
A glass cylinder that runs horizontally through the center suggests an idea of linear movement. The horizontal glass tube that runs through the glass center bath house indicates the programmatic use of a lap pool. Swimmers can engage strictly in the horizontal alignment of the body with water. A shallow tube that allows only for a linear progression creates a disciplined movement within a tight spatial condition. The pure form of the lap pool creates a moment of violence in architecture, providing a heightened experience swimming in a glass chamber.
Athletic showmanship that happens in a rectangular architecture condition has been traced all the way back to ancient architectural works. The rectangular shape of the court indicates certain kinds of actions that could occur within, having the same shape as the Mesoamerican Ball Court, where a game of religious divination was played and where the loser would be sacrificed. Similar: Today winners of the court become divine through social media popularity while the loser endures social suicide or sacrifice. No longer being a character of the elite. Current day ball games could occur in this court including: basketball, racquetball, volleyball, soccer, dodgeball, tennis, handball, badminton, and many more—alleviating the space to be qualified by action. The court and the limits of the game are defined by architectural means. In ancient Mesoamerica, the rings where the ball would be shot through were attached to the architectural walls that created the boundary of the court. In the DTAC court, a basketball hoop is attached to the syntactic grid, the infrastructure of the court.
FIFTH FLOOR: A GLASS PLANETARIUM

The only programmatic volume on the fifth floor is the glass planetarium. It is a transformation of a planetarium’s original program. Instead of a planetarium that is devoid of light to carefully exhibit simulated projections of the sky, this planetarium is instead a transparent spatial condition encouraging the user to become re-affiliated with nature by framing the existing condition of the sky. Now, specific site conditions are put on display through the glass dome. The exhibit is now humans current condition and negotiation with the world; airplanes flying at night, lights from surrounding buildings, as well as stars can all be viewed at once. The planetarium’s form recalls those of ancient Roman bath’s that were capped with domes with an oculus that allowed steam to escape from the center. The planetarium resembles this dome-shaped form and translates it by using the current material advances of glass.
BATH HOUSE AND TRACK JUXTAPOSITION

With the placement of the two autonomous spatial systems: the syntactic grid and the geometric volumes in Charleston, South Carolina, a greater discussion about their autonomy and relationships occur. The syntactic grid measures the landscape, lightly touching the ground and allowing for a return to the city through material use of the brick on the floor. The grid negotiates with the geometric programmatic volumes of the track and bath house by multiplying its measurement and ordering system to accommodate for the various loads from the glass and brick volumes. The geometric volumes are now reliant on the syntactic grid to raise them off the ground to comprehend with their juxtaposition. Standing in the geometric volumes, one can view the cold autonomy and regulating, ordering, harmonious power of the grid and while occupying the syntactic grid, one can understand a finely tuned geometric volume providing use, action, and context. This thesis juxtaposes these two systems in only the situations that occur from being placed in Charleston, South Carolina, allowing for contemplation as to what might occur if these systems were to be placed in different situational contexts.
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Precedent Studies/Readings on Program

Precedent Studies/Readings on Place

ADDENDUM

Drawings, Photographs, Models that contributed to the process of the thesis.
The search for harmony and order using geometric volumes led to the idea of understanding spatial order through section. Inspired by Franco Purini, and his article Studio di elementi architettonici, classifying order through sections of spatial situations became the primary investigation in a search for architectural order. Drawing studies were done with geometry as well as with architectural elements to study how through repetition, rotation, and translation, one can create an architectural work through organization and harmony.

GRID DIAGRAMS

The search for harmony and order using geometric volumes led to the idea of understanding spatial order through section. Inspired by Franco Purini, and his article Studio di elementi architettonici, classifying order through sections of spatial situations became the primary investigation in a search for architectural order. Drawing studies were done with geometry as well as with architectural elements to study how through repetition, rotation, and translation, one can create an architectural work through organization and harmony.

Left: Sectional Studies of architectural elements in relation to one another. A search for order between elements of architecture.
Abstracting relationships and proportions from elements of circulation, including the ramp, stair and elevator, in a search for measure by order. Through drawing and modeling these proportions, a search for order between these elements was established. A proportional grid is drawn on the paper allowing decisions on spatial volumes that occur from modeling to be guided by a repetitive order. The grid is drawn with the same measurements on all the models; however, each grid is translated through rotation, shifting, compression and extension to test the orders variety.

Using a pure form, investigations of harmony and repetition can lead to an understanding of its organizational principles. Analysis shows a variety of material means, site conditions, and syntax. Following this series, it became evident that following an order of syntax would be the best method to develop the grid and that eventually led to the infrastructure of the Downtown Athletic Club.
INTRODUCTION OF SPATIAL CONDITIONS ON SITE

Placing the grid within the specific site, the grid condenses due to site restrictions. Now that the syntactic grid has been condensed and rotated due to site conditions, the introduction of the formal geometry can occur relating to histories and layers of the site. A secondary grid from the dimensions of historic cotton gins on site help provide disruption where the formal geometric volumes can be placed on site.

CHARLESTON MAPPINGS

Studying the site for layers of information and histories. The site was once home to the Charleston Cotton Company, Charleston’s number one economical good. The site held a variety of cotton gins and coal sheds to edit the cotton before sending it to the port located just a couple blocks away. The grid was rotated and translated to align itself with Charleston’s historic grid. Studying the site in elevation and section allows for comparison of height and neighboring buildings. The grid rotated on the same axis as the Charleston Market allows for a repetition of elements between both buildings, allowing for harmonious order to come to the site.
The syntactic grid transforms from a series of points and lines to a column-beam structure through iterative model making. The structure's order is investigated by duplicating beams and columns, but not for structural purpose, but for rhythm and continued measurement.
THE INTERDEPENDENCE OF GRID AND VOLUME

Studying the co-dependence and independence of two spatial systems when placed in juxtaposition to one another. One linear structure starkly contrasts the pure formal volumes that rest inside its structure.