

Matthew Jogan

matthew.jogan@earthlink.net

160 Hoyt Street # 2
Brooklyn, NY - USA
(917) 690-2570

A Parametric Theater

Generative Form Structures from Sight Line Criteria

Abstract:

The form of a theater is a direct result of relationships between a performance space and viewing locations in a theater house. These relationships are based on criteria that combine lines of visibility, dimensional constraints, and proximity influences from other view locations, to shape the layout and experiential comfort of a room.

Using Generative Components, I propose to explore the impact of sight line relationship criteria to generate and study form structures for a multi-tiered balcony theater.

Conventional sight line analysis is part art and part science. Even the best theaters have a percentage of seats with compromised or limited sight lines. With conventional analysis, all sight line criteria cannot be met for every view location in a room. Through the use of parametric tools, the intricacies and nuances of sight line criteria, when directly related to form generating components, have the potential to create form structures that visualize opportunities for room shapes that go beyond conventional analysis. This potential includes the ability to link a sight line form structure to other influential or analytical components.¹

This proposal builds upon a previous parametric theater study by this candidate that related generative seating layouts to ticket pricing structures. This precedent work involved the creation of parametric models for an opera-type theater that were linked to a cost structure in order to study changes in the house revenue based on changes in the room configuration. Created in Gehry Technologies Digital Project software, these models were able to visualize changes in revenue as both the size and shape of the theater was altered. The changes in the seat and cost models were reported in spreadsheet format for easy comparison and analysis.

¹ This proposal acknowledges that there are other important criteria, such as acoustics, that have great influence on the form of a theater. It would be idea to also include other criteria in this study, although for the purposes of the workshop, the scope of the study will be limited to a proof of concept model for sight line criteria.

In addition to the seat layout and cost structures, these models used parametric sight line criteria at the centerline section to generate the sectional shape of the room. This resulted in three-dimensional models that began to explore the impact of sight line criteria on the form of the room.

Design Premise:

A sight line can be formulated as a parametric variable with two primary relationships. The first is a direct linear relationship between a view location and a fixed point (or series of points) of focus, called the arriving point. The second is a relationship with adjacent view locations, usually located between the primary view location and the arriving point of the sight line. With these two establishing relationships, a line of form can be determined that allows for clear view to the arriving point without line-of-sight obstructions. When these basic relationships are initiated into a larger system of parametric sight line components, form structures can be produced that are optimized for view, based on multiple sightline variables from the same series of view locations.

A detailed sight line analysis will look to several arriving points for each view position. Arriving points are often established throughout the entire performance area (upstage and downstage), within the orchestra pit (normally the conductor), and around and above the proscenium. Specific arriving point criteria will often vary in relation to the anticipated use of the theater space, although the general premise is the same. The line of sight from every seat to a specified arriving point must be unobstructed, otherwise a seat will have limited or partial visibility.

A centerline-section-based sight line generation (such that was used in the candidate's precedent work), although affective for a pre-schematic seating layout study, applies a limited influence of sight line criteria to the shaping of a theater space. The generated section is only correct for the sight lines at that specific section, and only for the specified arriving point used. Once the view location is moved off the centerline, the relations between the establishing criteria are altered based on the change in section between the viewing position and the arriving point. In addition, the centerline section is not taking into account sight lines to other arriving point locations within the performance area that are not in the same plane as the section.

The use of a parametric modeling tool has the ability to consider multiple sight line variables (for example, one for each arriving point criteria) at the same time in order to generate a series of form structures based on a designer's specified criteria. This will be especially useful as the view position moves toward the sides of a theater, where the site lines are not perpendicular to the stage front or to the rows of seating. It is important that the model be able to parametrically model

form structures that consider a multiplicity of sight line criteria for every view location in a theater space. The goal and proof of concept will be to generation these parametric form structures from multiple sight line criteria in a way that they can then be used to further inform a design process.

Additional Project Questions for Consideration:

- How do the generative sight line components relate to different theater types? (ie, Arena, Concentric, Concert Hall, etc.) Are there different components for each, or just different variables?
- Can a better "site line" be created? One that is not limited to a two-dimensional section plane and that takes into account multiple arriving points at the same time. (perhaps it is not a sight line but a sight area or sight object.)
- What opportunities are there to use parametric tools to introduce analysis criteria that that are often not considered? For example, the relation of the eye line of an artist on stage to the number of audience members above and below this line can determine the intimacy of a room. Often criteria are only considered from an audience's point of view and not from a performer's point of view.

End of Proposal Brief