

The Design of Opera Houses

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Acousticians seem to be more familiar with the architectural and historical development of the Concert Hall than with the development of the Opera House. George Izenour provided the first clue to the Concert Hall riddle in his book “Roofed Theatres of Classical Antiquity.” This led me to understand how rectangular buildings became the norm for places of public assembly for over two thousand years, and that composers, aware of the acoustic environment of these spaces, composed scores that accommodated these facilities. I covered this area in detail in numerous papers presented at the ASA and in my recently published book.

But what about Opera Houses: how did their shape develop and why haven't we seen more innovative designs over the years? Based on some research on my part and with the help of Joshua Dachs of Fisher Dachs (who provided a number of key photographs of transitional Italian Opera Houses), I came up with some of my personal thoughts as to how the design of opera houses evolved, and I would like to share them with you.

Opera is Musical Theatre—dependent on good speech intelligibility and the vocal capabilities of the performers. Early Greek theatre was presented in open-air amphitheatres and might, at first glance, be considered a forerunner of opera performance. But it is our understanding that the actors only spoke their lines, and that music and some dance were just interludes rather than accompaniments to the words (Figure 1). The actors faced their audience for maximum vocal strength and were backed by a wall that raised the level of the lower frequency tones.

Still there are some similarities. Speech Intelligibility was key to early Greek theater as was vocal capability, although the actors did wear megaphone-like masks that amplified their voices (Figure 2). After all, we are referring to unamplified voice projection to a 5,000-seat semi-circular outdoor theatre.

From the open-air amphitheatre, we progress to the roofed theatres of the Greco-Roman period that Izenour also covers in his book (Figure 3). Here we find the amphitheatre form set within small indoor buildings. The actors still face the audience and there is a wall behind them (Figure 4). But the full circle Greek Amphitheatre “orchestra” area has evolved into a half circle that might, at times, hold either performers or audience members (Figure 5). Although the amphitheatre seats, floor and side walls are of stone and the roof of wood, large openings in the side walls and the absorptive quality of the audience kept reverberation down to reasonable levels (Figure 6).

From here the trail grows a bit murky. But we know that from 300 BC to 300 AD, the Greco-Roman model was the predominate design for the theatres that presented the Roman equivalent of Greek Tragedies and Comedies, although the comedies are the ones primarily associated with that period. With the decline of the Roman Empire and the rise of Christianity, the Church became a powerful force in European History. The Church banned all theatrical performances, and actors and actresses were even forbidden baptismal ceremonies. As a result, the construction of new permanent theatres came to a halt.

For the next millennium, the Church did allow performances of “miracle” and “mystery” plays to be presented in houses of worship. Starting with Pageants at Easter and Christmas describing the birth, crucifixion and resurrection of Christ, the church also offered stories related to the martyrdom of saints, the pleasures of Heaven, and the damnation of Hell, shown here with a print of “The Fool and the Devil” and “The Martyrdom of Saint Apollonia” (Figures 7 and 8).

With the blossoming of the Renaissance, there was a rebirth of interest in the life and literature of Ancient Greece and Rome. As early as the end of the fifteenth century, revivals of classic plays were presented on outdoor stages with wood and cloth scenery to an audience located under a fabric roof (Figure 9). New knowledge of the classical stage was unearthed and in 1580, Andrea Palladio came up with the seminal design of a new permanent indoor space that is still today a landmark hall in the history of the development of the European Theatre—the Teatro Olimpico in Vincenza. Architects from all over Europe and England, including Inigo Jones, came to view this building for inspiration (Figure 10).

The design of the Teatro Olimpico was based on the design of the Greco-Roman Theatres with a modification of the seating area from a semi circle to an ellipse to improve sightlines. Candles with reflectors were used for stage lighting and bottles of colored water were placed in front of the lights to create color effects (Figure 11). The most significant change was the design of the stage that now incorporated a series of perspective alleys to enhance the latest fashion for stage scenery. Here again, the performers faced the audience and there were reflecting surfaces behind a large portion of the stage area. Also, there were two small seating areas on either side of the downstage platform that might have been the first example of box seats in a theatre.

Now we see changes and developments evolving more quickly, as evidenced with three developments instigated at the Teatro Farnese, built in Parma, Italy, in 1618 (Figure 12). First, in an apparent effort to create a hippodrome plan in conjunction with a drama theater, the Teatro Farnese was the first theatre to incorporate the horseshoe seating area (Figure 13), similar to those found in almost every opera house built subsequently from the 17th to the 21st centuries. Second, the theater had a full stage house that could be adapted for rapid scene changes. And third, the use of a shortened proscenium opening (Figure 14) created off stage wing space.

Looking back into the hall itself (Figure 15), one can conceive of boxes where the windows are located. Another view toward the stage (Figure 16) illustrates the ornamentation that was added to the proscenium at a later date. It is interesting here to show an image of the hall with the windows open juxtaposition with an illustration of the remains of a Greco-Roman Theatre (Figures 17 and 18).

The first opera ever performed was “Dafne” by Jacopo Peri, in Florence in 1597. That was 21 years before the completion of the Teatro Farnese and 59 years before the completion of an opera house in Florence itself. I was unable to locate any information regarding the building in which “Dafne” was performed. It might even have been presented in an outdoor setting. We do know that it was scored for five individual instruments and that the performers sang the libretto in the form of a recitative; hence, opera as musical theater was born.

As the opera form developed, the number of musicians increased and arias became an important part of performances while the opera houses themselves hardly changed. Here is a chronological and pictorial progression of the construction of these buildings over the years (Figures 19 through 27).

As we observe, the singers still face the audience and they still hope there will be a bit of scenery behind them to assist their vocal endeavors. Yes, there have been some thrust opera stages such as the one at Loretta Hilton College outside St. Louis; and yes, for years, opera was presented in the round at the Boettcher Concert Hall in Denver, albeit with a bit of very subtle electronic lift with wireless microphones for surround sound distribution (Figure 28). However, the new Winspear Opera House in Dallas (Figure 29) and the new Opera House in Oslo (Figure 30) still follow the age-old design concepts from nearly 400 years ago.

I hope this paper provides some answers as to how opera houses evolved. But why hasn't the design changed much in 400 years? It may be due to the fact that opera audiences must receive a balanced sound between the performers and the orchestra, and the traditional opera house plan serves this goal very well. In other theaters, like the typical Broadway House or a classical Film Theatre, the balconies are brought so far forward that they create deep pockets that have short musical reverberation, and at the same time they bring those listeners who are at the front of the balconies too close to the pits for proper balance, as shown in the State Opera House in Cleveland (Figure 31). Maybe others have related ideas to share.

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