

# The Acoustics of Early Concert Venues in Japan

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## Introduction

The popularity of western classical music in modern Japan is documented by the large number of professional symphony orchestras, public concert activity, and the high number of public concert halls. While the introduction of western music culture in Japan at the end of the 19<sup>th</sup> century has been investigated quite thoroughly [1][2], the thesis presented in this paper [3] focuses on the venues where early performances of western classical music took place. The most important concert venues of this period have been identified and examined with regard to their architectural and acoustical features. Since none of these buildings exist anymore in their original condition, computer models have been created based on original floor plans and pictures, and some common acoustical measures were calculated from the modelled impulse responses.

## State of Research

While more or less detailed historical descriptions for all buildings under consideration exist in Japanese (e.g. [4]), literature on these structures in any Non-Japanese language is very rare. Even in the Japanese literature, however, architectural features play only a minor role compared to descriptions of the performances that took place at a certain venue and the people involved in these performances. A comprehensive survey of early concert venues and the development of concert halls with their architectural and acoustical features in Japan does not exist. Only an investigation on “acoustical features of the old Sōgakudō” was carried out at Tōkyō University recently [5]. In this study, geometrical models for all states of construction have been created, a set of acoustical values was calculated, and the reverberation time was measured on various locations in the existing hall.

## The Beginning Concert Life in Japan

The importing of Western music in Japan has to be seen as part of a broader social project that began after the Tokugawa Shōgunate collapsed in 1867. The ideas of the newly installed government included a modernization of the country through westernization, resulting in an active import of ideas, habits and institutions completely alien to the Japanese at that time. The Institute for Music Research (later: Tōkyō Music Academy) was established in 1879 for the purpose of training music teachers and the development of teaching materials for the schools. It became the center of innovation for many years. The first concert of orchestral music is said to have taken place in 1881, the first performance of European symphonic music in 1887. The orchestra of the Academy started giving regular concerts from the middle of the 1890's [6]. According to newspaper articles of the time [7], the most prominent private

organization to performed public concerts in these early years was the Meiji Music Association, founded in 1898.

## Early Concert Venues in Tokyo

The importance of concert venues in the time between 1890 and 1930 has been determined according to the number of concerts held at the halls under consideration. The most important concert venues within a first period were the ballroom of the Rokumeikan, the lecture hall of the Kanda YMCA, and the auditorium of the Music Academy (commonly referred to as Sōgakudō), with a cubic volume between 1200 m<sup>3</sup> and 2300 m<sup>3</sup>.

**Table 1:** Most prominent concert halls in Tōkyō between 1890 and 1930.

Name	Year of Opening	Volume [m <sup>3</sup> ]	Capacity
Rokumeikan	1883	1300	400
Kanda Seinenkan	1890	2280	500
Sōgakudō	1894	2025	390
Teikoku Gekijō	1911	6300	1700
Nihon Seinenkan	1921	6300	2000
Kabukiza	1924	7650	2700

The second group features halls that had their peak time between 1910 and 1930 and are notably bigger, with a volume over 5000 m<sup>3</sup>.



**Figure 1:** The Kabukiza, first opened in 1889, was destroyed and rebuilt several times. The photo shows the 3<sup>rd</sup> state of construction (1924-1945), with a capacity of 2700 people.

This group consists of the two most prominent theaters that existed at the time in Tōkyō, namely the Kabukiza (Kabuki Theater), and the Teikoku Gekijō (Imperial Theater) as well as the auditorium of the Nihon Seinenkan (Japan Youth Center).

### Acoustical Evaluation

Computer models (EASE Version 4.2.3.36 [8]) were generated for the six halls described above. The room shape, geometrical structures as well as the volume could be rather accurately extracted from copies of the blueprints that could be found for all of the buildings. Descriptions of the basic materials used were available, even if the exact absorption coefficients could only approximately be determined from the existing blueprints and descriptions. The resulting inaccuracies, however, primarily affect the calculations for the unoccupied case. In a fully occupied concert hall, the absorption by the audience and orchestra areas constitute 75 % of the total absorption, therefore uncertainties concerning the residual absorption will have minor effects on the calculated reverberation time values. For an omnidirectional source on stage reflectograms were calculated, as well as values for  $T_{30}$ , EDT, Bass ratio (BR),  $C_{80}$  and G, using the AURA mapping module.

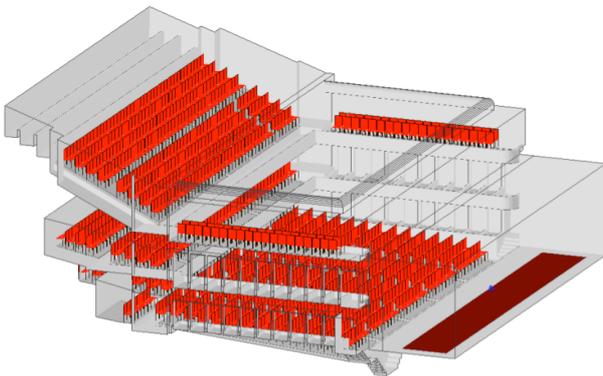


Figure 2: Acoustical model of the Kabukiza.

In Table 2, the calculated room acoustical measures are presented.

Table 2: Calculated room acoustical measures.  
\*reverberation time values are for the unoccupied case

Name	RT*	BR	$G_{mid}$	$C_{80}$	$LF_{E4}$
Rokumeikan	0,8 s	0,7	+ 15	-1,5	0,24
Sōgakudō	1,2 s	1,1	+ 11	+ 3	0,24
Kanda Seinenkan	0,8 s	0,9	+ 12,5	+ 0,5	0,2
Teikoku Gekijō	1,0 s	0,9	+ 2,5	+ 3,5	0,2
Nihon Seinenkan	1,4 s	1,0	+ 7	+ 0,5	0,18
Kabuki-za	0,9 s	1,0	+ 1	+ 5	0,23

### Discussion

The most prominent concert venues for a period of early concert life in Japan, in the years between 1890 and 1930, have been identified, and a number of acoustical measures was calculated based on room acoustical computer models. The first halls in which performances of western concert music took place were buildings influenced by western architecture, but not primarily built for music. The Rokumeikan was designed as a place, where foreign dignities could be accommodated, the lecture hall of the YMCA in Kanda was mainly used for church service and speeches. These venues are characterized by a high loudness (high values of  $G_{mid}$ ) and a high clarity (high values of  $C_{80}$ , low values of RT), similar to halls that were used one hundred years before for the first public concerts in European cities such as Vienna [9] or Hamburg [10]. The measures calculated for the two theater buildings (Kabukiza, Teikoku Gekijō), in particular for the Teikoku Gekijō, are similar to those of the prominent theaters that existed in Europe at the same time, such as the Opera Garnier in Paris, demonstrating the meticulous studies of the western architecture at this time. The Kabuki-za shows some distinctive features of architectural design, originating from the integration of Japanese influences, such as the *hanamichi* (a passageway connecting the rear part of the auditorium with the stage), and the *sajiki* (the equivalent to boxes in a Western theater, in which the audience was seated on *tatami* mats on the floor), and Western influences, such as the upholstered auditorium seats. The use of this venue for the performance of western classical music certainly represents a unique case.

### Literature

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