

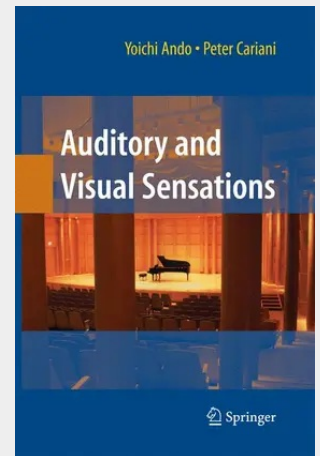
Auditory and Visual Sensations

This is an approach from the auditory and visual brain activities and functioning to sensations. This book is concerned with physics, psychology, brain physiology, blending science and art. Temporal sensations such as pitch or missing fundamental, loudness, timbre, and duration sensation, which is introduced here as the fourth, may be described by the temporal factors extracted from the autocorrelation function (ACF), which are associated with the left hemisphere. On the other hand, spatial sensations such as localization in the horizontal plane, apparent source width (ASW) and subjective diffuseness are described by the spatial factors extracted from the interaural cross correlation function (IACF) are associated with the right hemisphere.

The "primary sensation" may be classified in two categories: temporal sensations and spatial sensations. Therefore, any subjective responses of the sound field may be described based on both the temporal and spatial factors. The first part of book contributes to basic acoustics researches related to brain including concert hall and opera house acoustics, noise measurement and effects of noise on man, but also psychological and physiological acoustics as well as speech and music perception.

As described in the second part, there is a certain degree of similarity in the processing of auditory- and visual –brain systems. An analogy of this theory may be applied for the temporal sensations and the spatial sensations of vision, as well as the subjective preference of the visual environment. The typical temporal sensation of vision is "pitch" of a flickering light, which includes the missing fundamental phenomenon. Visual spatial sensations discussed here are contrast, regularity and coarseness. But, no color effects on the sensations are treated in this volume. As an application, a design theory incorporating temporal and spatial factors may be generalized in architectural and environmental design. Some examples of application will be offered.

Ando establishes a theory of subjective preference of the sound field in a concert hall, based on preference theory with a model of human auditory-brain system. The model uses the autocorrelation function and the interaural crosscorrelation function for signals arriving at two ear entrances and considers the specialization of human cerebral hemispheres. The theory may be applied to describe primary sensations such as pitch or missing fundamental, loudness, timbre, and duration. These four primary sensations may be formulated by the temporal factors extracted from the autocorrelation function associated with left hemisphere. Spatial sensations such as localization in the horizontal plane, apparent source width, and subjective diffuseness are described by spatial factors extracted from the interaural crosscorrelation function associated with the right hemisphere. Any important subjective responses of sound fields may be described by use of both the temporal and spatial factors. The theory may also be applied to visual sensations as well as subjective preference of visual environments. Remarkable findings in activities in both auditory-brain and visual-brain systems in relation to subjective preference as a primitive response are described.



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