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Shepherd, Alan

Let's Calculate Bach

Applying Information Theory and Statistics to Numbers in Music

- Applies information theory, mathematical, statistical and computational methods to explore numbers and proportions in music
- Features detailed descriptions of the techniques and a computer program, equipping readers to reproduce all results
- Shows how scientific tools can be used for the humanities, appealing to anyone interested in arts and science
- Summarises the main take-aways for each chapter

This book shows how information theory, probability, statistics, mathematics and personal computers can be applied to the exploration of numbers and proportions in music. It brings the methods of scientific and quantitative thinking to questions like: What are the ways of encoding a message in music and how can we be sure of the correct decoding? How do claims of names hidden in the notes of a score stand up to scientific analysis? How many ways are there of obtaining proportions and are they due to chance? After thoroughly exploring the ways of encoding information in music, the ambiguities of numerical alphabets and the words to be found "hidden" in a score, the book presents a novel way of exploring the proportions in a composition with a purpose-built computer program and gives example results from the application of the techniques. These include information theory, combinatorics, probability, hypothesis testing, Monte Carlo simulation and Bayesian networks, presented in an easily understandable form including their development from ancient history through the life and times of J. S. Bach, making connections between science, philosophy, art, architecture, particle physics, calculating machines and artificial intelligence. For the practitioner the book points out the pitfalls of various psychological fallacies and biases and includes succinct points of guidance for anyone involved in this type of research. This book will be useful to anyone who intends to use a scientific approach to the humanities, particularly music, and will appeal to anyone who is interested in the intersection between the arts and science. With a foreword by Ruth Tatlow (Uppsala University), award winning author of *Bach's Numbers: Compositional Proportion and Significance* and *Bach and the Riddle of the Number Alphabet*.

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