More than 60 years ago, Chiba and Kajiyama published “The Vowel: Its Nature and Structure” in 1942, and it was fundamental to the establishment of the modern acoustic theory of speech by Stevens, Fant, and other eminent scientists. This book approached the mechanism of vowel production and perception from the viewpoints of physiology, physics and psychology, and importantly, it integrated them together for the first time. They showed that the waveform of a vowel is treatable by Fourier analysis, introduced the concept of the electric-circuit analog to simulate a resonance of the vocal tract, and succeeded in calculating vowel spectra from data of the vocal tract shape. In the present study, we first review the topics of this historical book and reconfirm that it established the basis of currently accepted theories on vowels, such as source-filter theory and perturbation theory. Furthermore, we confirm that their accomplishments were extremely influential for many researchers in the history of modern speech science. Finally, the usefulness of “Chiba and Kajiyama” from the pedagogical point of view is discussed. Arai (J. Phonetic Soc. Jpn., 2001) replicated Chiba and Kajiyama’s physical models of human vocal tract and showed that they are extremely effective in the classroom. We further extend these physical models, as educational tools, to consonants, such as nasals, stridents and liquids (l/r) based on modern literature, particularly “Acoustic Phonetics” (Stevens, 1998).