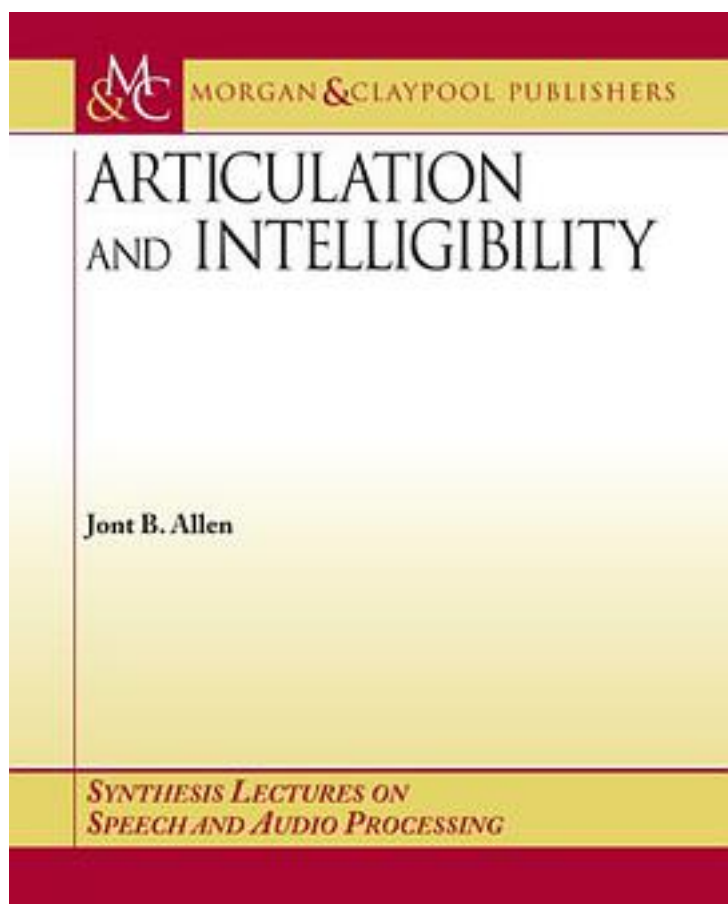


Articulation and Intelligibility (Synthesis Lectures on Speech and Audio Processing)



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Immediately following the Second World War, between 1947 and 1955, several classic

papers quantified the fundamentals of human speech information processing and recognition. In 1947 French and Steinberg published their classic study on the articulation index. In 1948 Claude Shannon published his famous work on the theory of information. In 1950 Fletcher and Galt published their theory of the articulation index, a theory that Fletcher had worked on for 30 years, which integrated his classic works on loudness and speech perception with models of speech intelligibility. In 1951 George Miller then wrote the first book Language and Communication, analyzing human speech communication with Claude Shannon's just published theory of information. Finally in 1955 George Miller published the first extensive analysis of phone decoding, in the form of confusion matrices, as a function of the speech-to-noise ratio. This work extended the Bell Labs' speech articulation studies with ideas from Shannon's Information theory. Both Miller and Fletcher showed that speech, as a code, is incredibly robust to mangling distortions of filtering and noise. It is my belief (i.e., assumption) that we can analyze speech intelligibility with the scientific method. The quantitative analysis of speech intelligibility requires both science and art. The scientific component requires an error analysis of spoken communication, which depends critically on the use of statistics, information theory, and psychophysical methods. The artistic component depends on knowing how to restrict the problem in such a way that progress may be made. It is critical to tease out the relevant from the irrelevant and dig for the key issues. This will focus us on the decoding of nonsense phonemes with no visual component, which have been mangled by filtering and noise.

作者介绍:

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