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Methods for singing voice control and synthesis

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There are various methods to synthesize the singing voice. Whatever the method, in order to obtain high quality voice output, it is essential to respect the precise parameter values for the first three to five formants of the vowels. These parameters depend on many factors including the singer, note, vowel, vocal effort, etc. Articulation of the notes is achieved by variations of fundamental frequency, vibrato, vocal effort and eventually formant characteristics of the vowels. Finally, the succession of consonants and vowels also has to be taken into account and implemented. With the expertise of J. Sundberg, a method called Formant Waveform Synthesis and a program for the control of all the above mentioned variations, except consonants, were developed at Ircam in the 80s. This program permitted high quality singing voice synthesis but without consonants. Another synthesis method is to concatenate units of recorded singing voice. This provides good consonant-to-vowel articulations. But it necessitates to transpose and change the duration of these units which often degrades the output quality and precise control over the formant characteristics is rather difficult. These various methods will be discussed and examples given.