

A Few (Programmable) Parameters of Musical Sound
Music 220b | CCRMA / Stanford University | Ge Wang

Here are some basic properties of musical sound; precisely controlling the parameters related to them is where programmability can really shine. By the way, not everything has to change all the time — but it can be helpful to have considered each of these...

Frequency (related: pitch) | Measured in Hertz, frequency has to do the number of oscillations per unit time. If the frequency of oscillation is audible (less than about 20,000 Hertz), then we hear it as pitch. This is generally easy for a computer to control.

Dynamics (related: volume / gain / loudness) | This may seem so trivial (it's a single multiplier on the amplitude of the sound) that it is all-too-easy to overlook and underutilize in sound design. Be mindful of the relative loudness of different elements, as well as a trajectory of change in loudness (e.g., crescendo, decrescendo, tremolo); subtle variations of amplitude may have pronounced effect over time! Amplitude envelopes can be applied to create expressive contours as a function of time.

Timbre (related: tone, frequency spectrum of sound) | Hard to define but essential quality of sound — we can think of timbre as the instantaneous make-up of a sound (e.g., the difference between a cello vs. a guitar playing a note of the same pitch and at comparable loudness). It can be controlled, and modulated in many ways, including adding sound components together, subtracting parts (through filtering), or modeling some physical or physically inspired aspects of sound.

Texture (related: interaction of "voices" in a mixture) | In music, texture refers how individual "voices" stack up (e.g., monophony, polyphony, counterpoint) and interact with each other to form a coherent overall sound. More broadly, texture might be thought of as how discernible sounds layer together in a mixture. Might describe the texture of a sound as "gritty", "smooth", "pointillistic", "thin", "full", ...

Rhythm (related: pulse, beat, meter, tempo, arhythm) | Any discernible repetition of arrival or change of sound. Can be as in-your-face as a repeating kick drum, or as subtle as gentle fluctuations (or pulse or flutter) of a sound...

Harmony (related: consonance, dissonance, chords, motion) | The simultaneity of pitched elements, as well as its progression from one state to the next. The progression of harmonies (whether tonal, atonal etc.) over time can be a prominent musical parameter to change over time.

Pan | Another seemingly simple parameter that can be used to great effect and subtlety, including for stereo; can be used to create a "sound field", giving space to the overall sound; can be used to simulate moving sound sources.