Psychoacoustics 1 Bell (a ratio)=1 order of magnitude (x10) in power, 1 decibell (dB) = 1/10 Bell, 10 dB = one order of magnitudedBm, dBV, etc, are relative to some fixed amount of power or voltage cochlea takes Fourier Transform Location by delta volume, or delta phase Inferior Colliculus for sound, Superior Colliculus for sight Mechanical Instruments Hollow log – actually quite sensitive transducer Wind (harmonics with hole half way up) Strings (harmonics with light touch) Pythagorean Scale Tempered Scale (Bach Well Tempered Clavier) 12th root of 2 Stretching (harmonics actually sharp) Voice – square wave into filter, fricatives (white noise) **Electrified Instruments** Electric Guitar, inductive pickup (better than microphone) Hollow body vs. Solid Body **Electric Pianos** Live miking vs. Recording (sound reinforcement, linear) **Electronic Synthesizers** Hammond Organ Theramin Analog synths (Moog) VCO, VCA, VCF (Subtractive Synthesis) Switched on Bach, Walter (Wendy) Carlos Additive Synthesis (Computers) 1960s FM (Chowning) Synthesis 1970s MIDI Touch sensitivity Sampling Modeling analog synthesizers with computers Modeling mechanical instruments with computers Better input devices Humans and Computers / Composing and Performing Effects Filters: hi, low, notch, bandpass, Vox Wa-Wa Comb filters, Flanging, Chorus Tremulo Pan, surround-sound Reverb Distortion: Overdriving speakers, fuzz box, clipping, sustain Intensional runaway feedback (Hendricks, non-linear) Compression (AGC, Dolby) **Recording Music** Player piano

Edison records, mono and stereo (Les Paul's double spiral) Hi-Fi (use of negative feedback to make linear) Magnetic wire Magnetic tape Digital tape Digital disk (magnetic, optical) Solid state Transmitting Music KDKA – Westinghouse 1920, first broadcast AM Radio – 40Khz bands, limited dynamic range (good in car, and for pop music) FM Radio – better SNR, stereo, HiFi (Feedback to make linear) Cyberspace / on demand