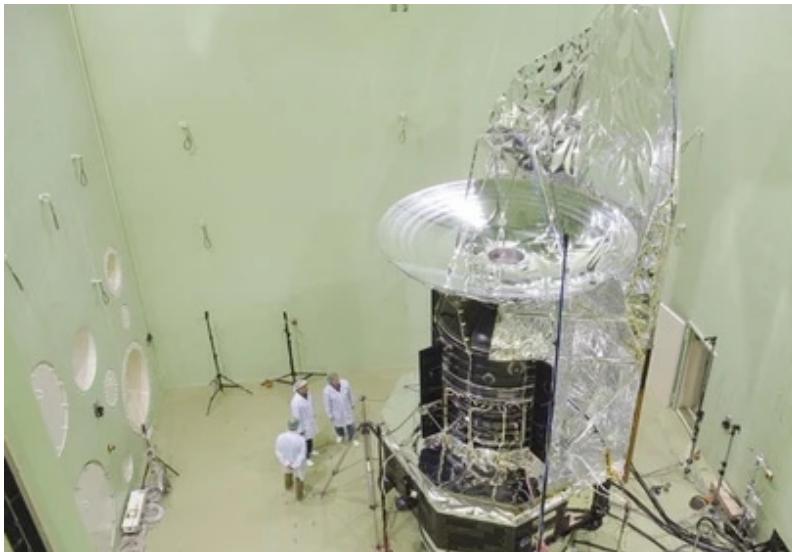


DIGITAL SOUND SYNTHESIS

02



Frequency & amplitude

Frequency & amplitude



high/low

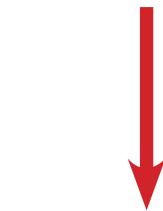


loud/soft

Frequency & amplitude



high/low



loud/soft

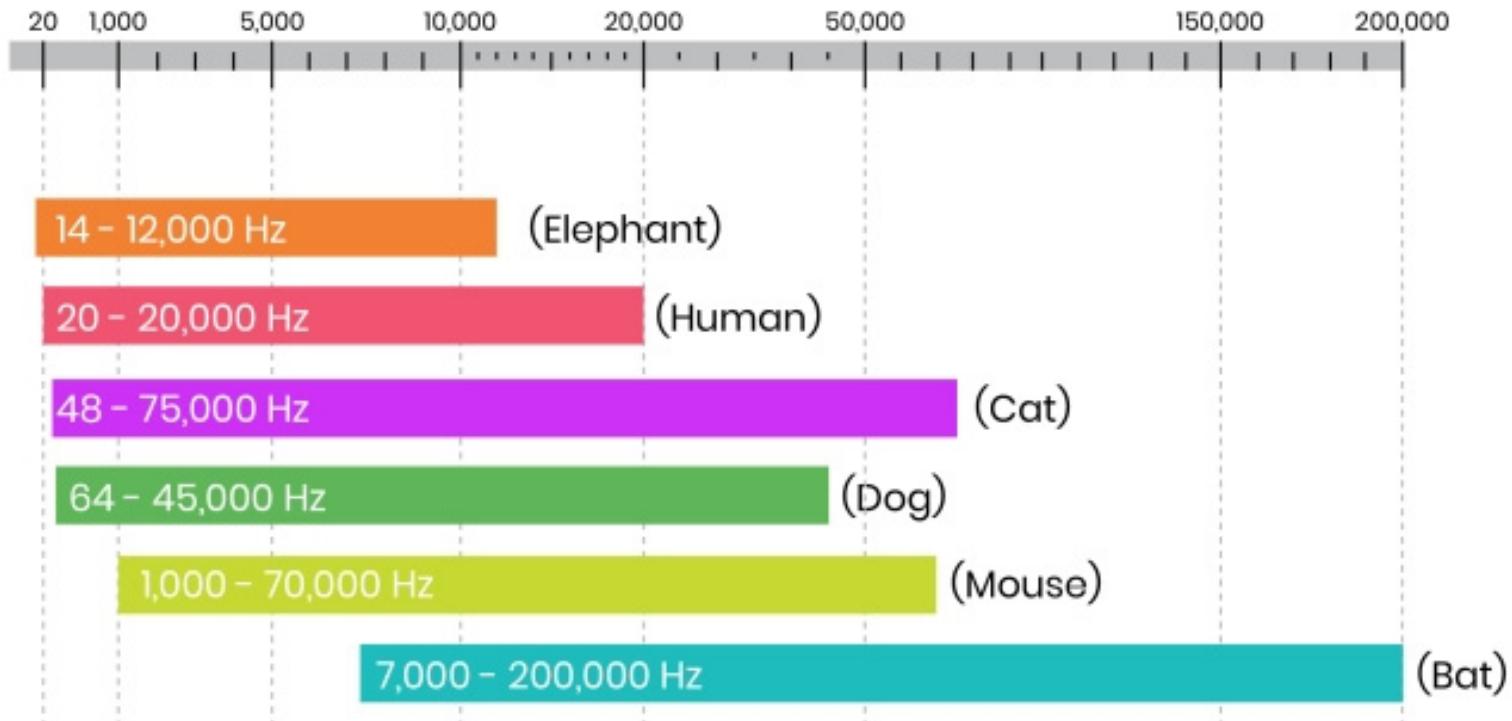


Hertz

Range of Human Hearing

20 – 20000 Hz

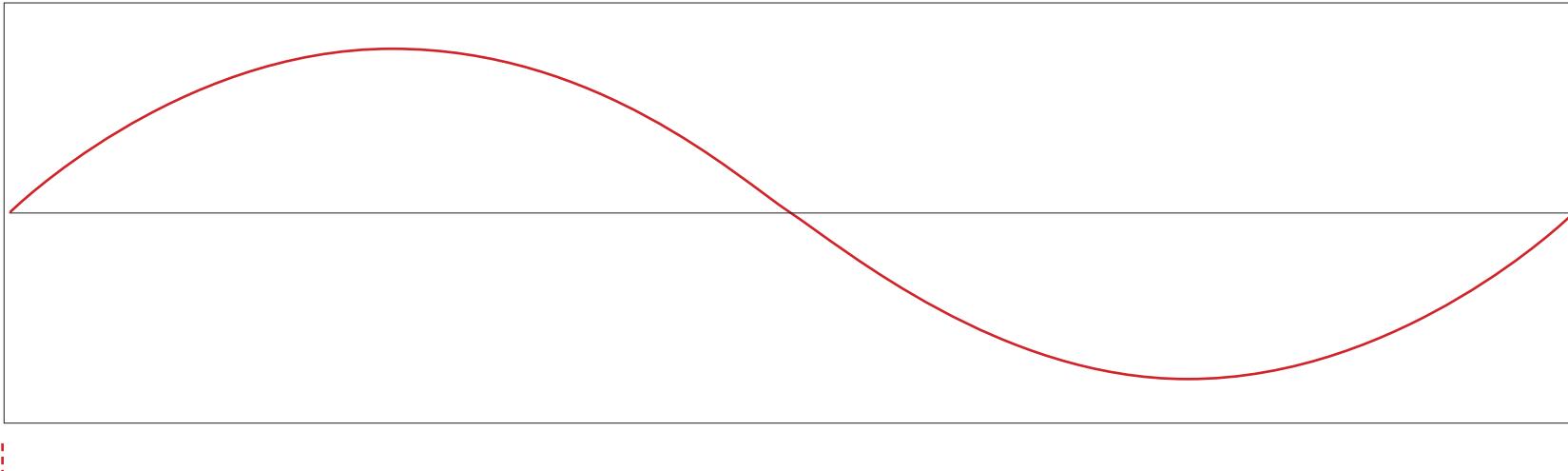
Hearing range of different mammals



Frequency = oscillations/second

1 Hertz = 1 cycle/second

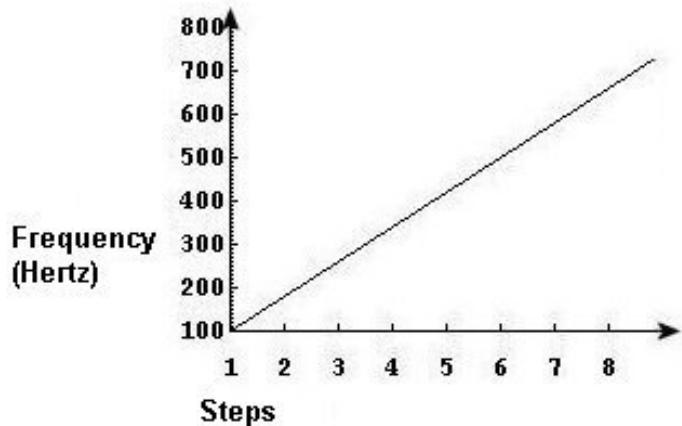
Sinewave at 1 Hz



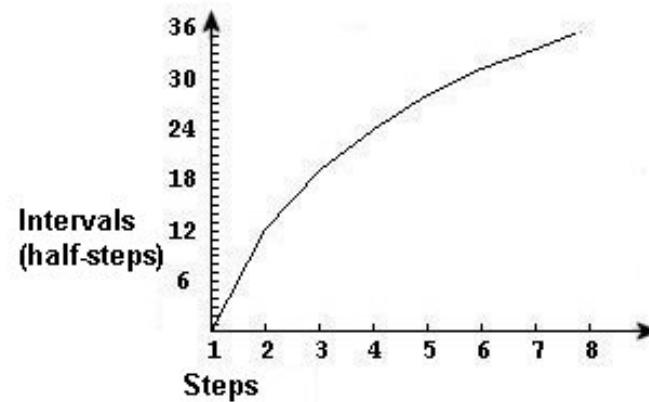
Wavelength in air: 343 m

Pitch Perception

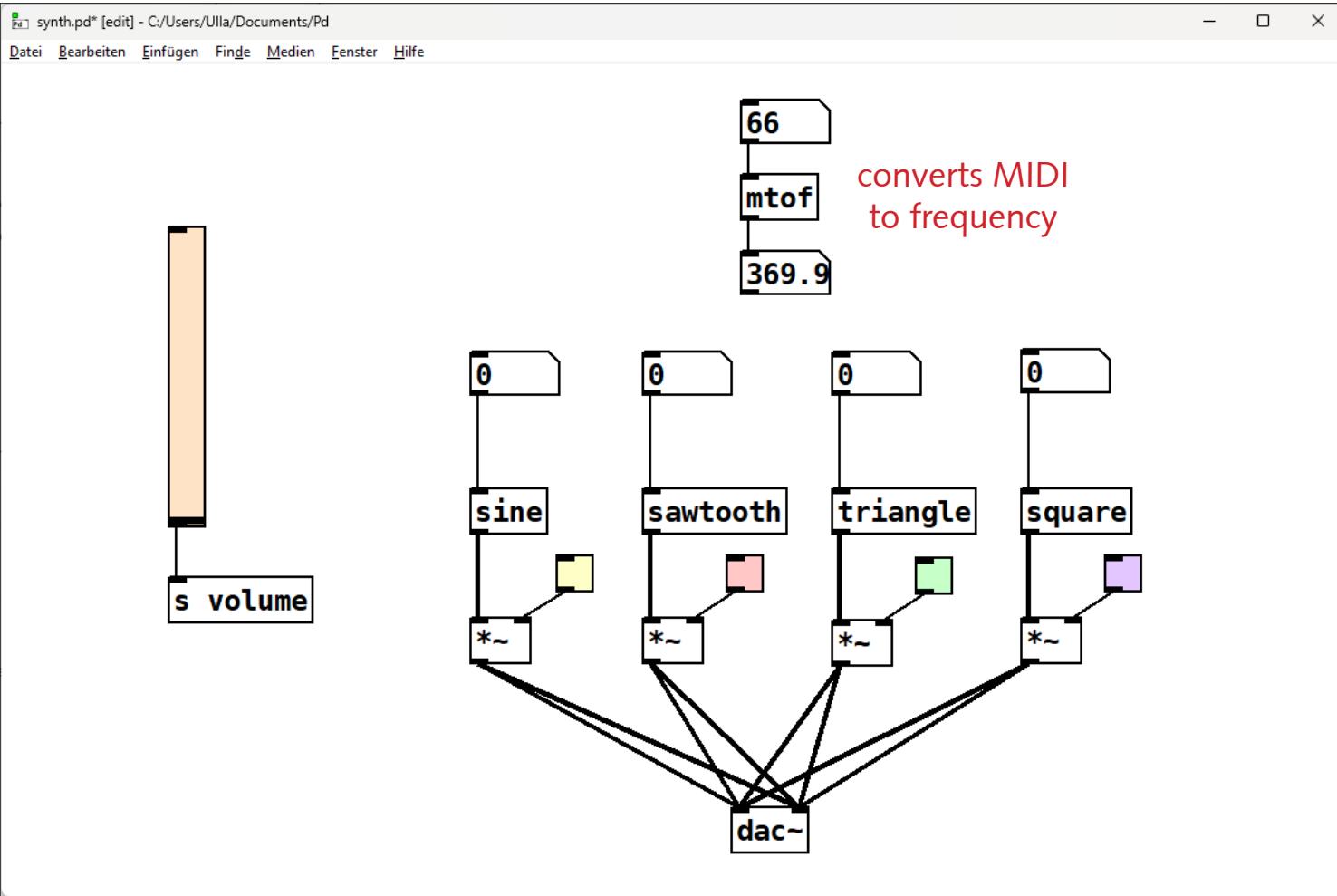
→ Logarithmic Frequency Scale

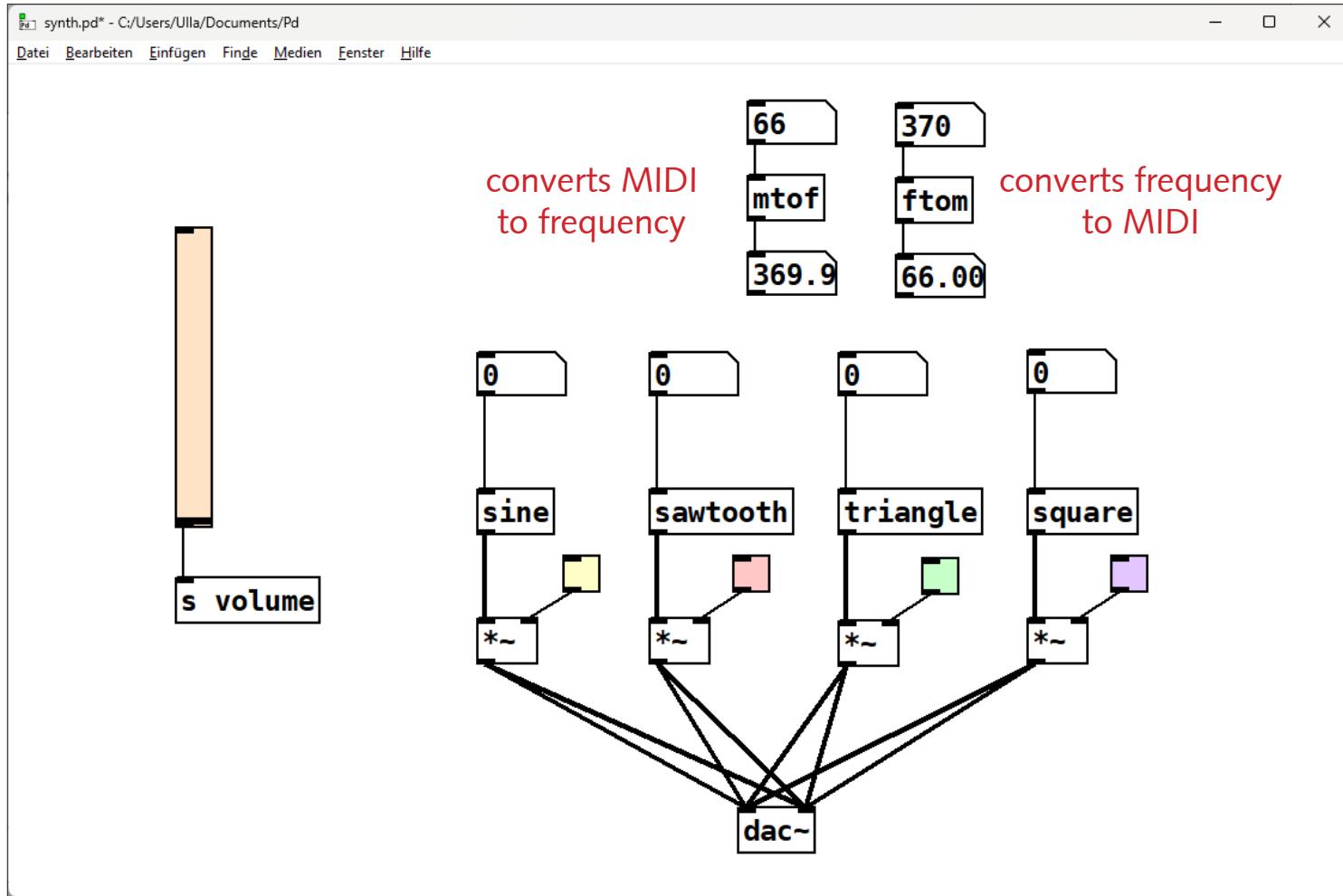


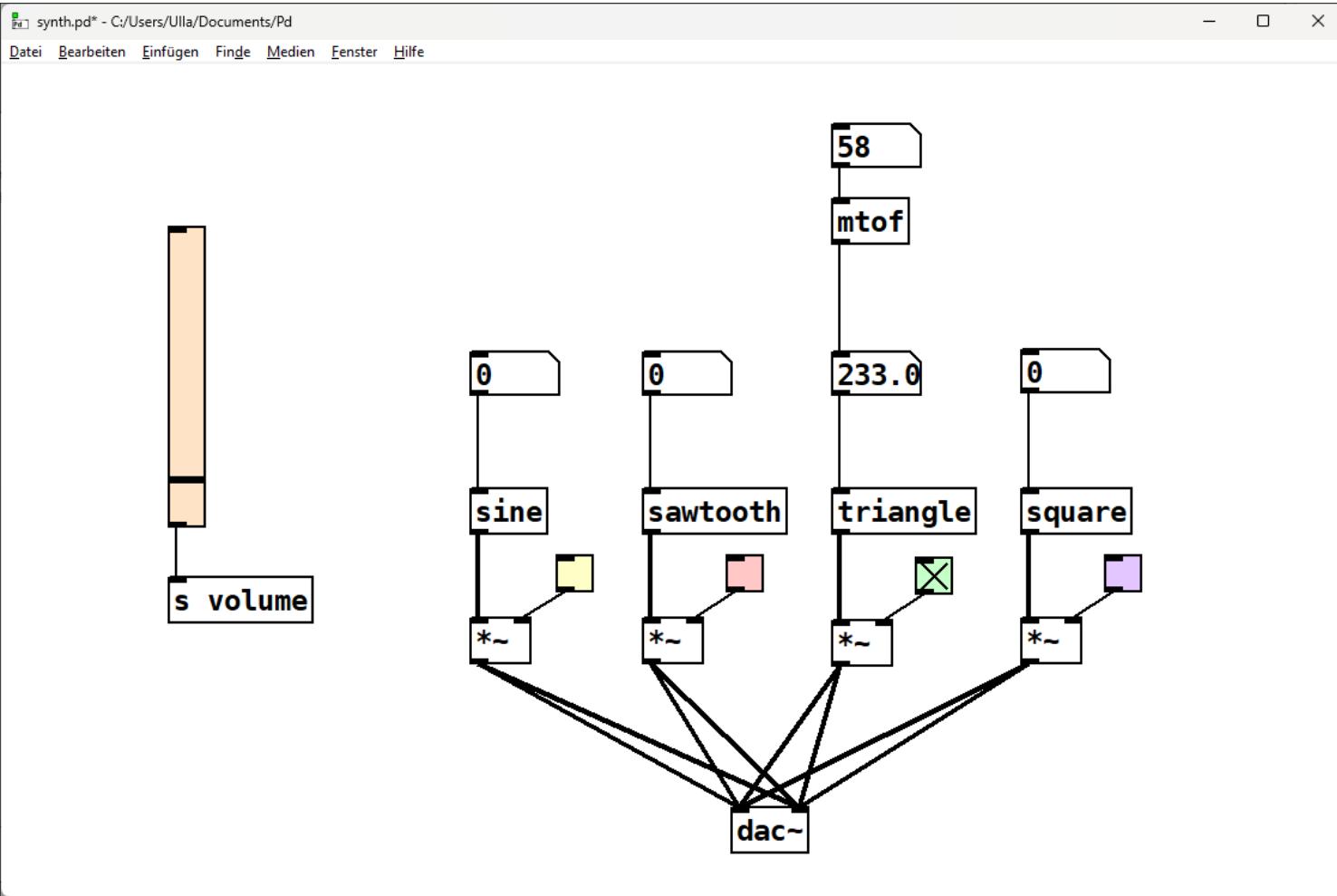
mathematical steps

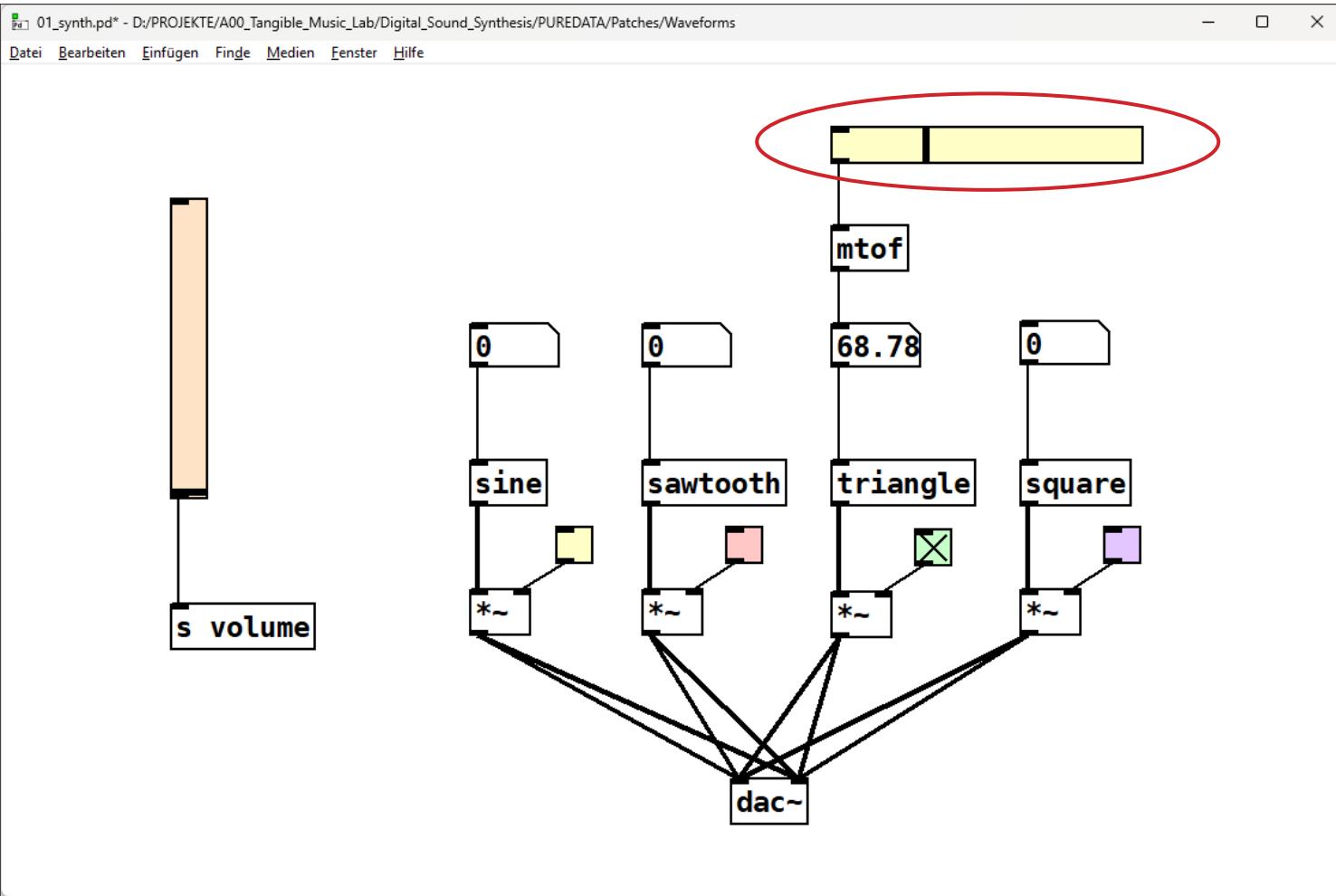


perceived steps



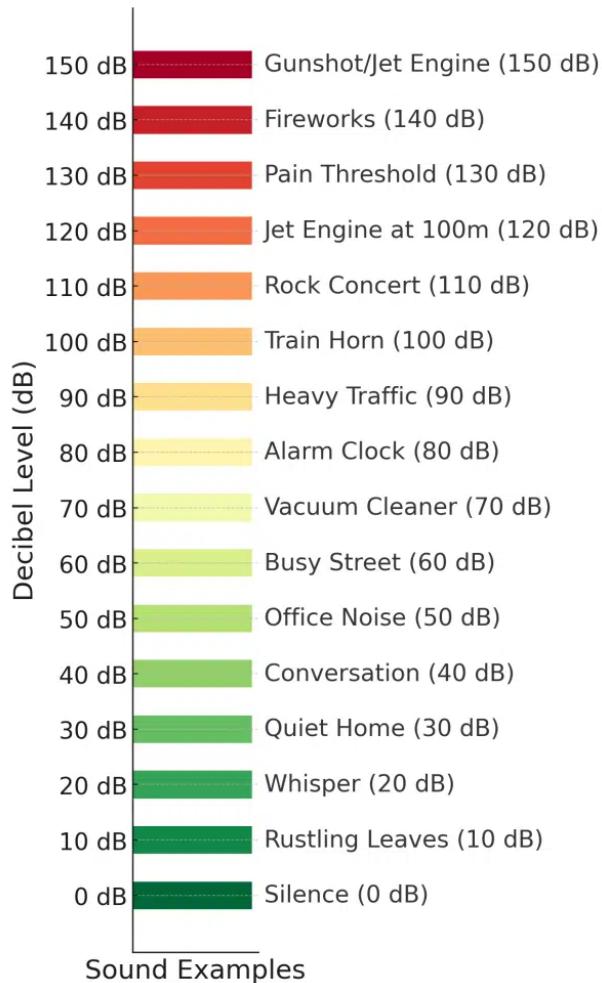






Frequency & amplitude

Decibel Levels with Common Sounds

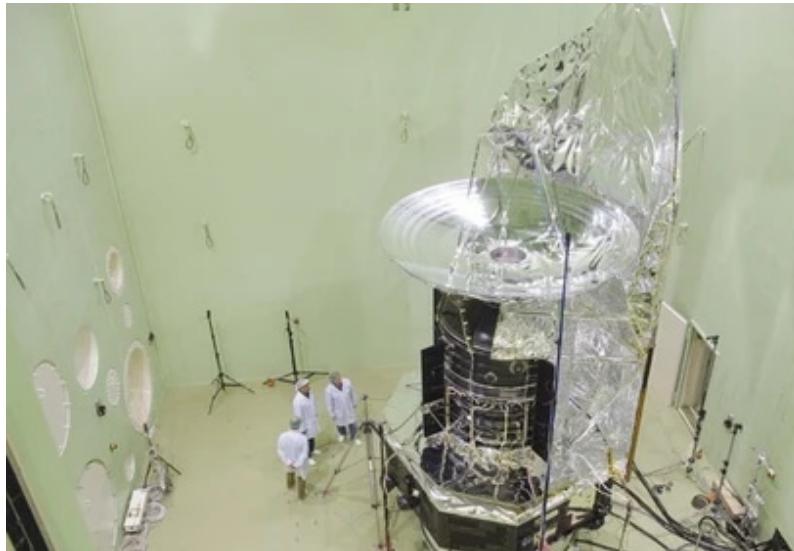


Atlantic City Hall Organ



138,4 dB

Sound System of ESA

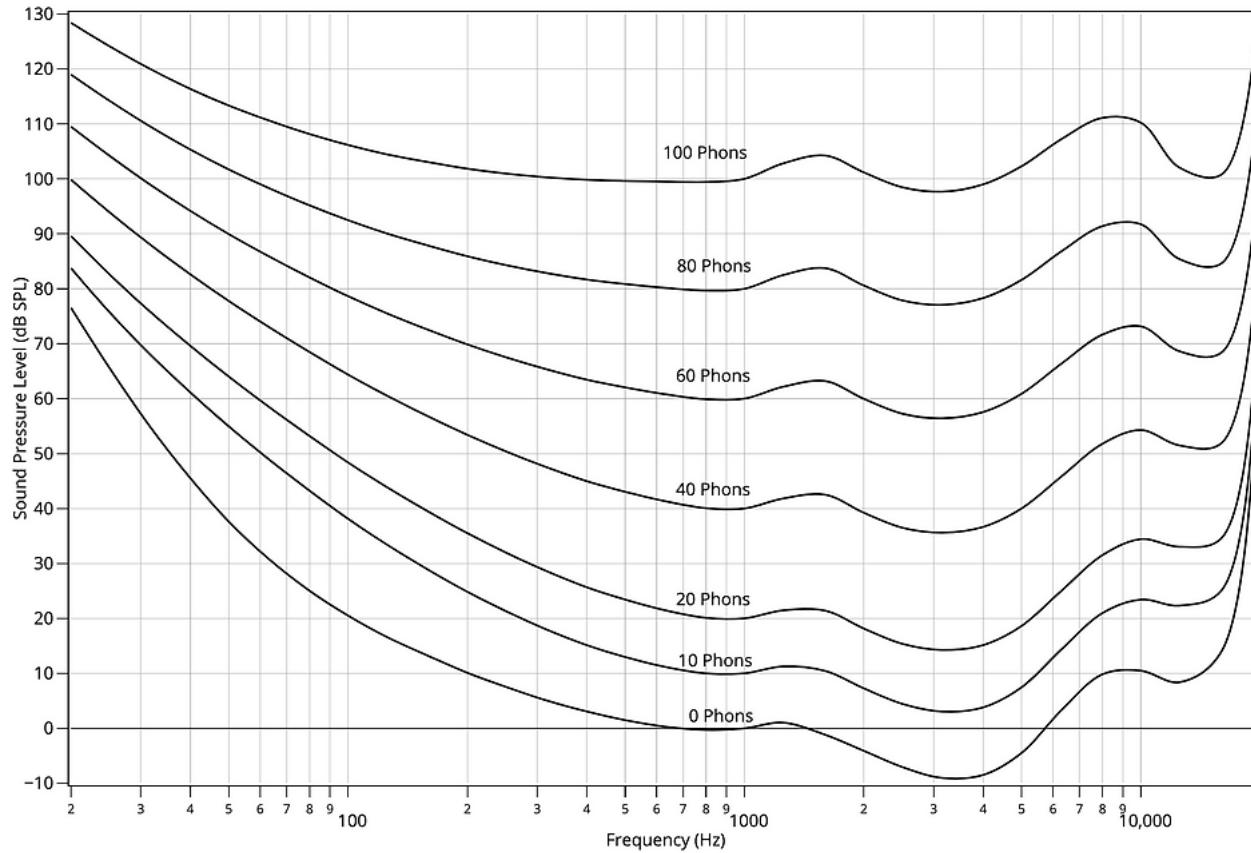


155 dB

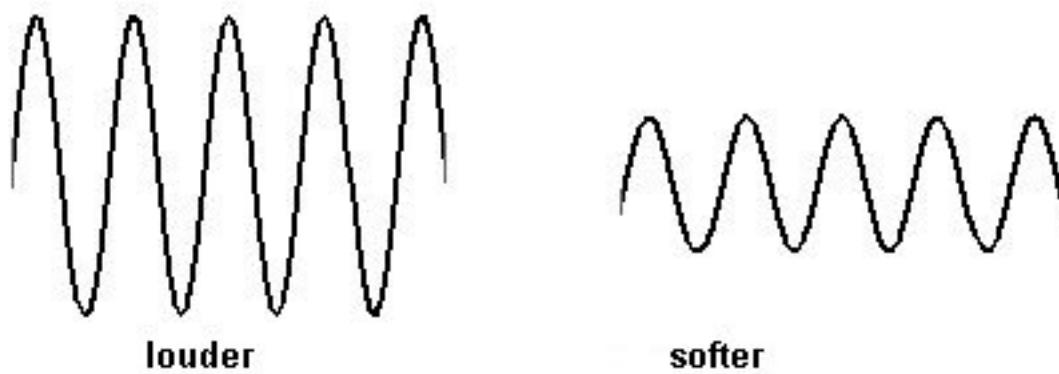
+ 6 dB = double volume

- 6 dB = half volume

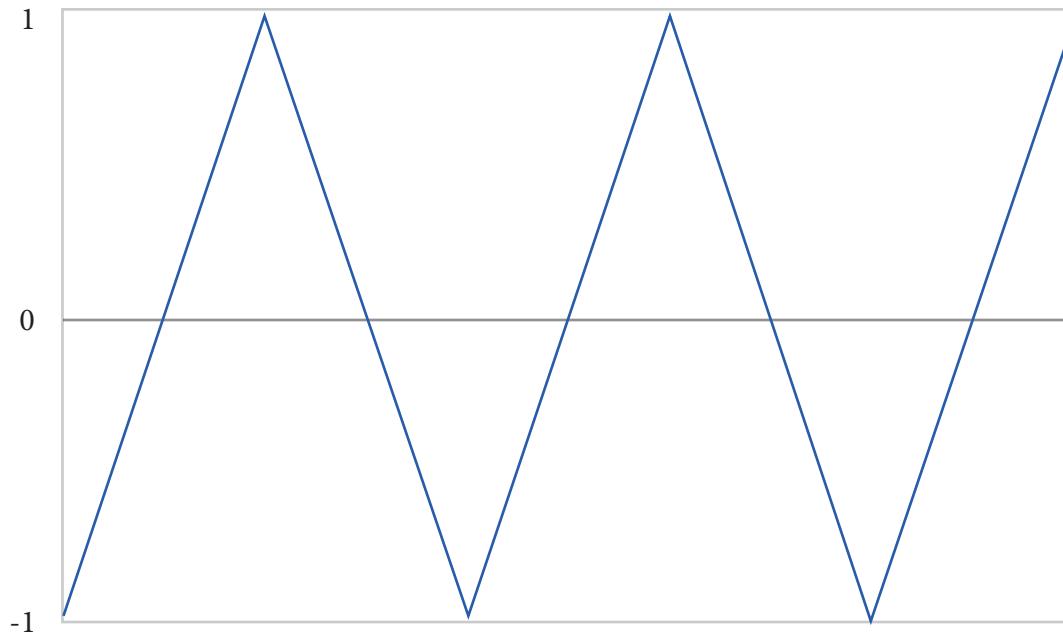
Equal loudness contour



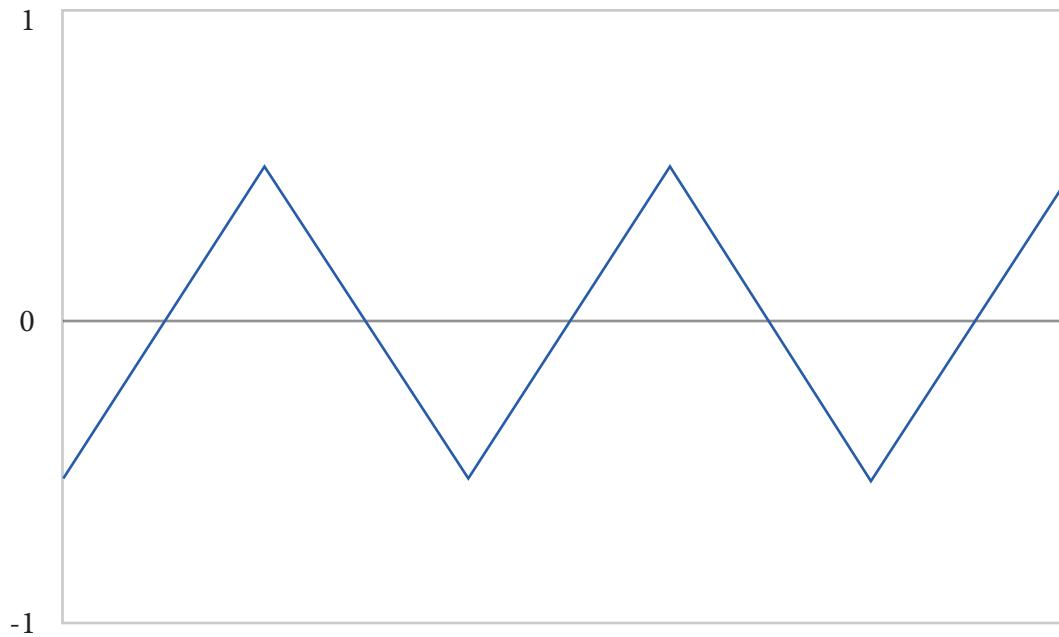
Amplitude

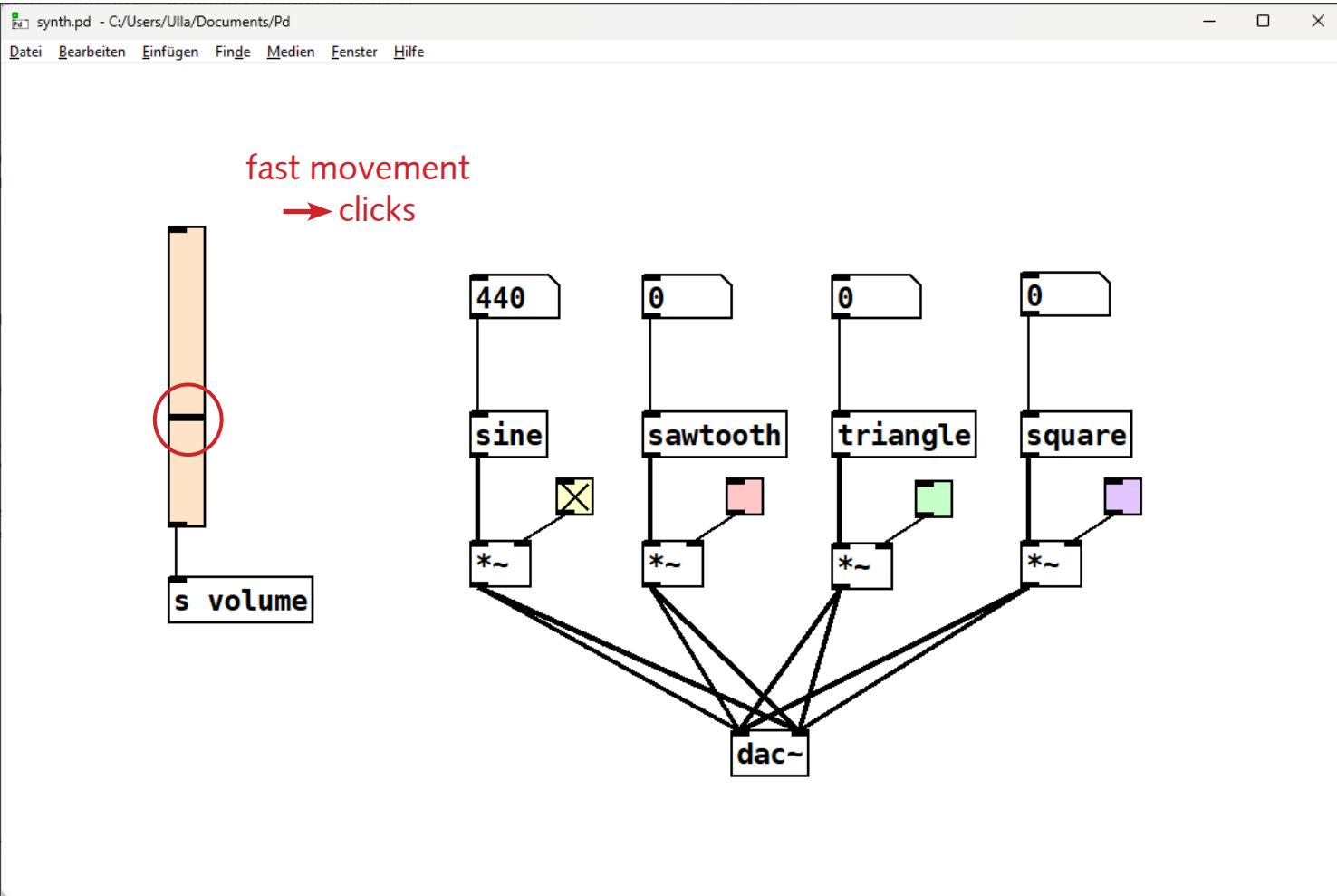


triangle wave – maximal amplitude

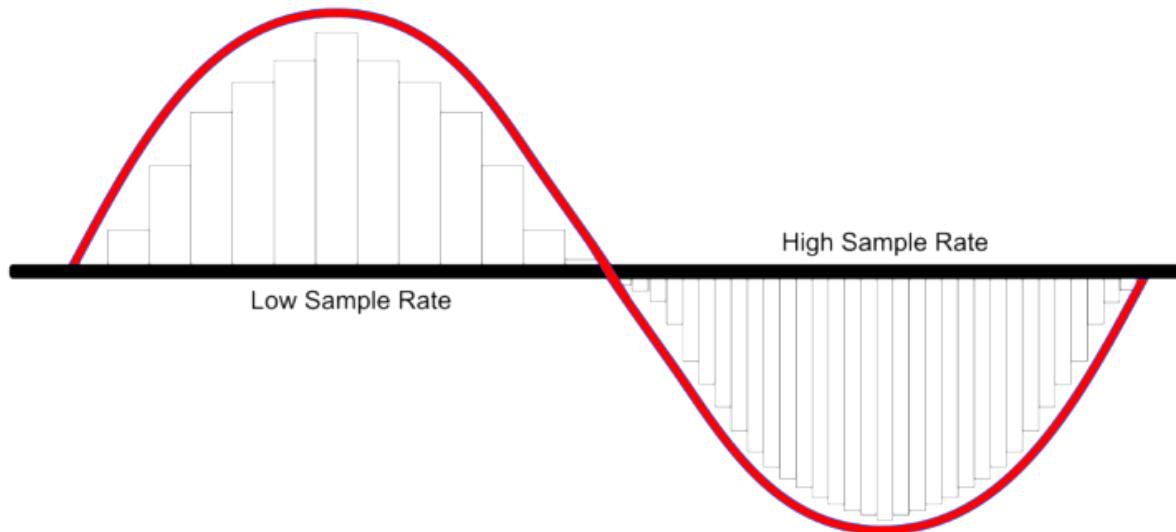


triangle wave – half amplitude





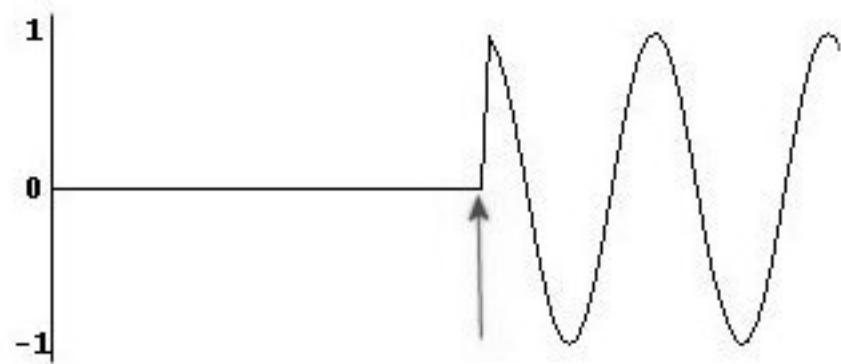
Sample rate



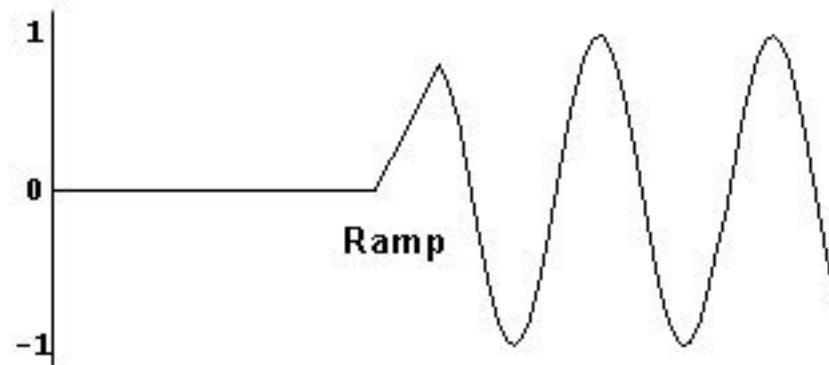
number of steps = Sample rate

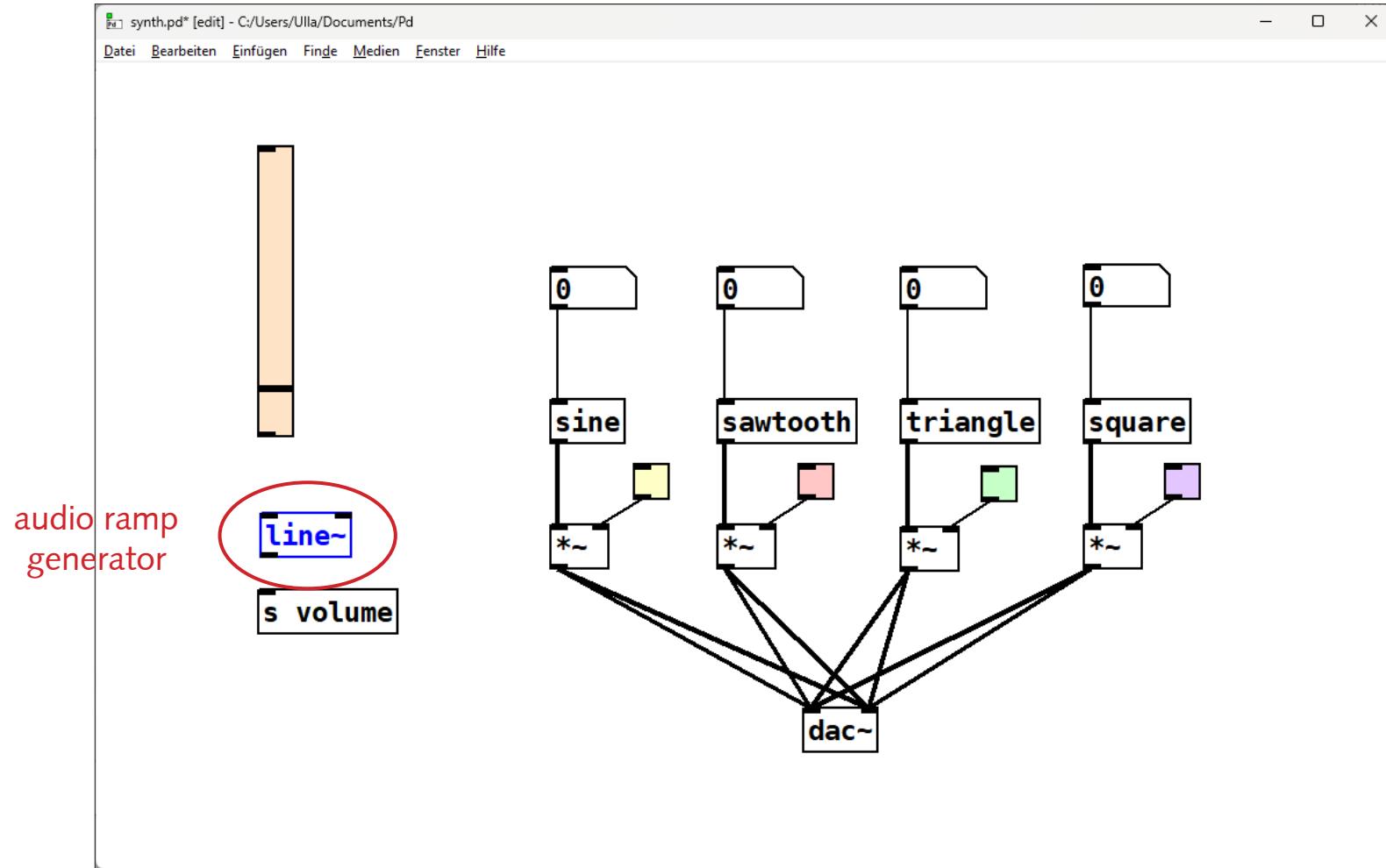
44100 (most common)

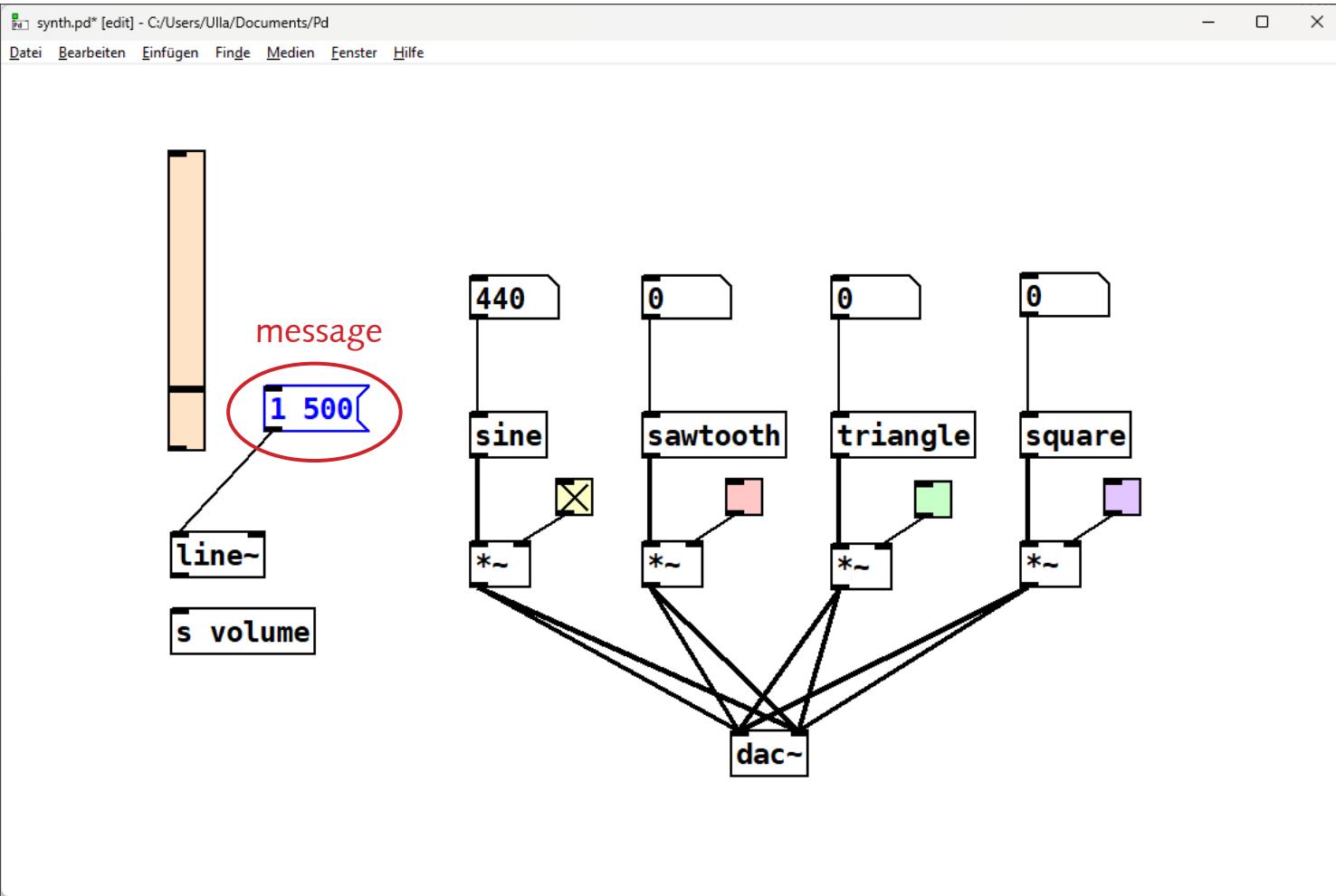
Clicks

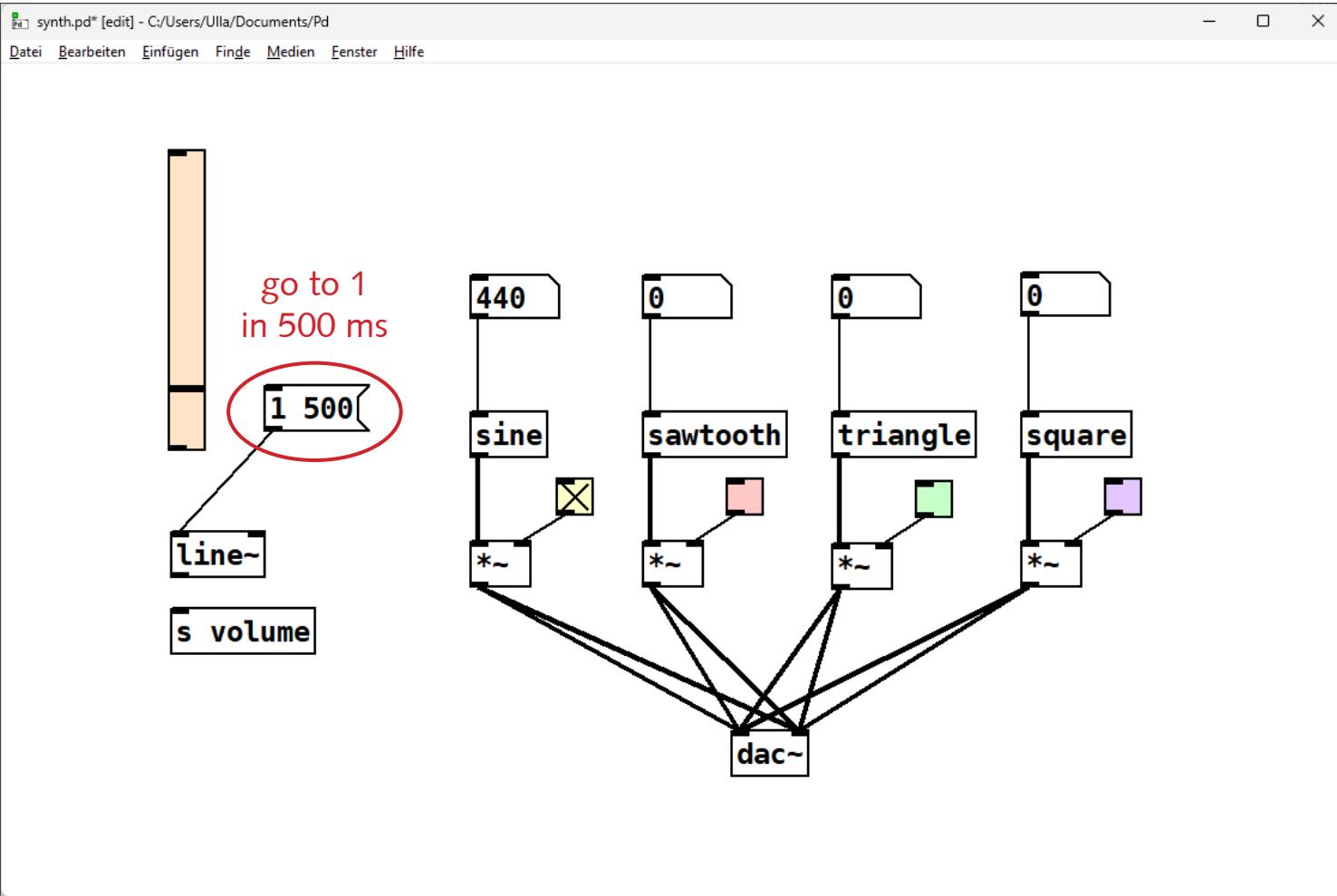


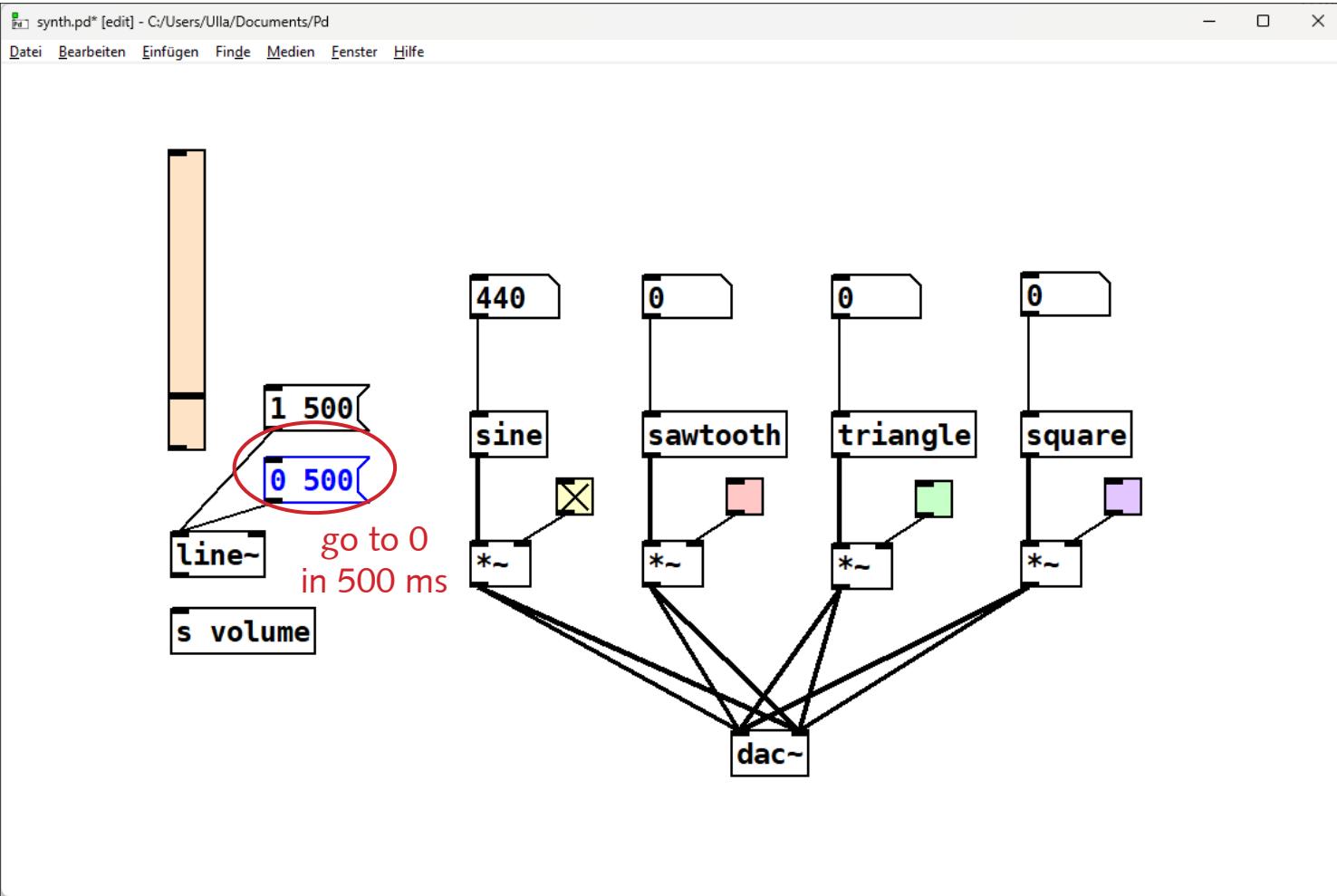
Create a ramp

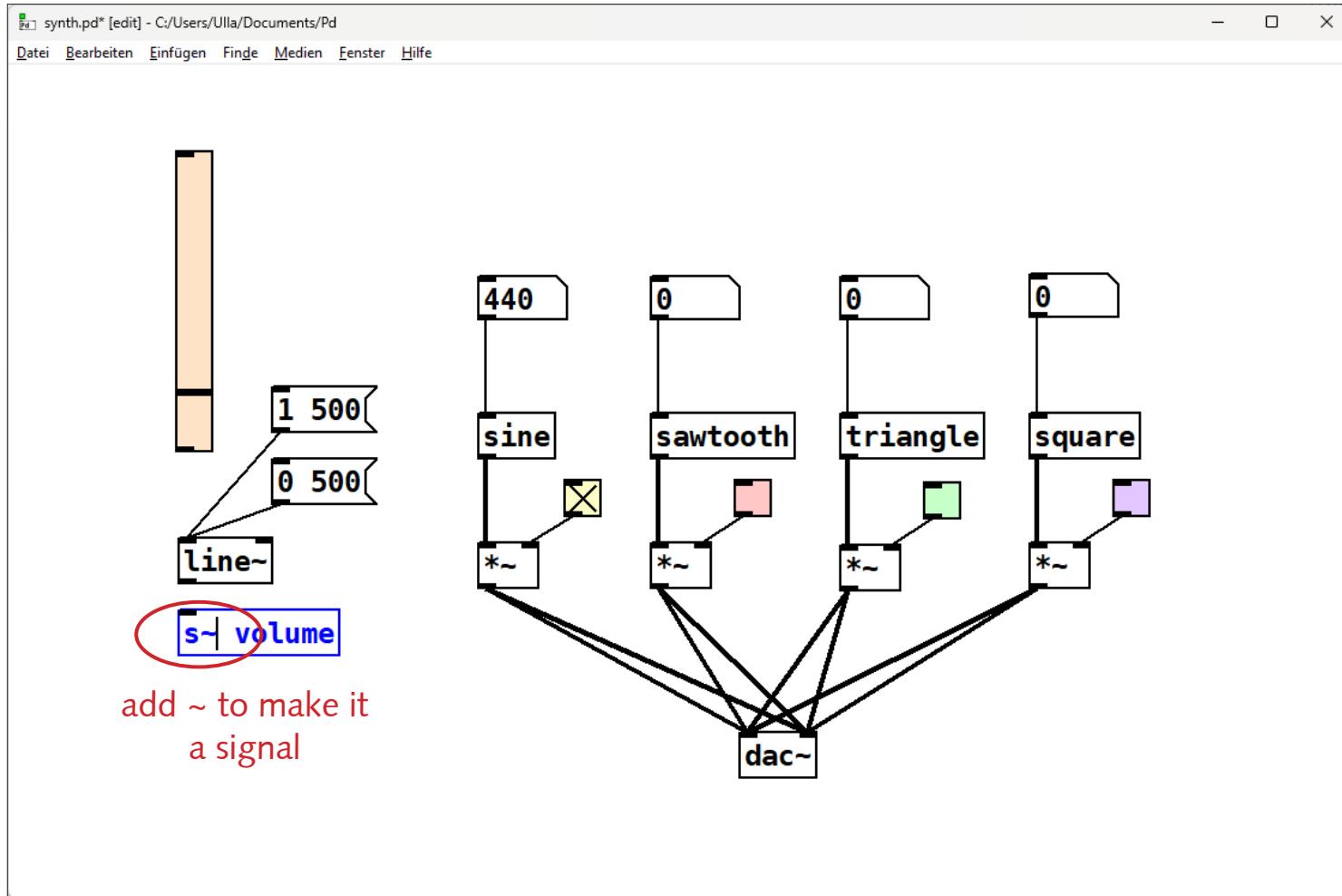


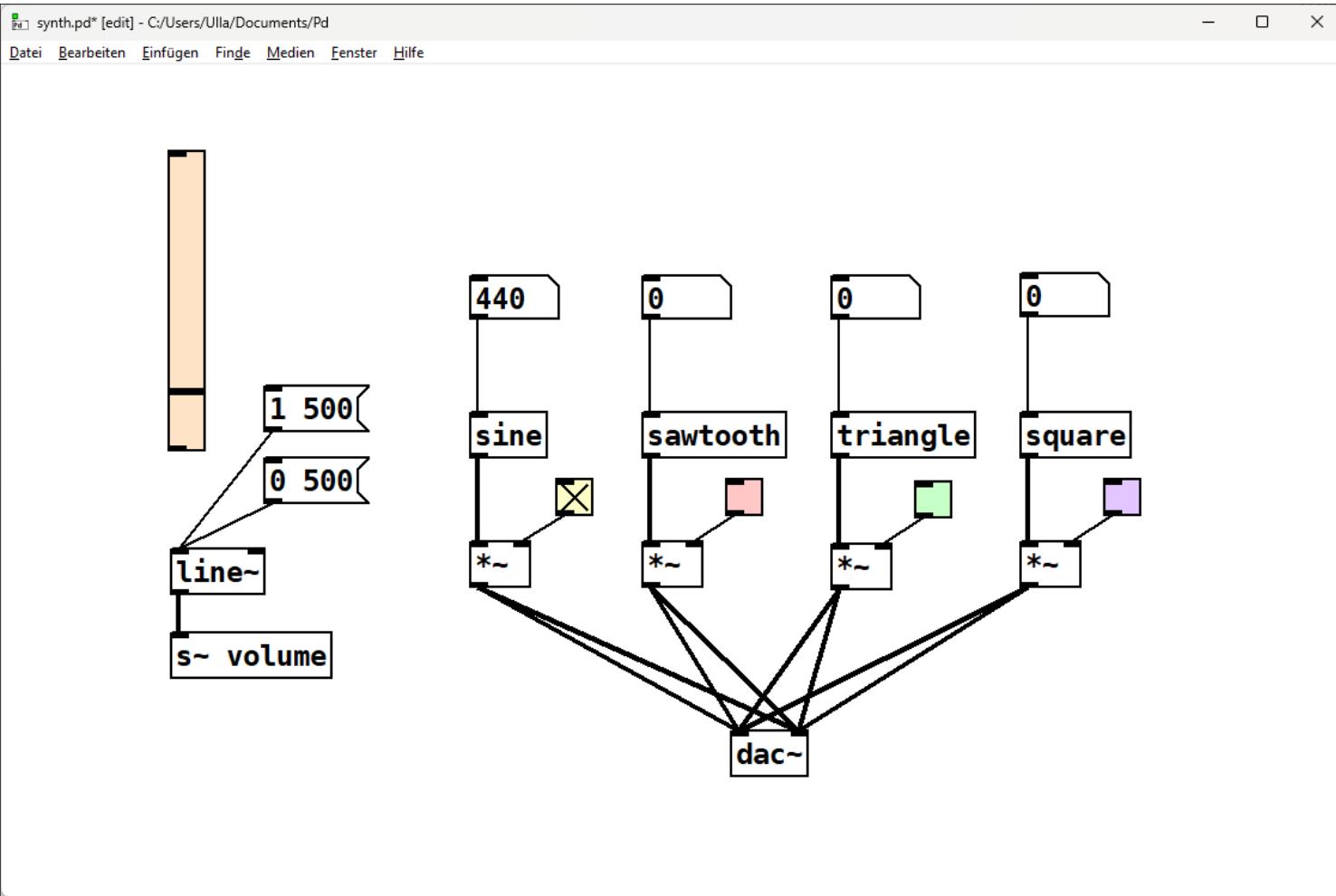


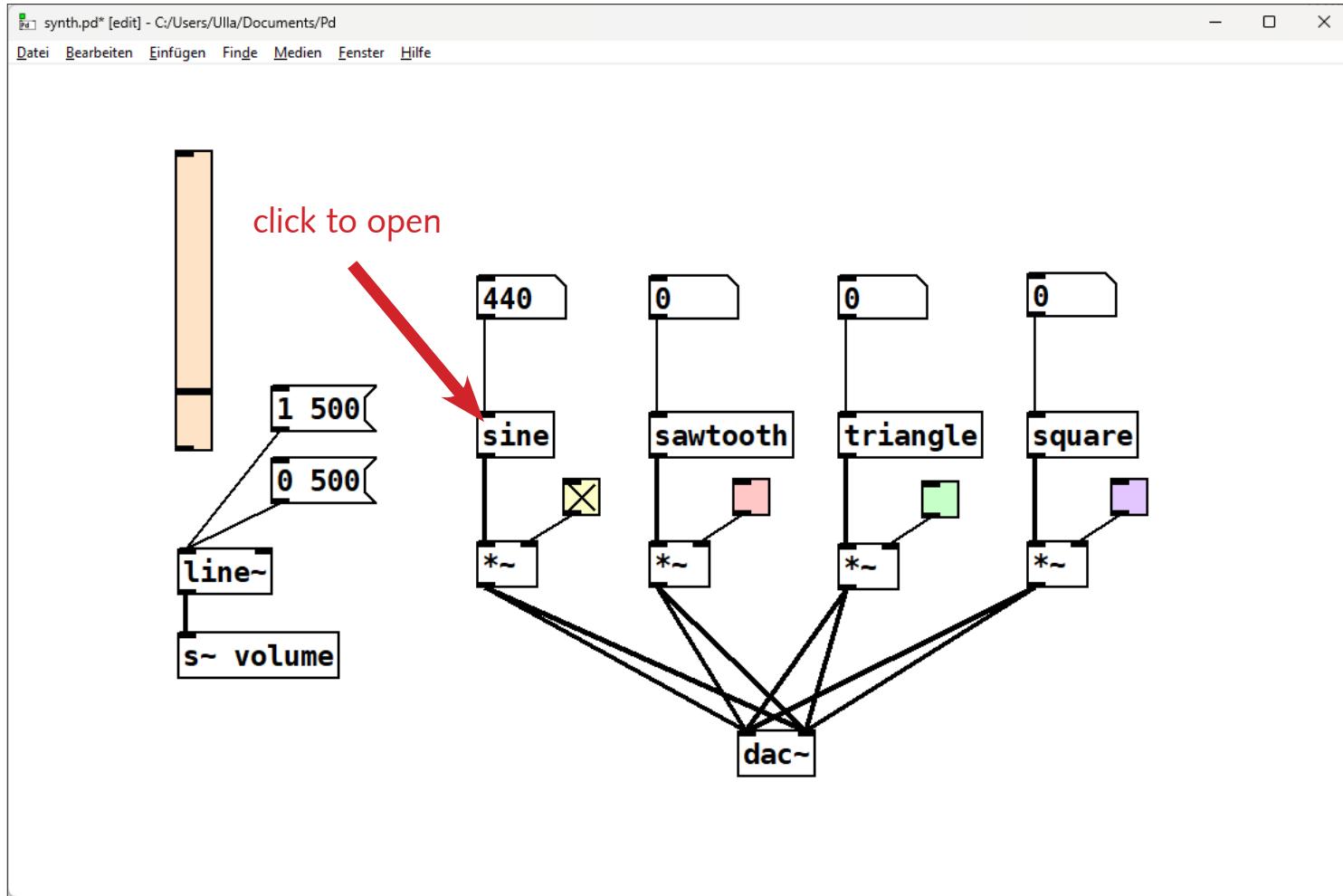


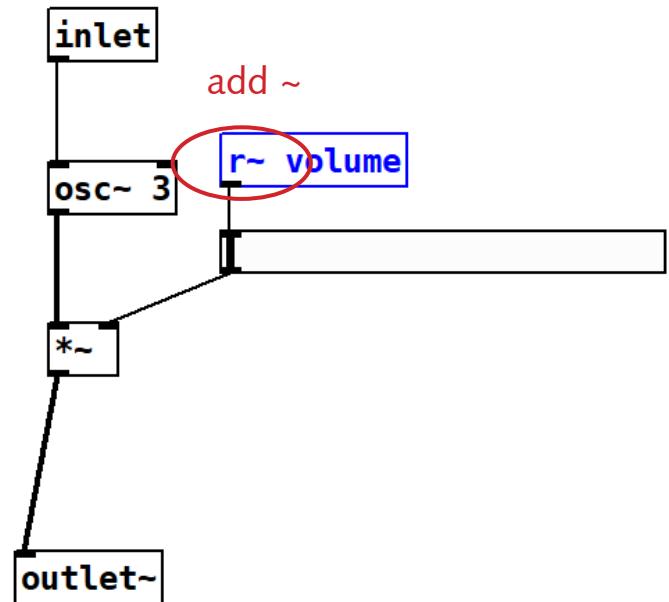


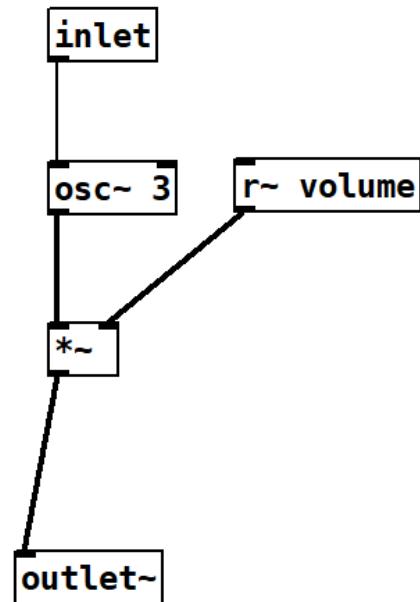




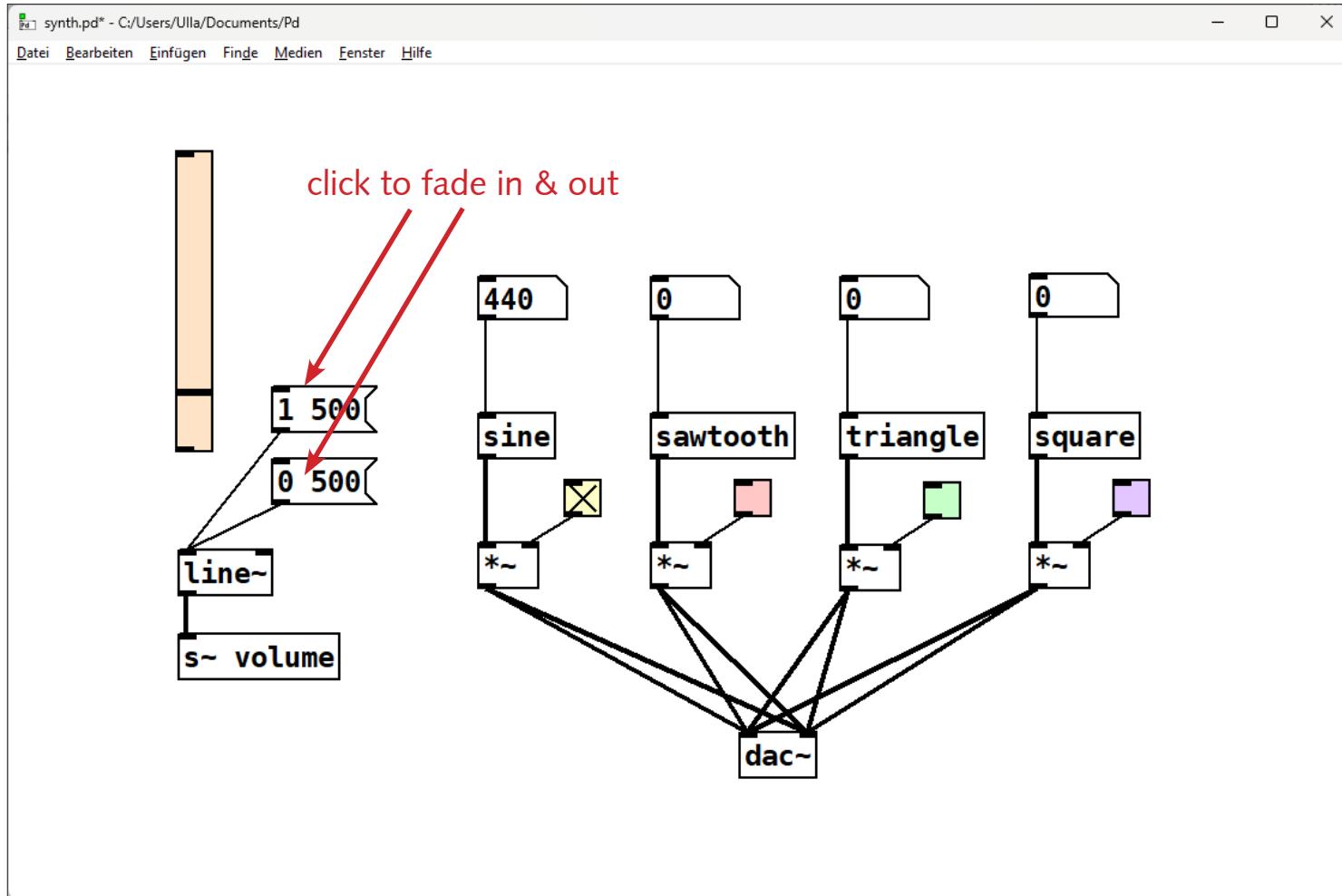


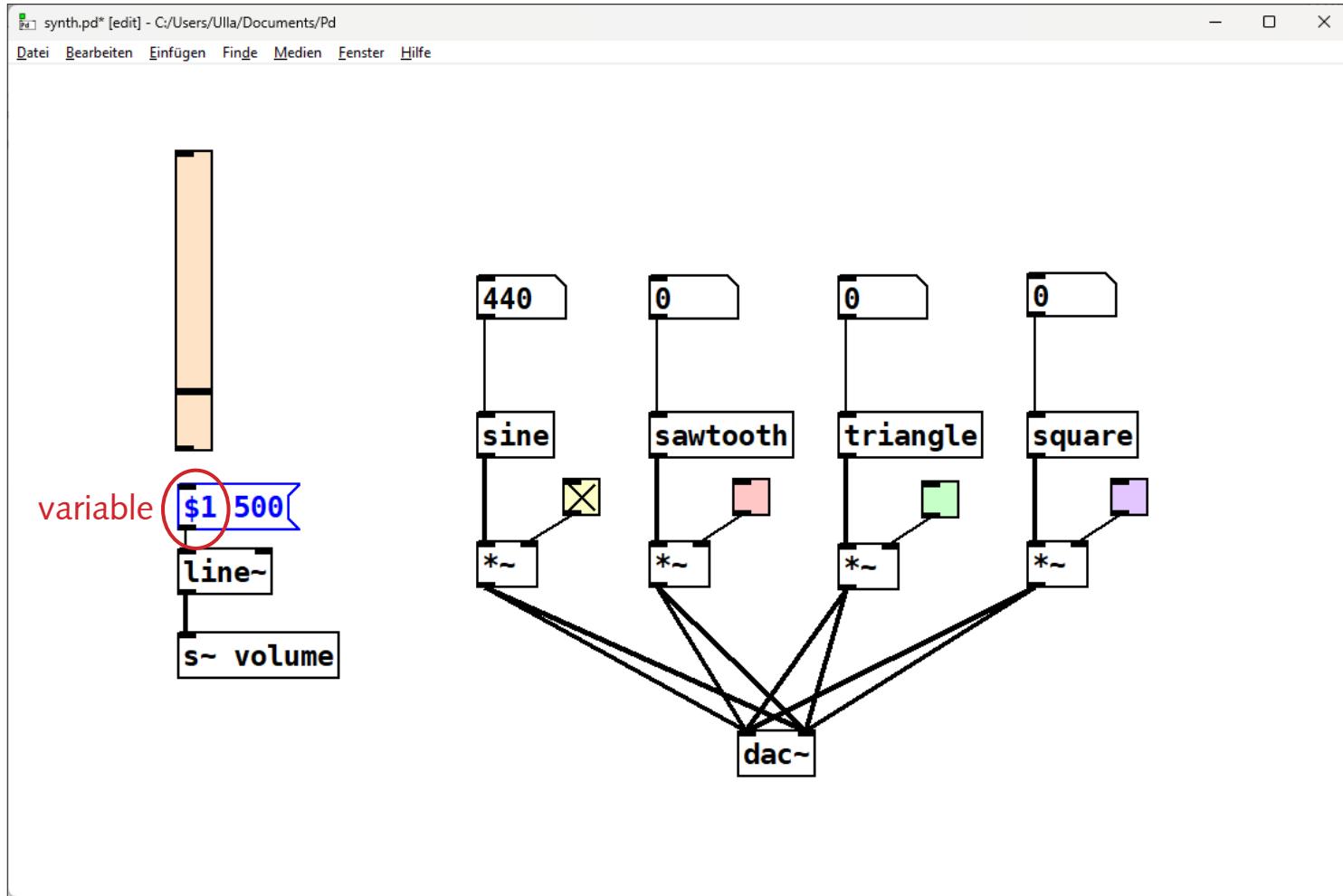


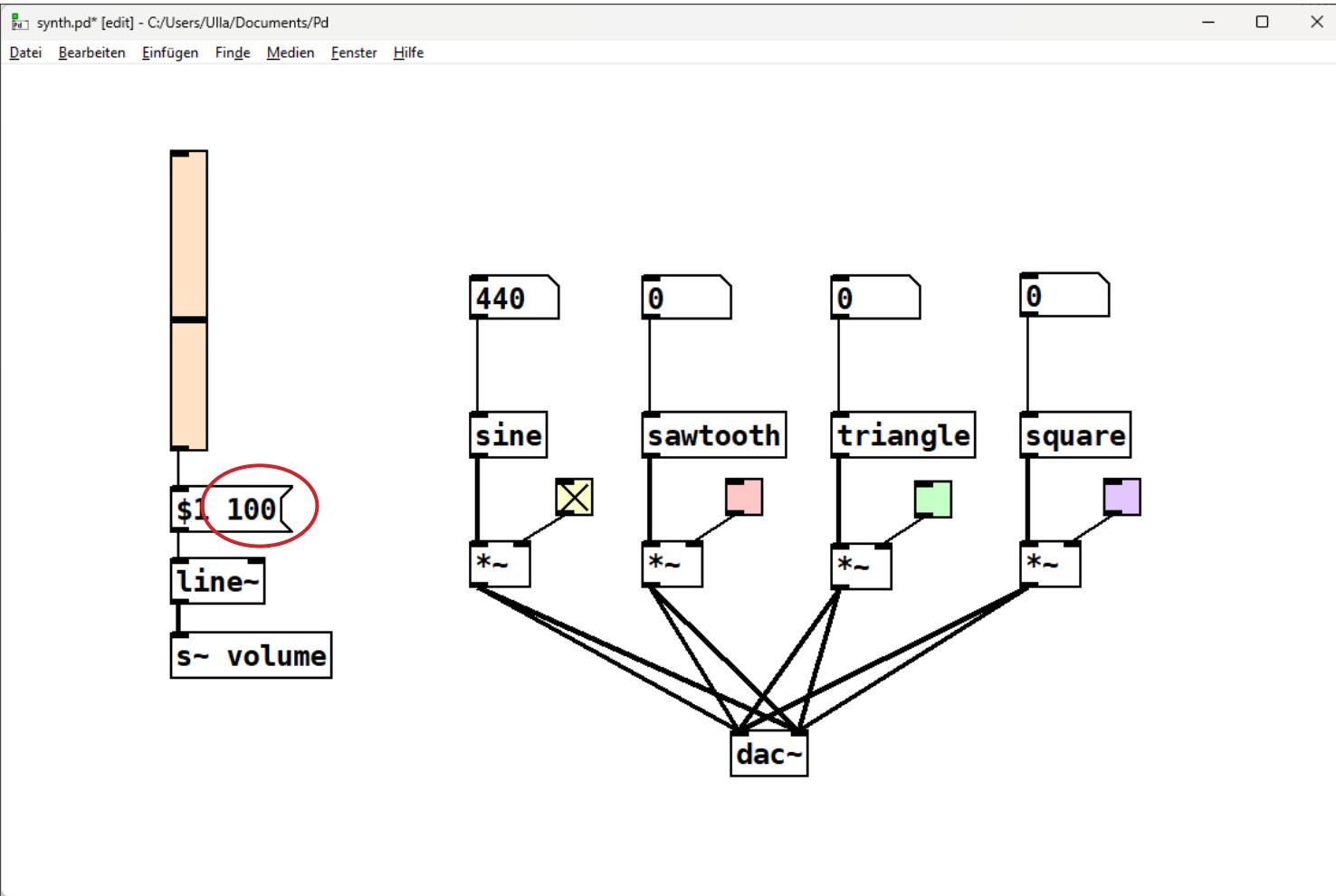


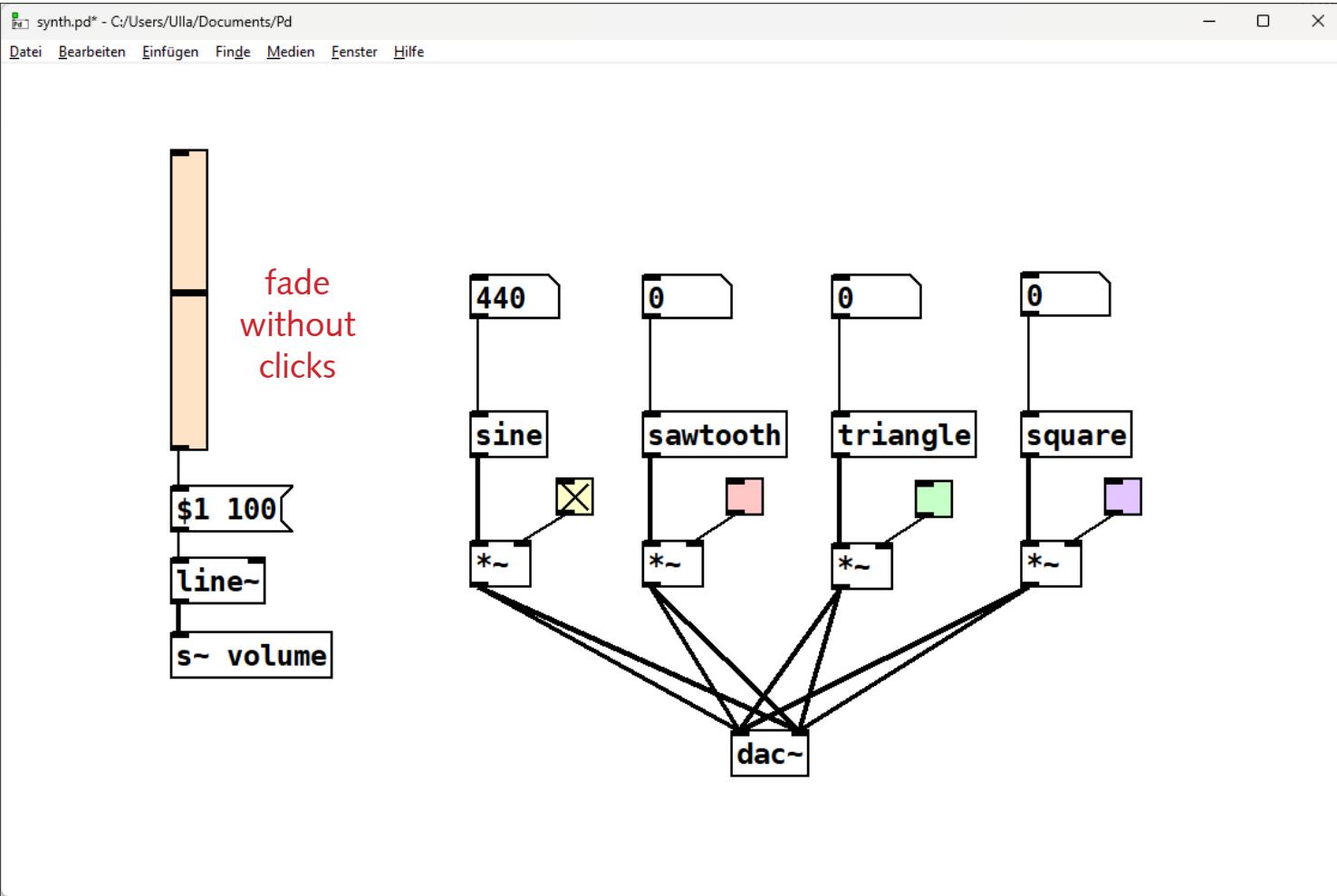


safe: cmd + s

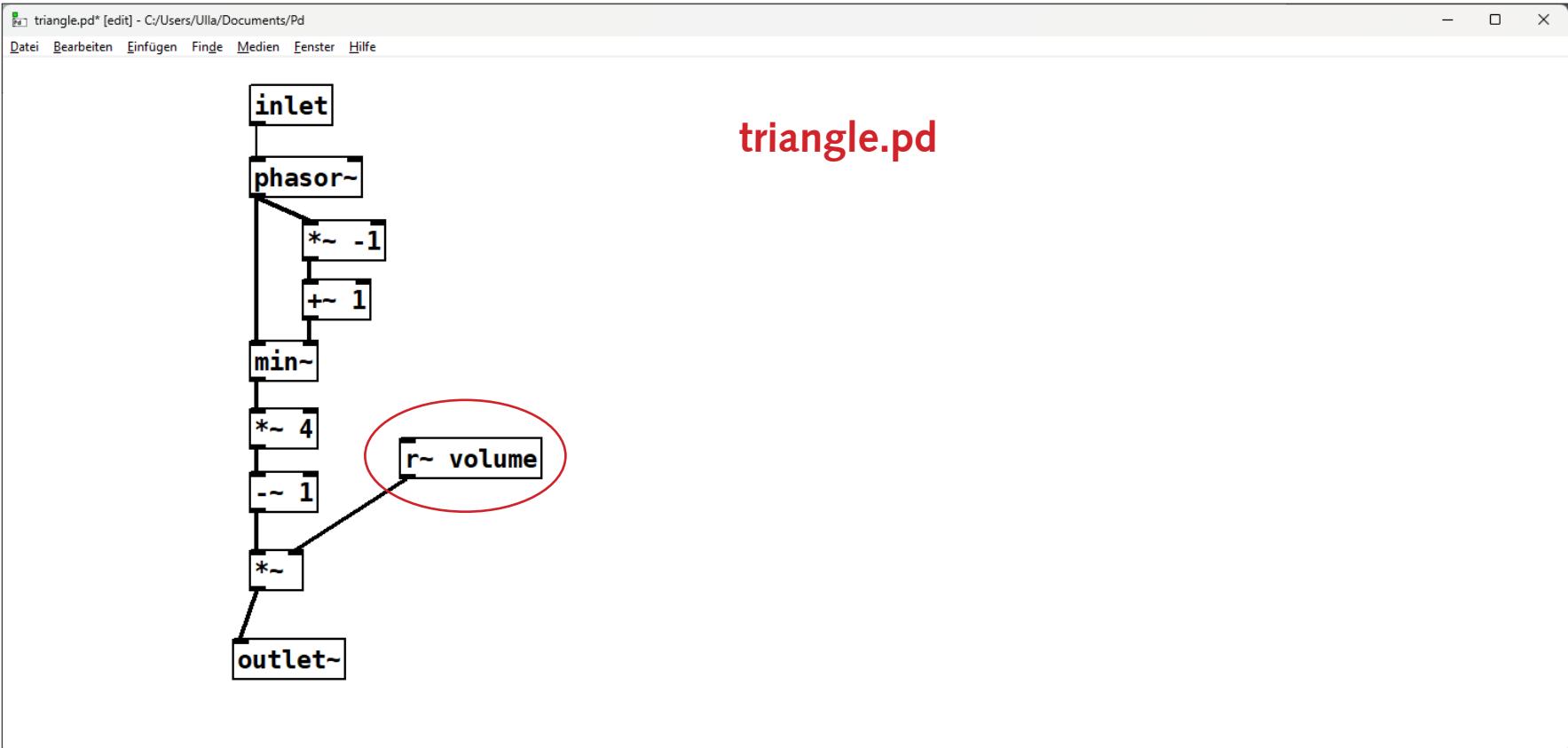




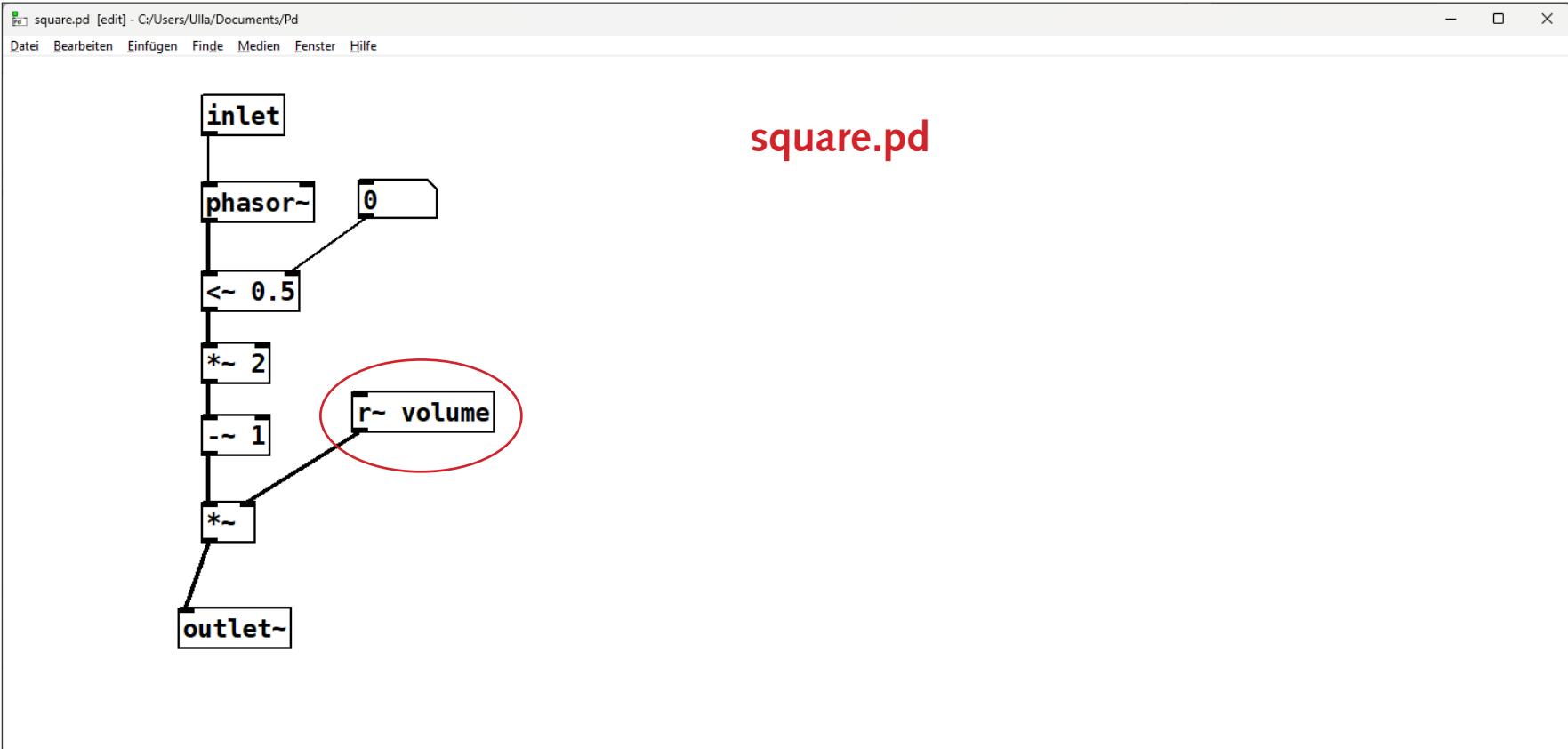


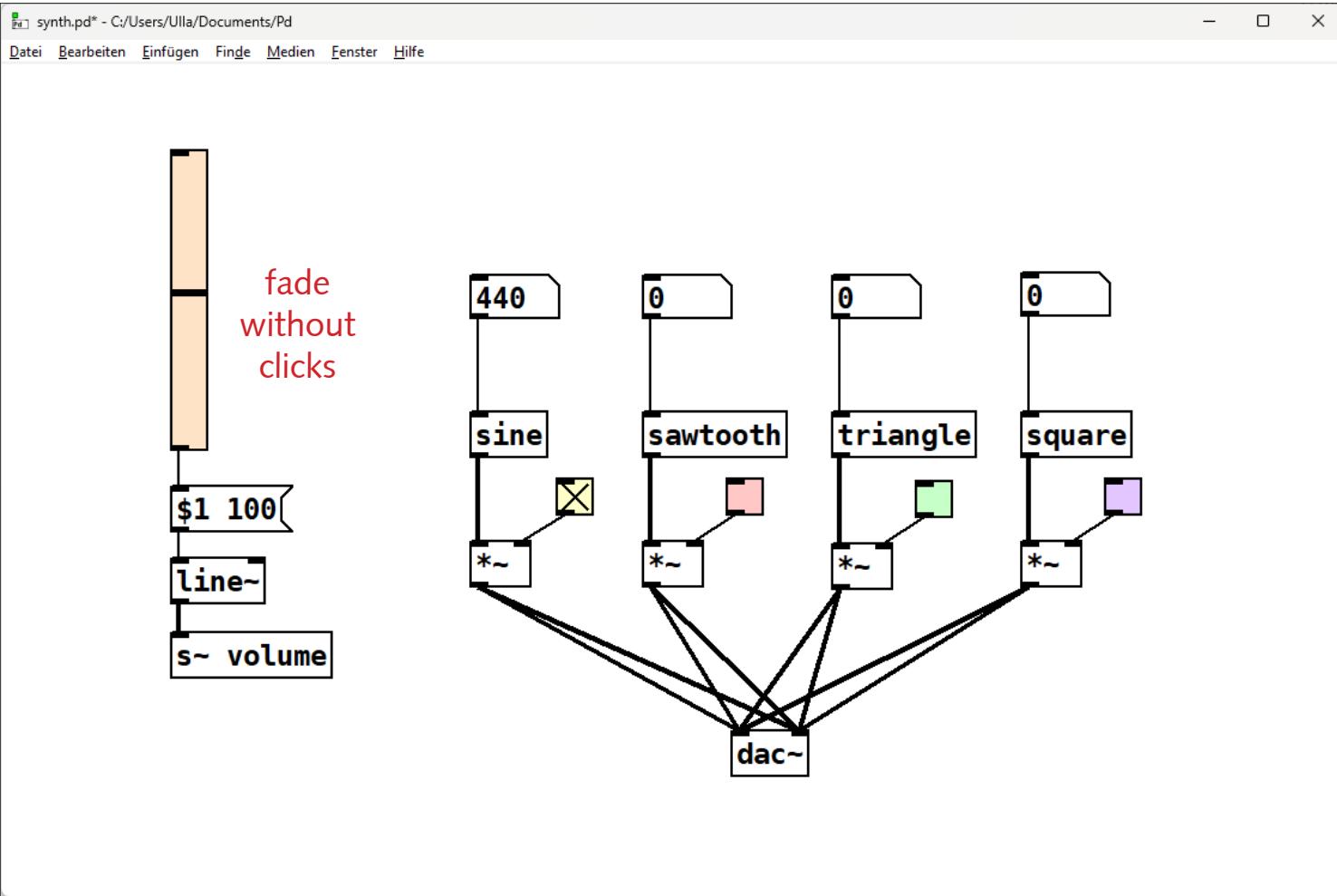




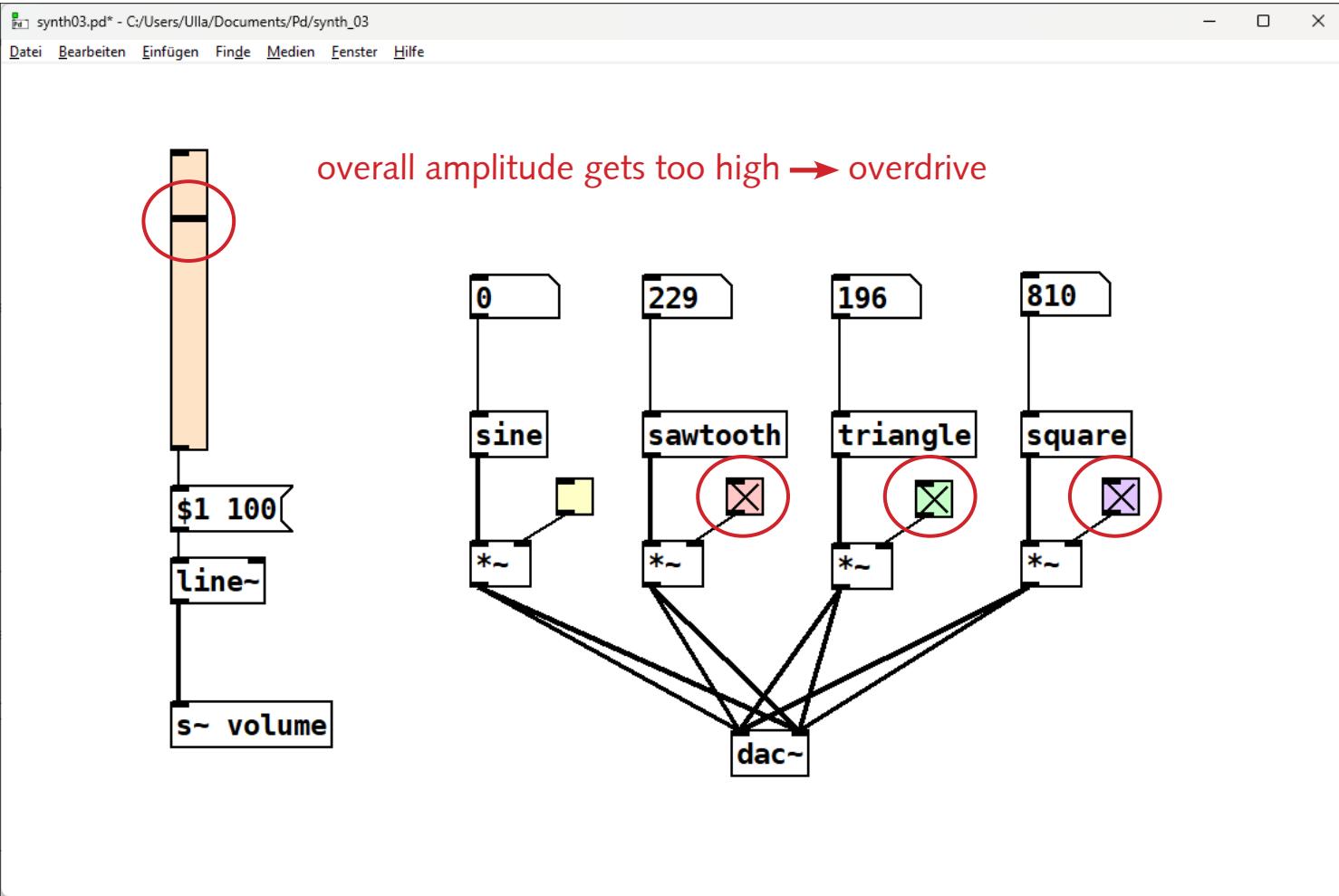


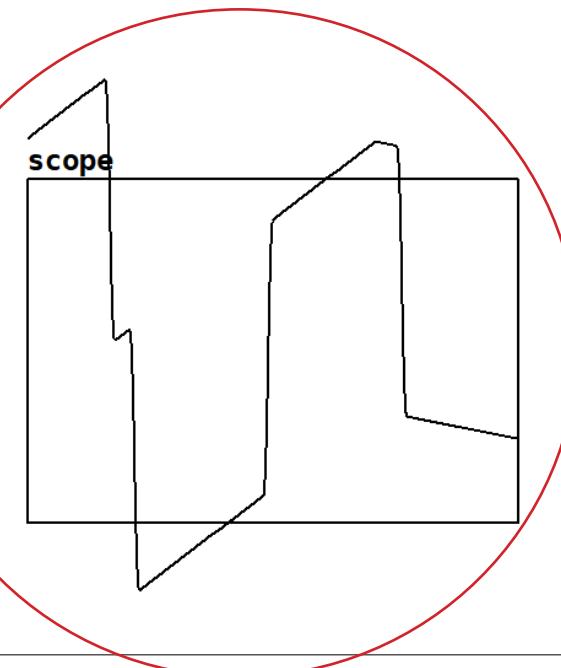
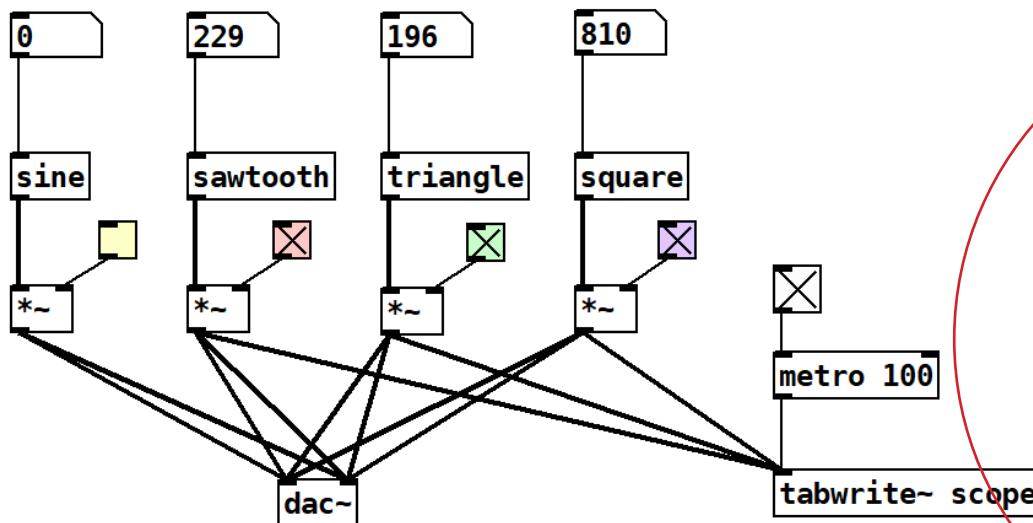
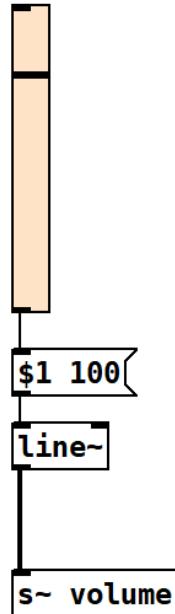
triangle.pd





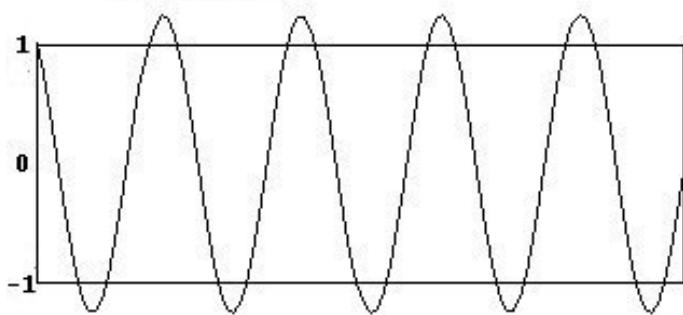
Clipping



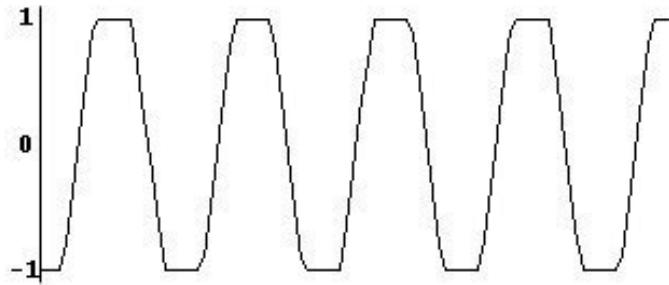


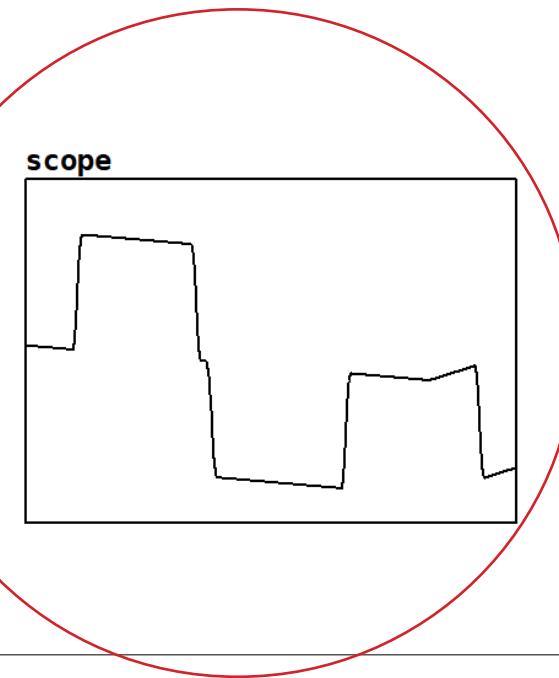
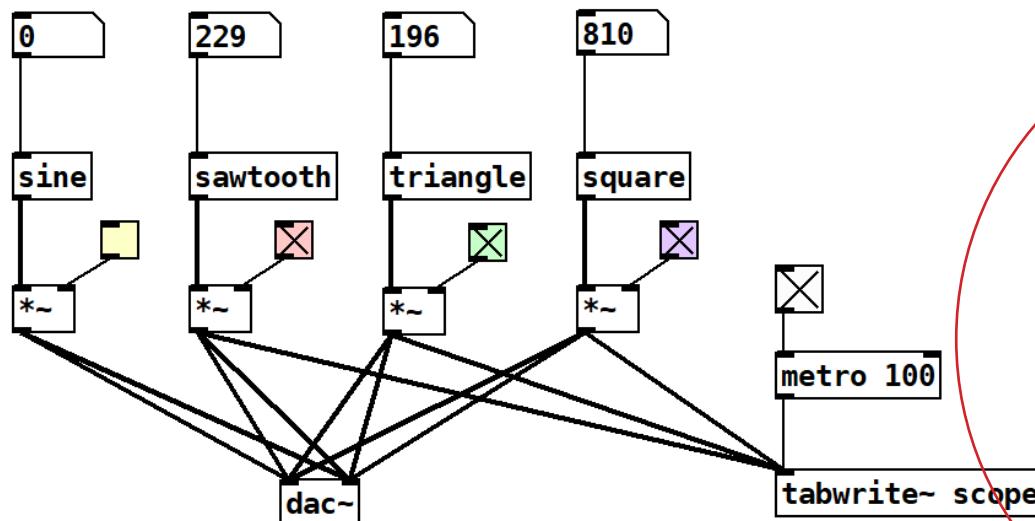
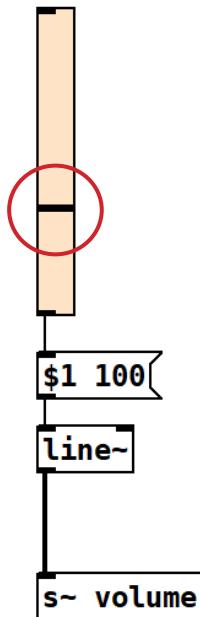
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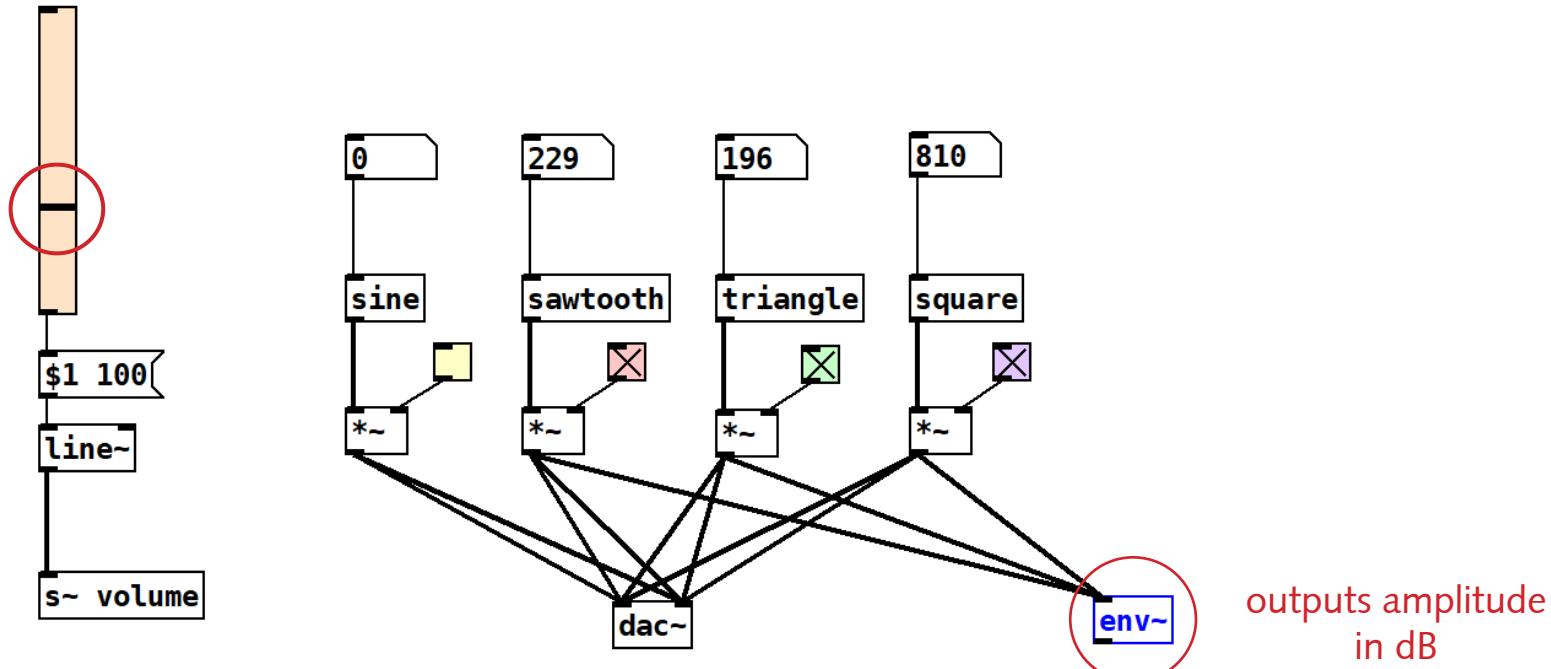
This wave

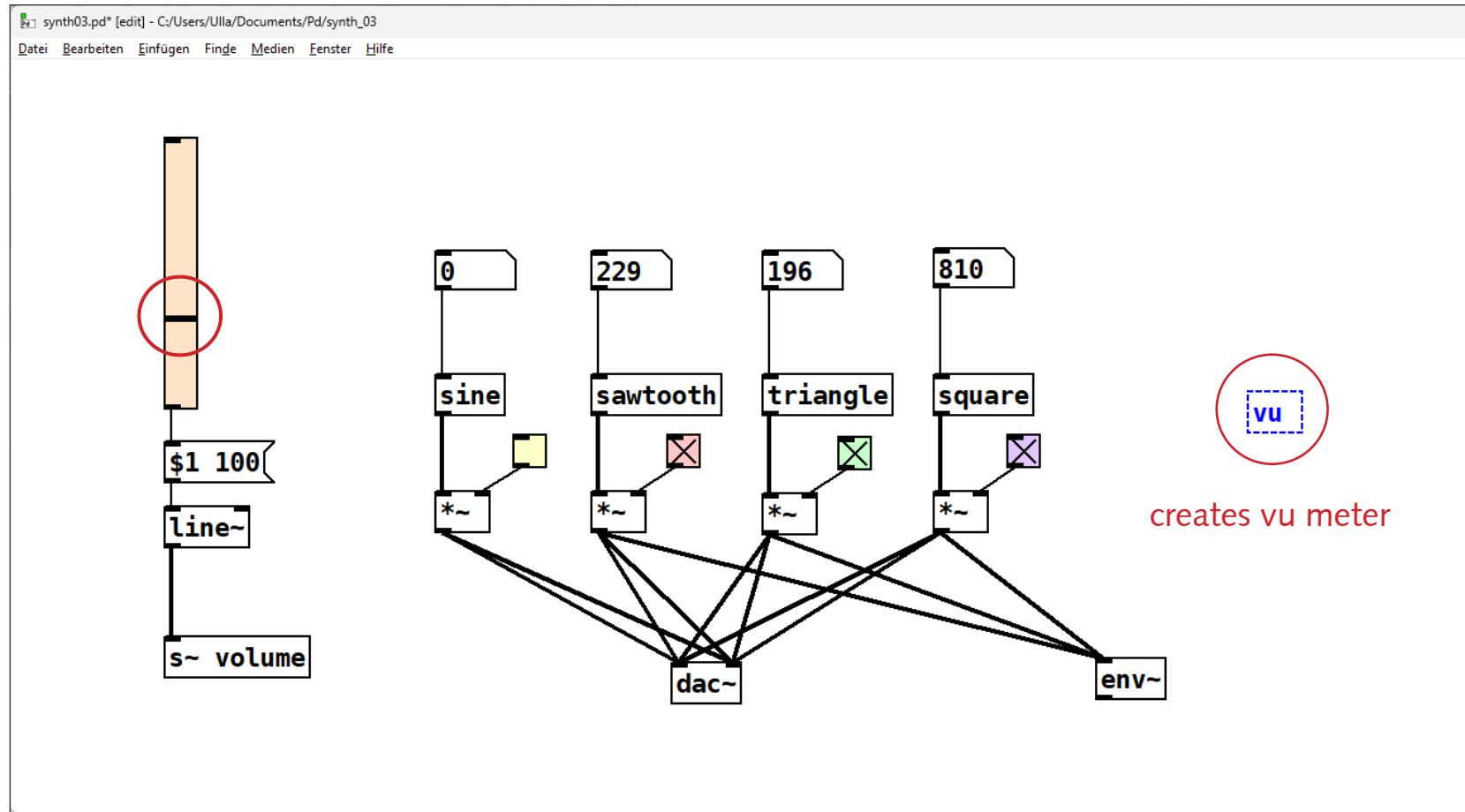


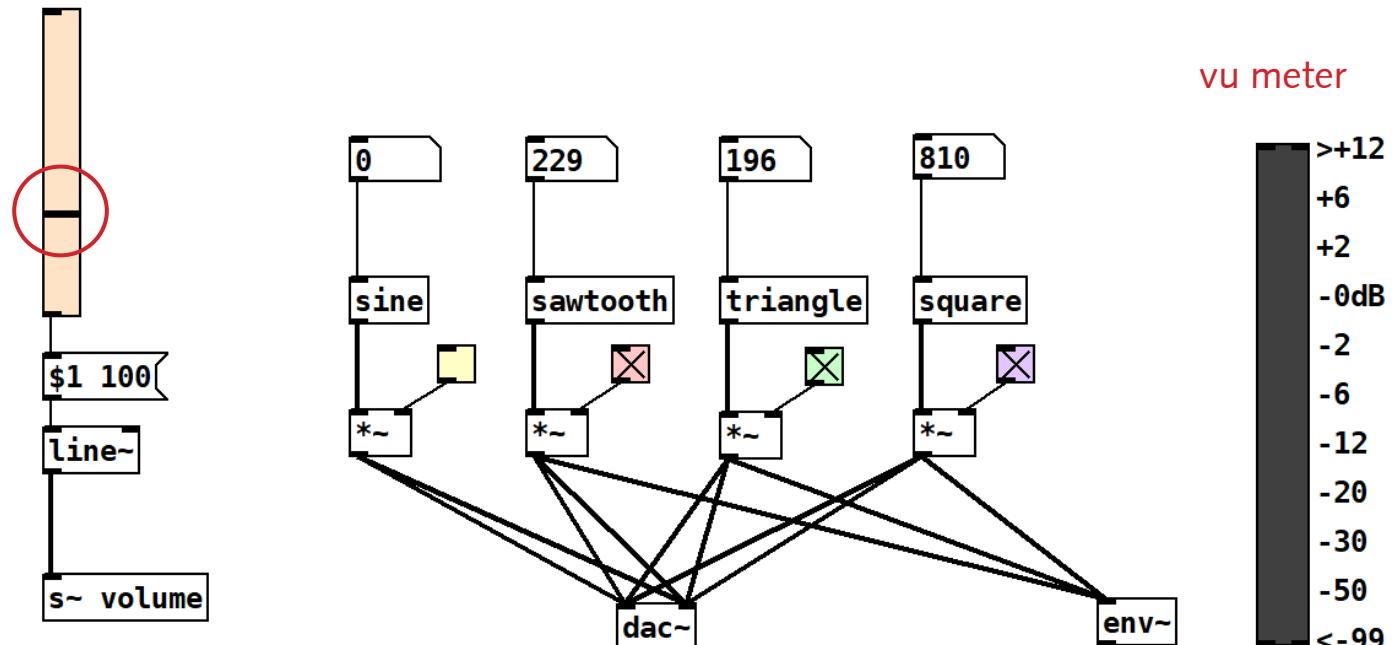
will appear
like this:

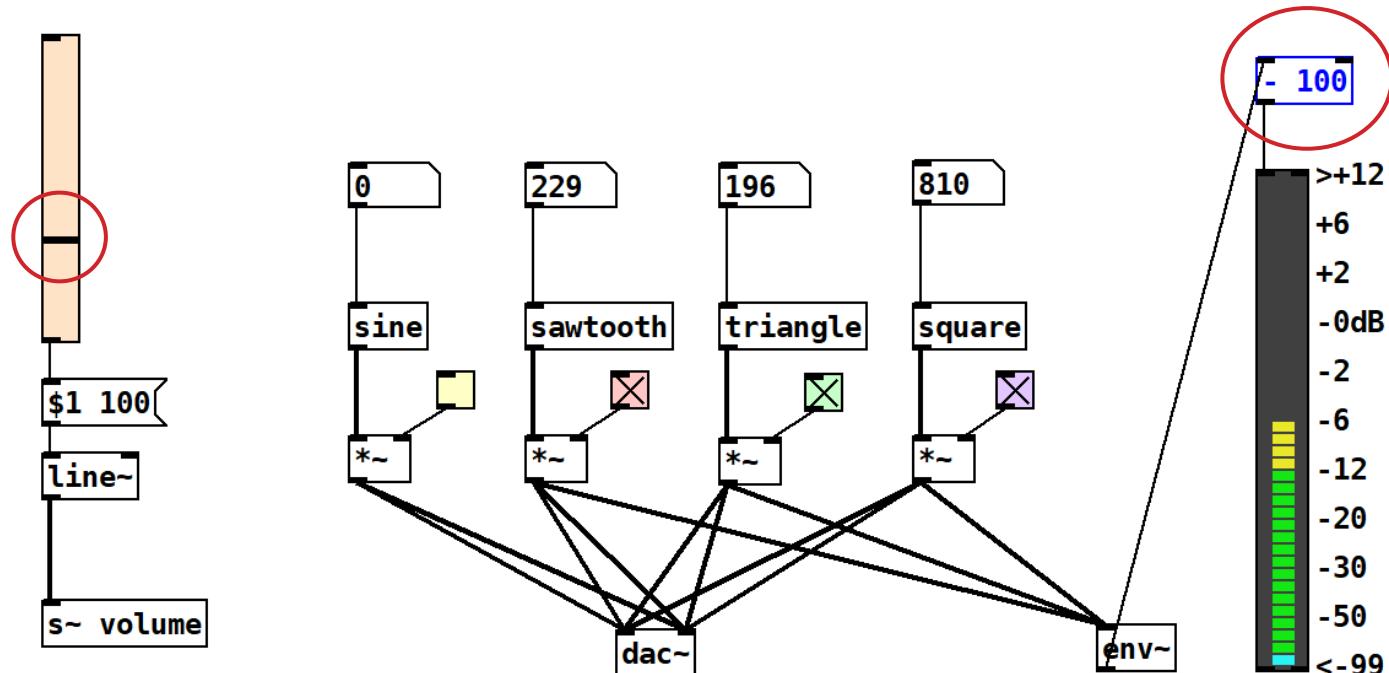


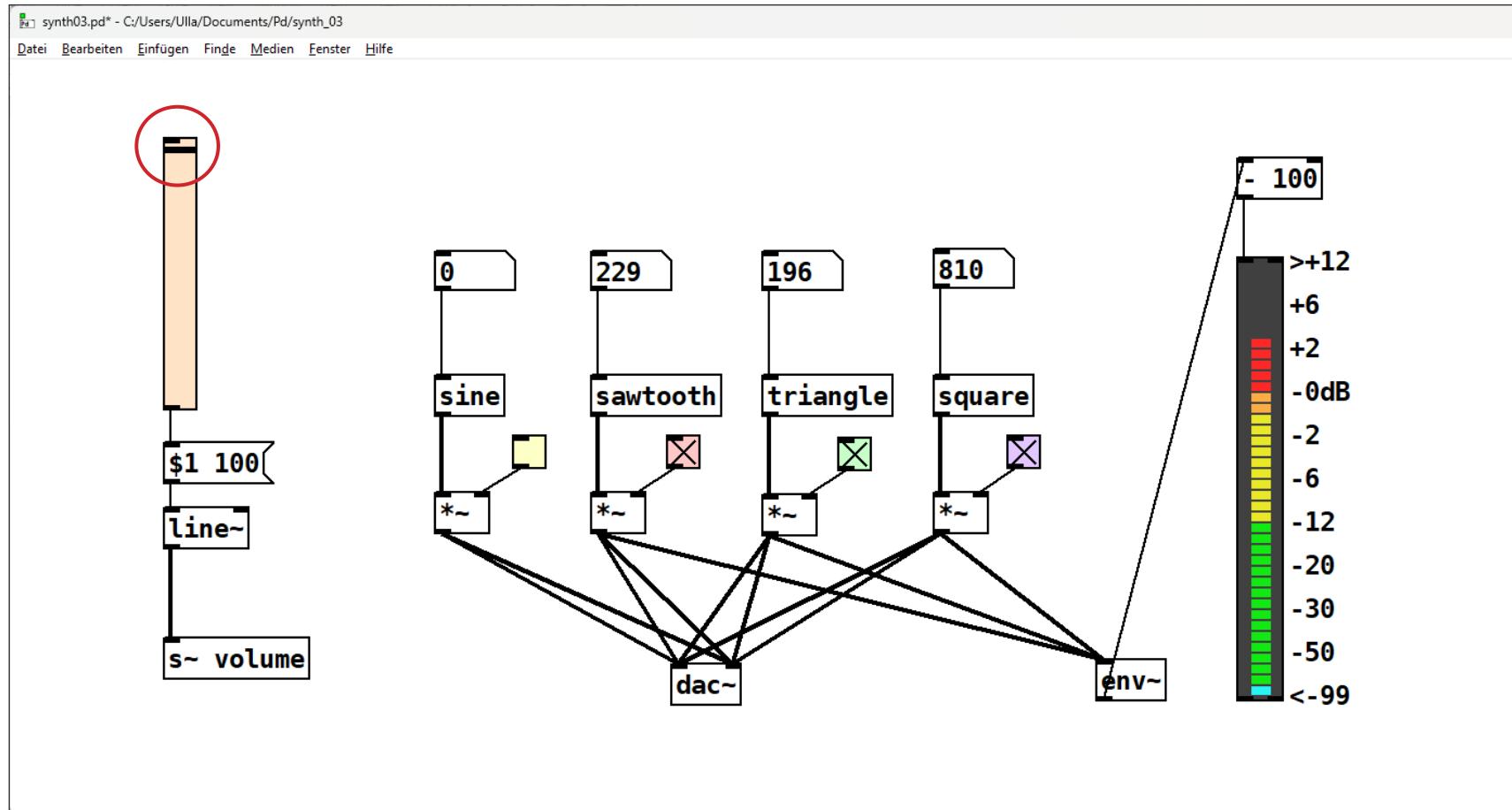




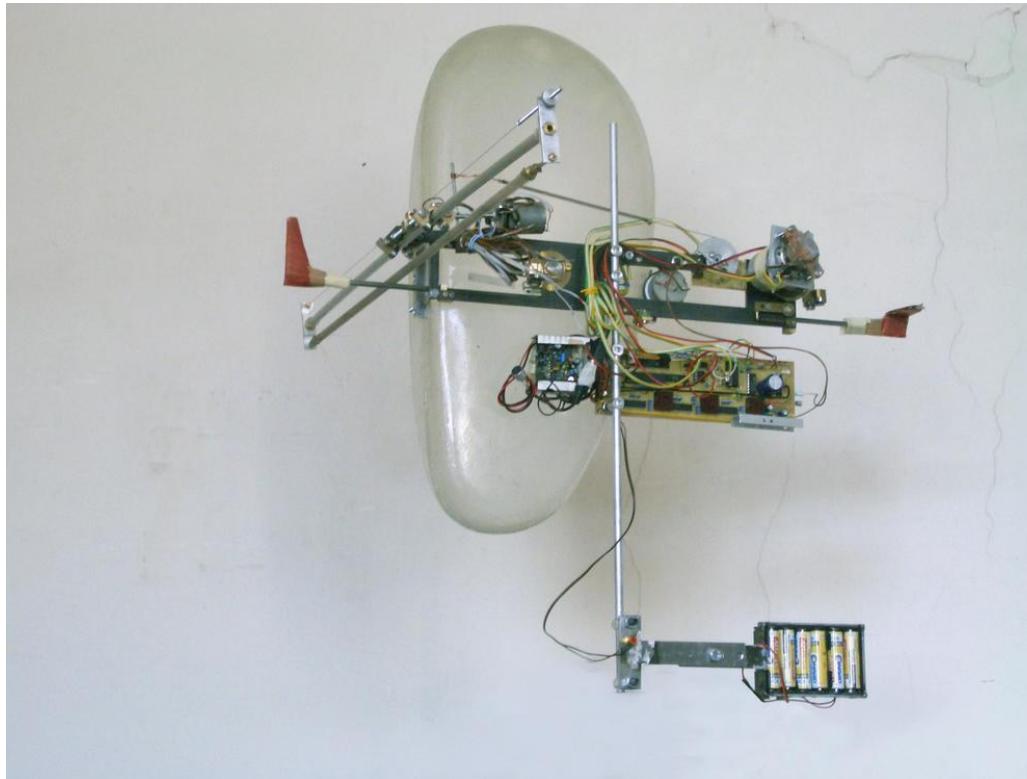








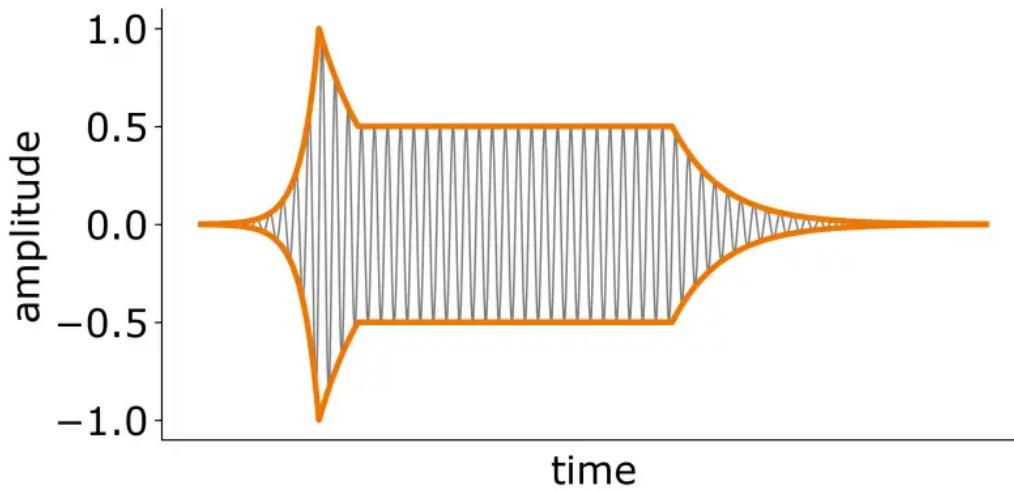
Jakob Scheid | Monochorde



<https://www.sirene.at/video/5-monochorde-jakob-scheid/>

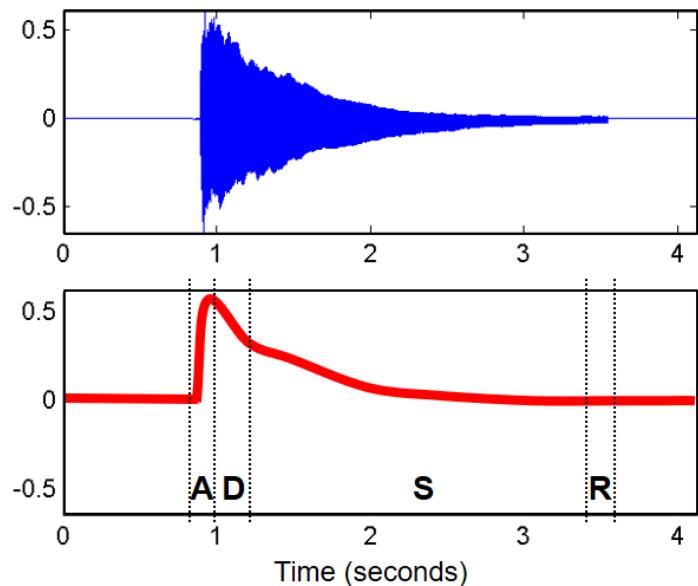
Envelopes

Evolution of the amplitude of a sound

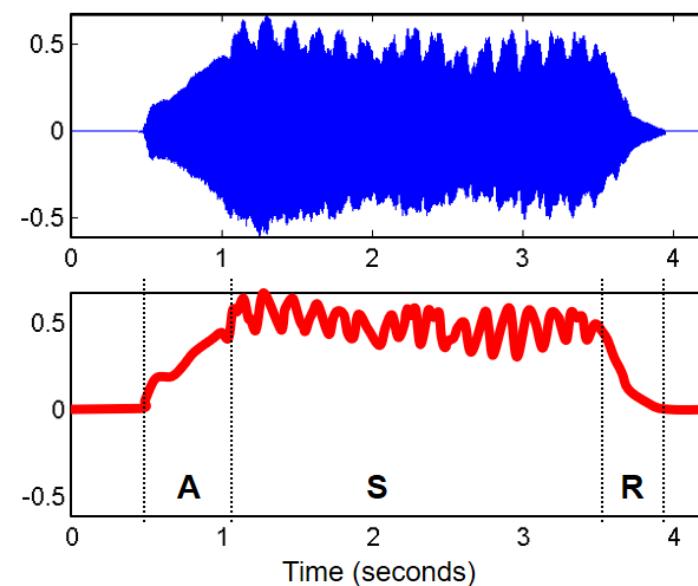


Evolution of the amplitude of a sound

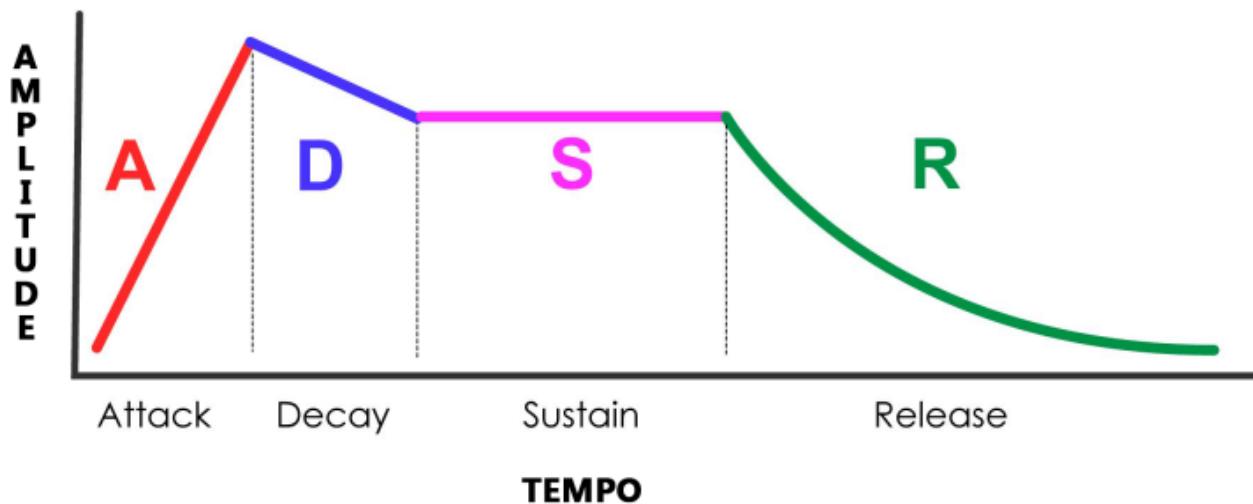
Piano sound



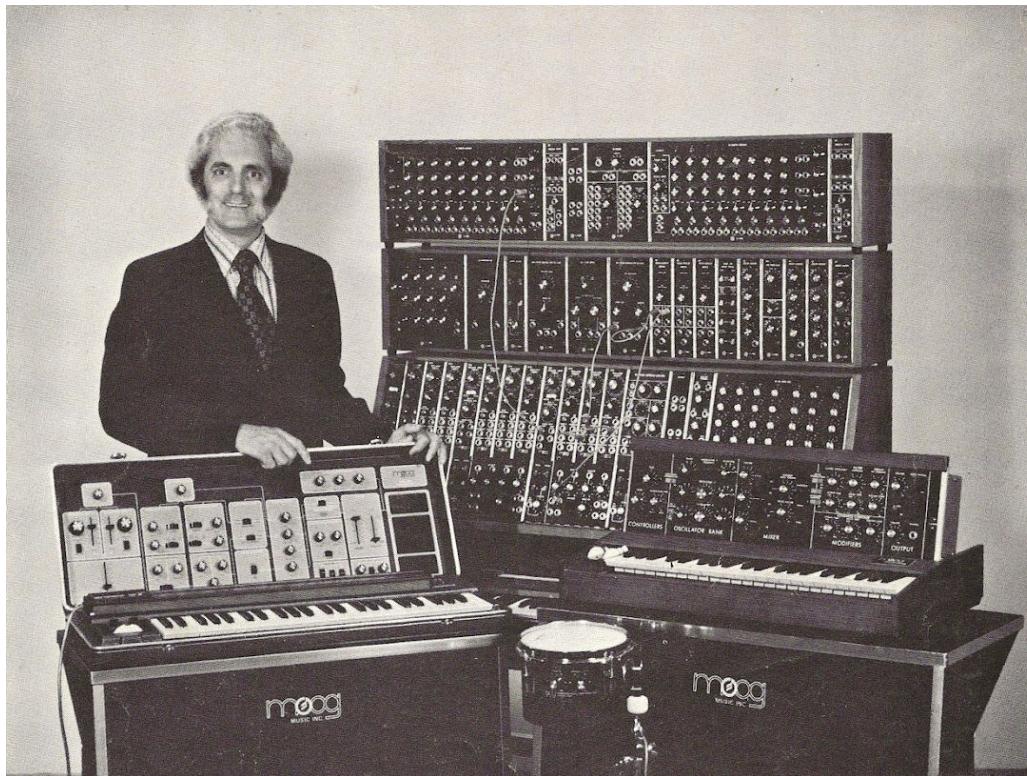
Violin sound



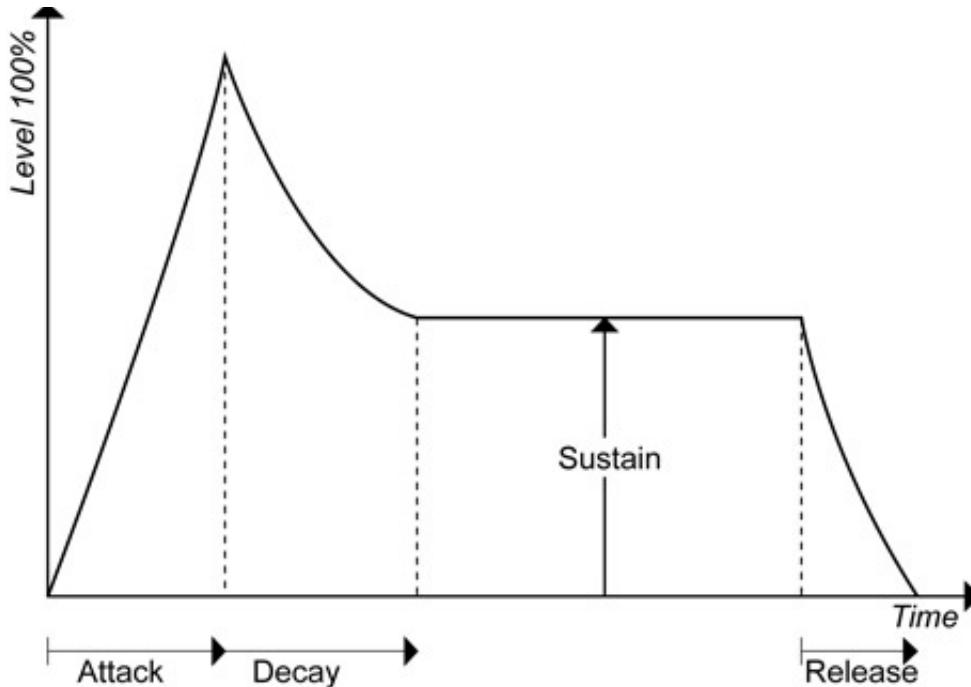
ADSR – Attack, Decay, Sustain & Release

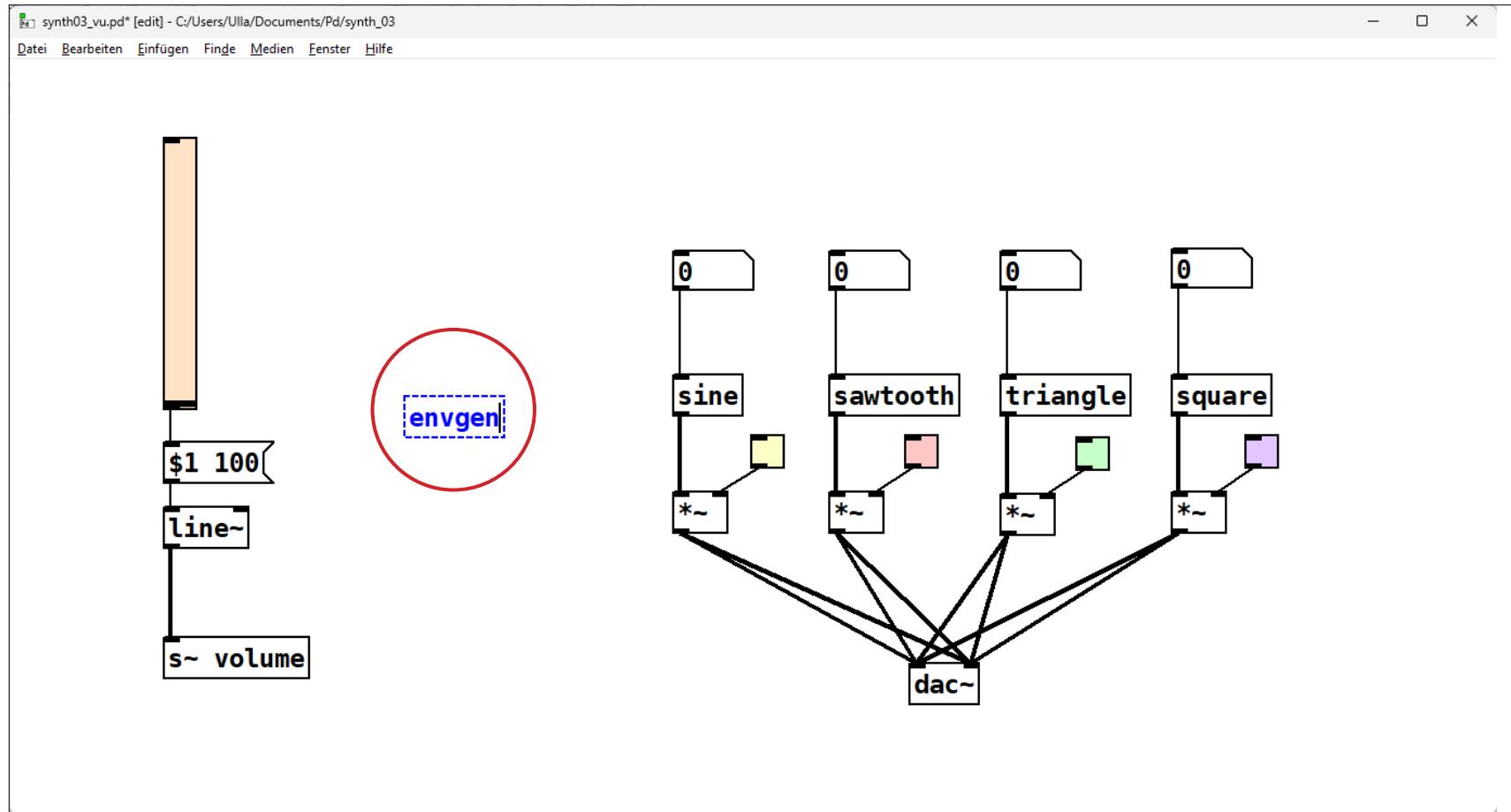


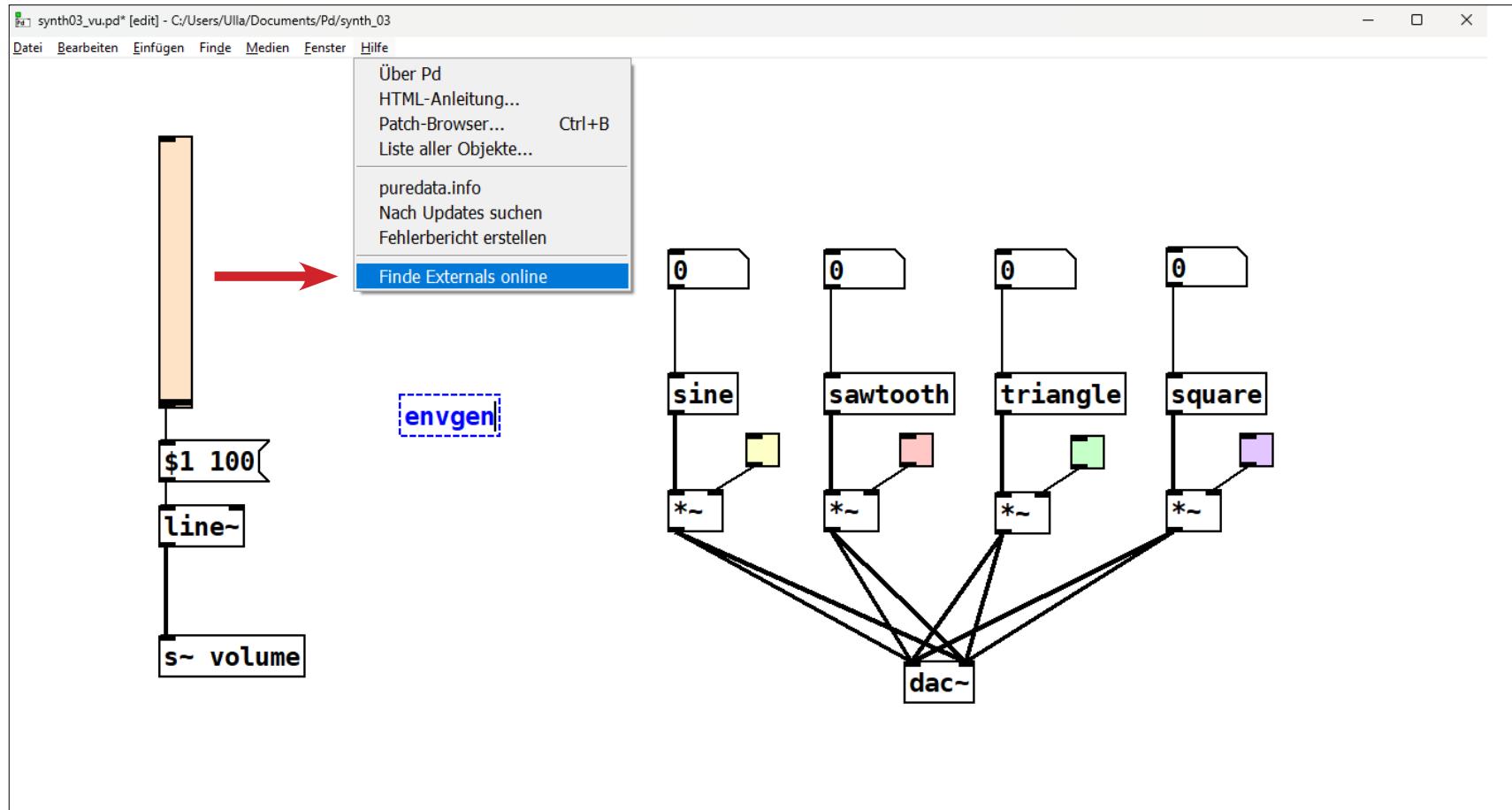
Robert Moog | Moog synthesizer

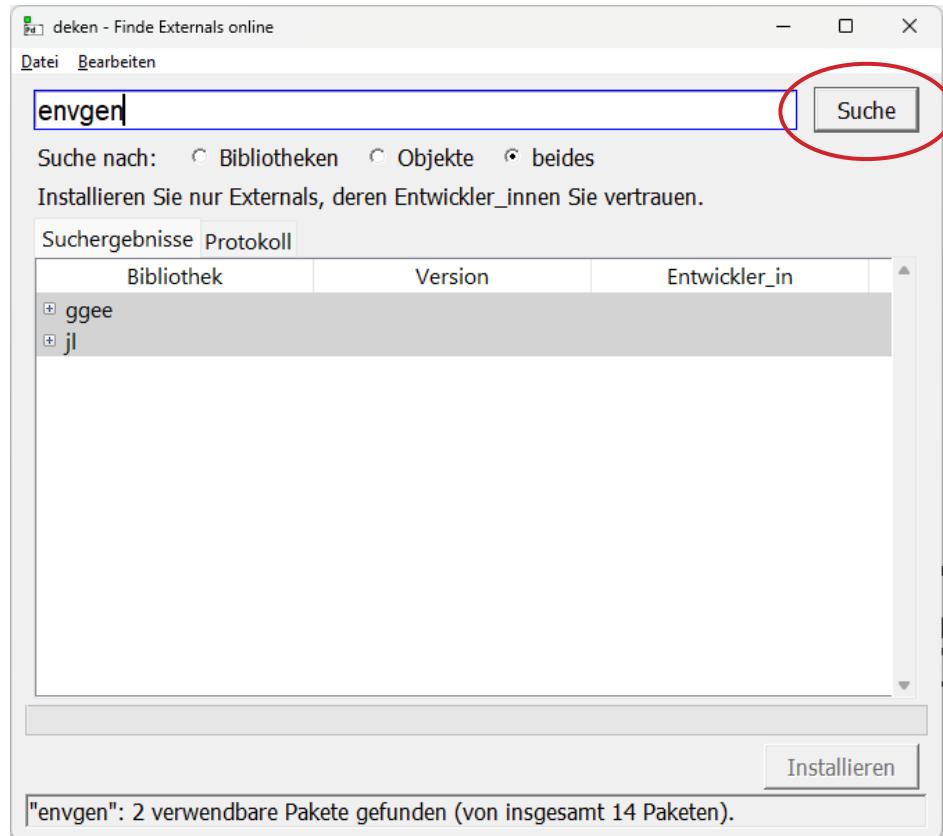


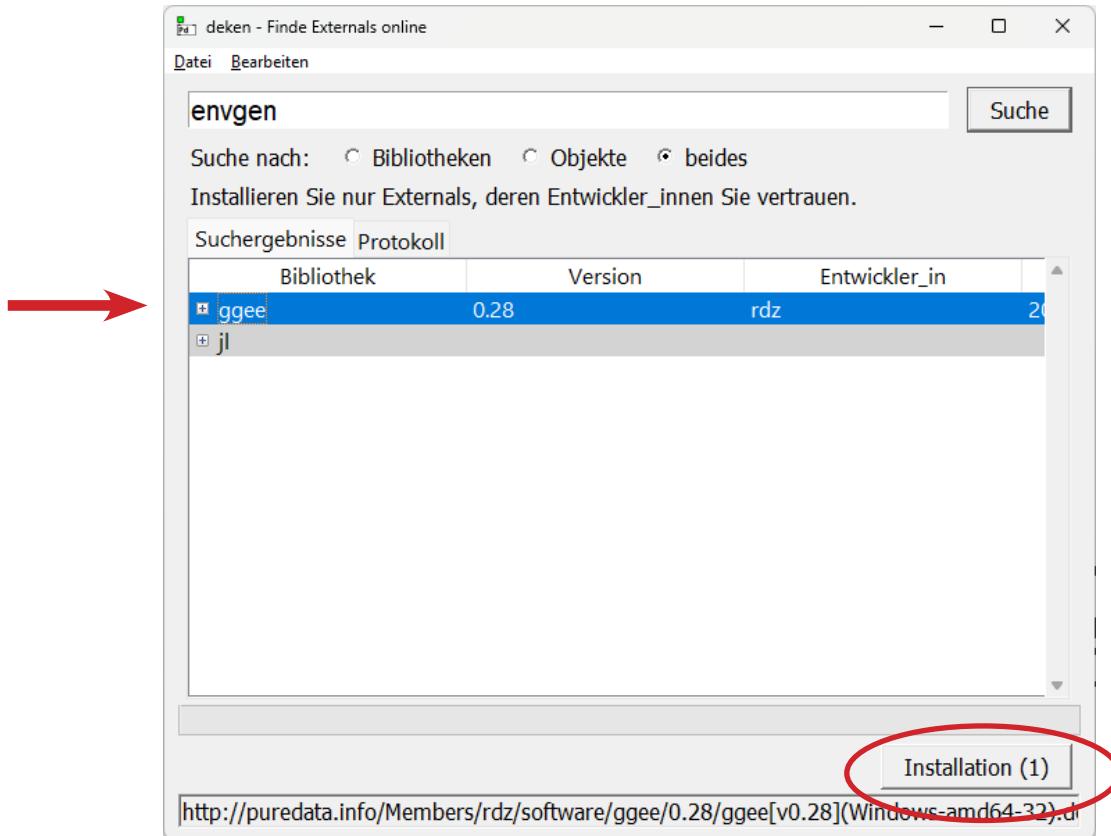
ADSR – Attack, Decay, Sustain & Release

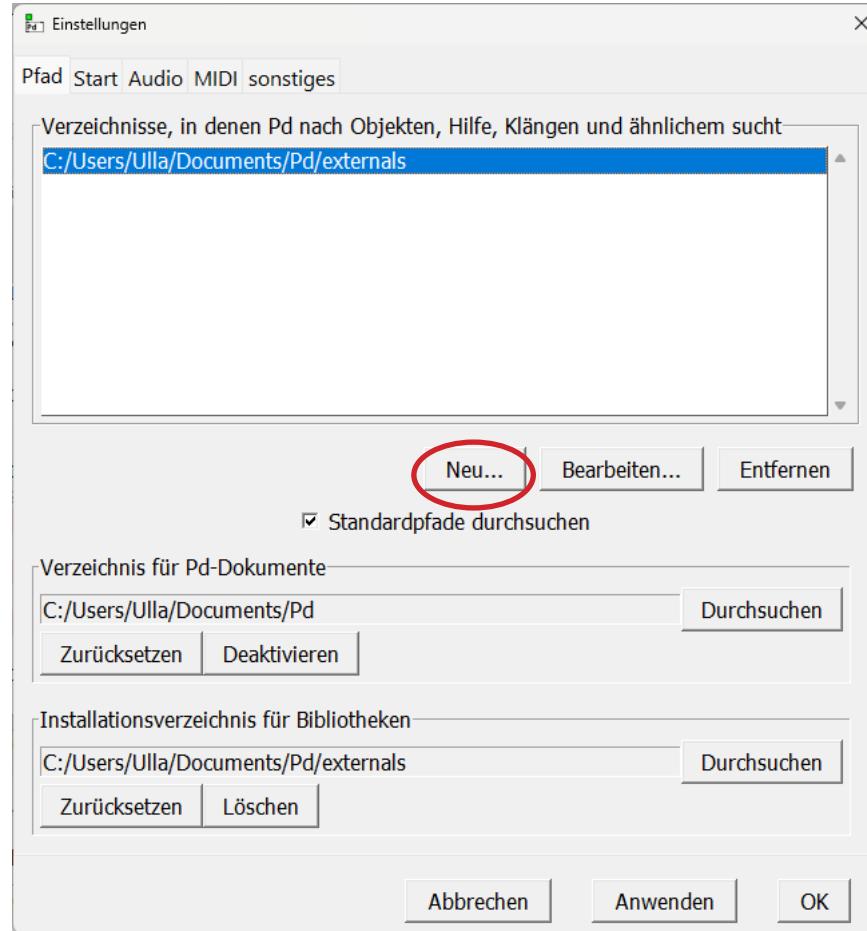


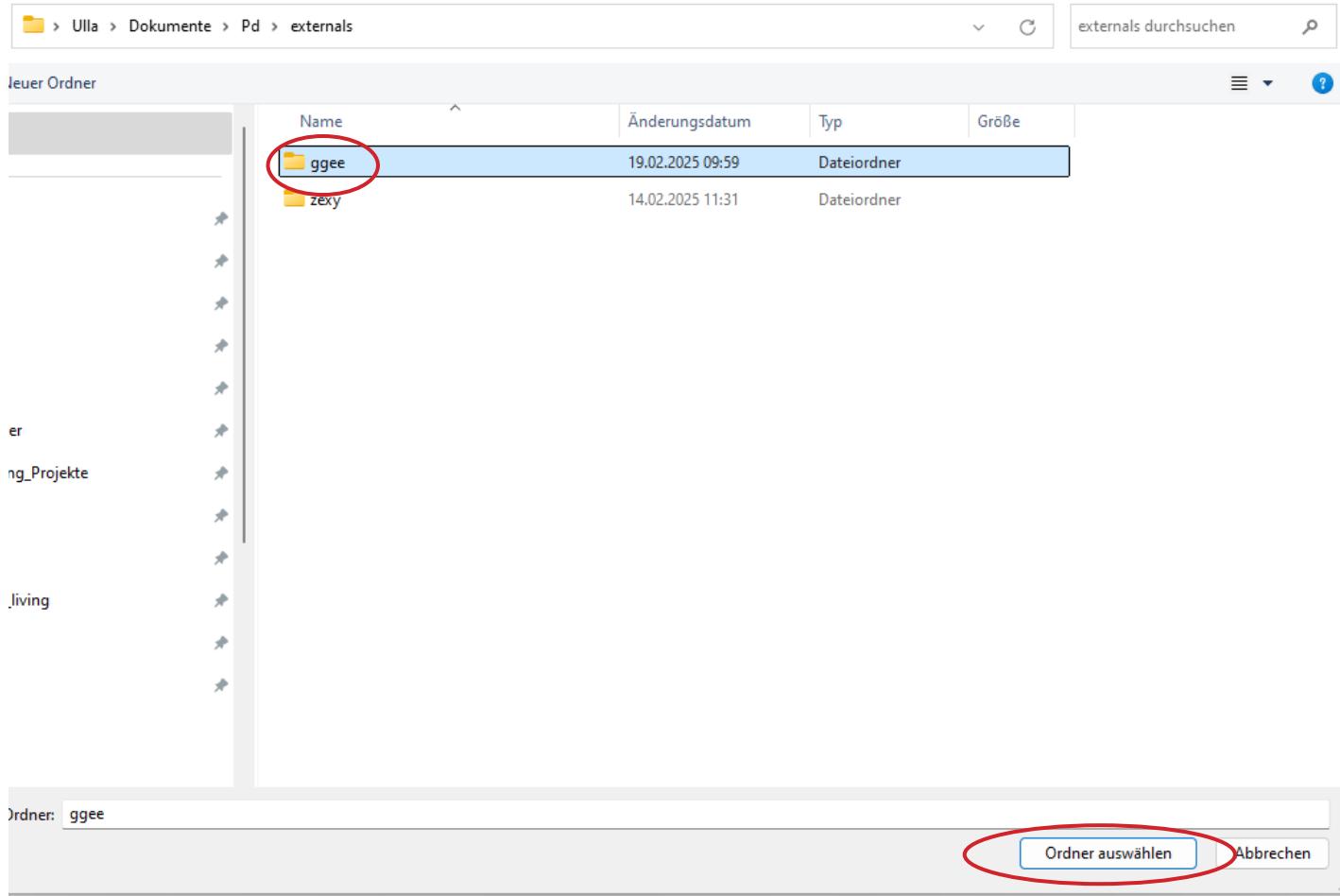


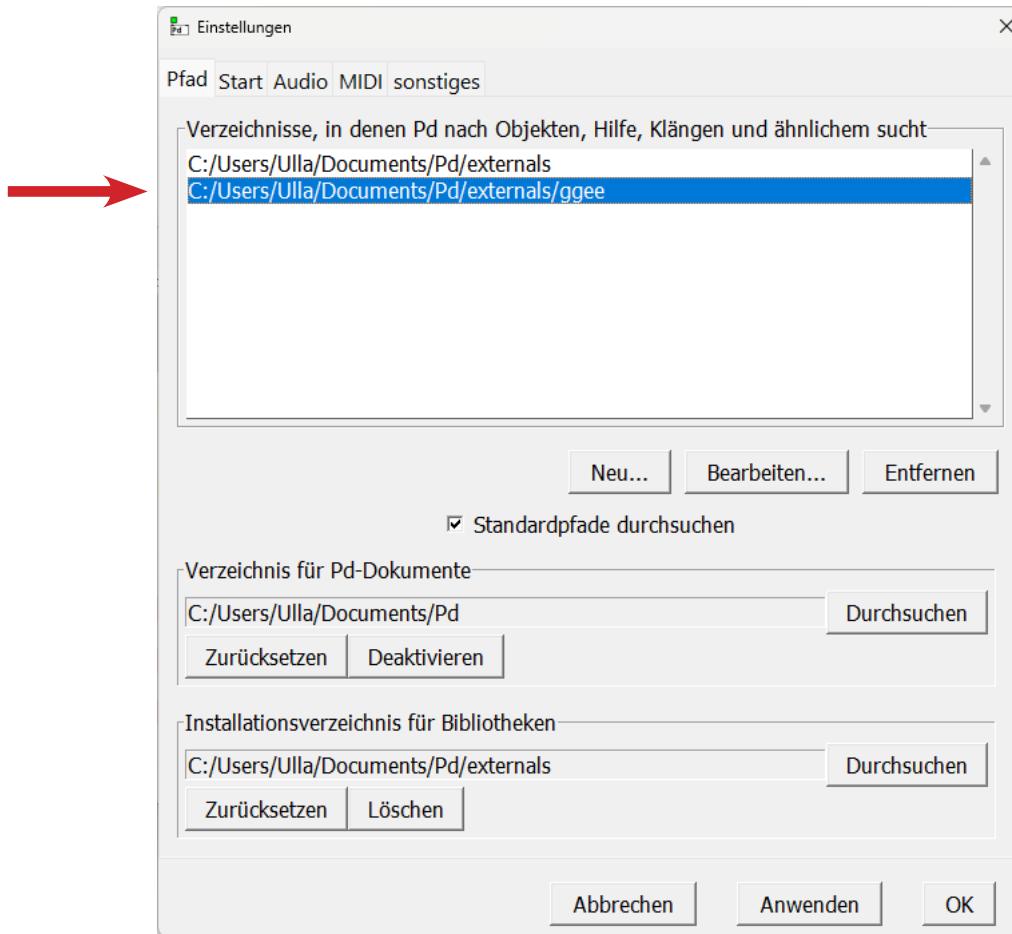


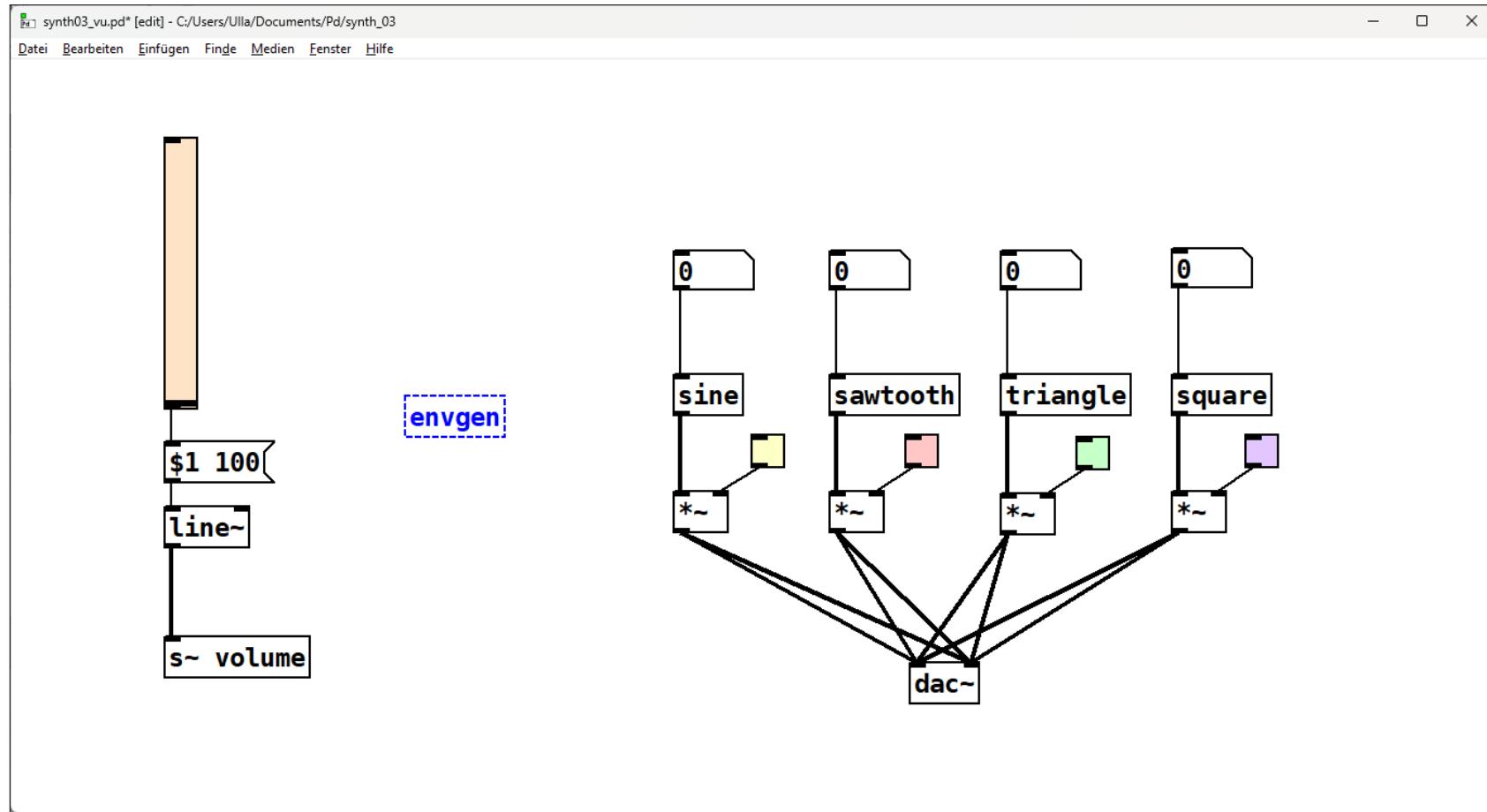


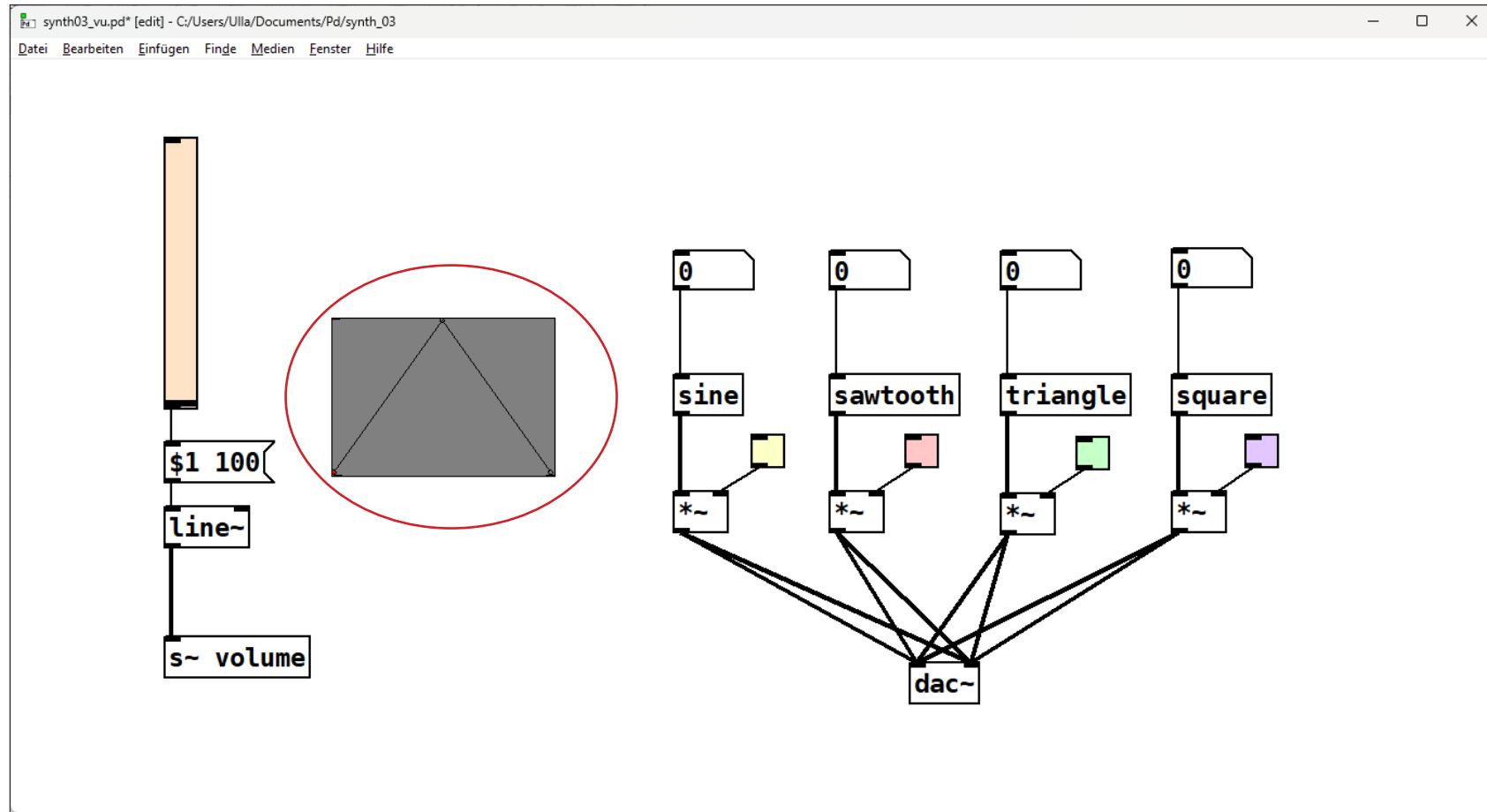


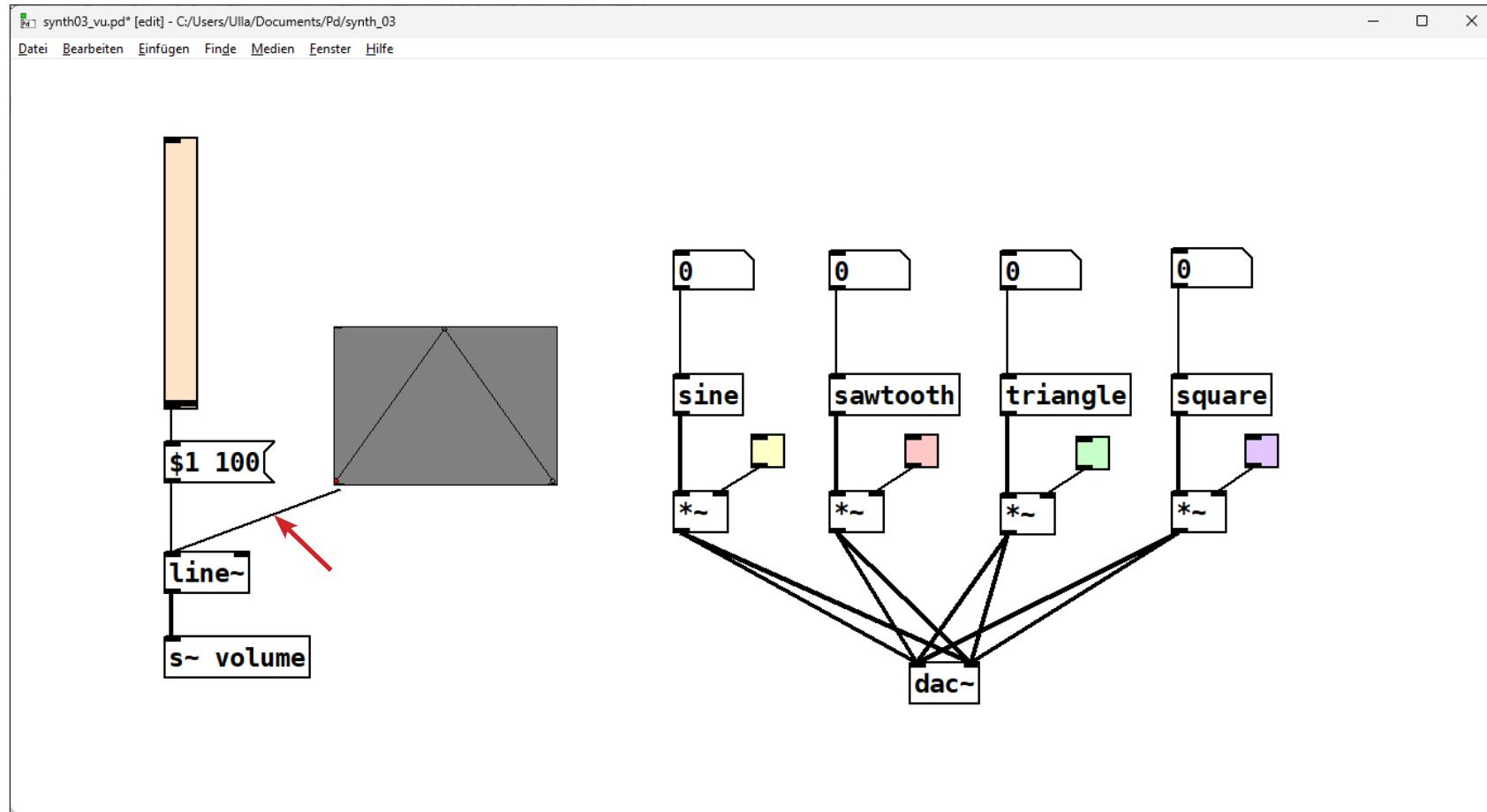


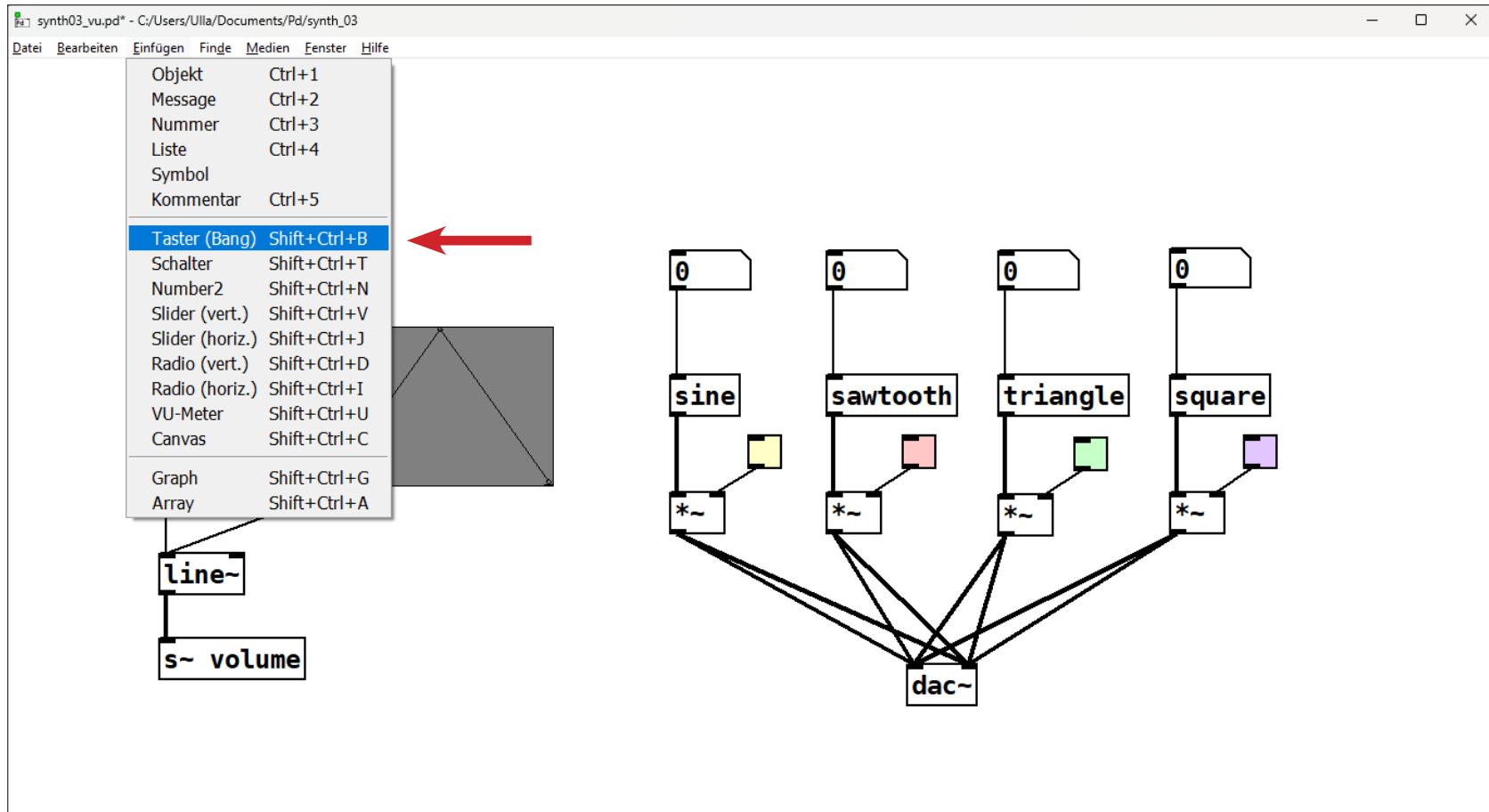


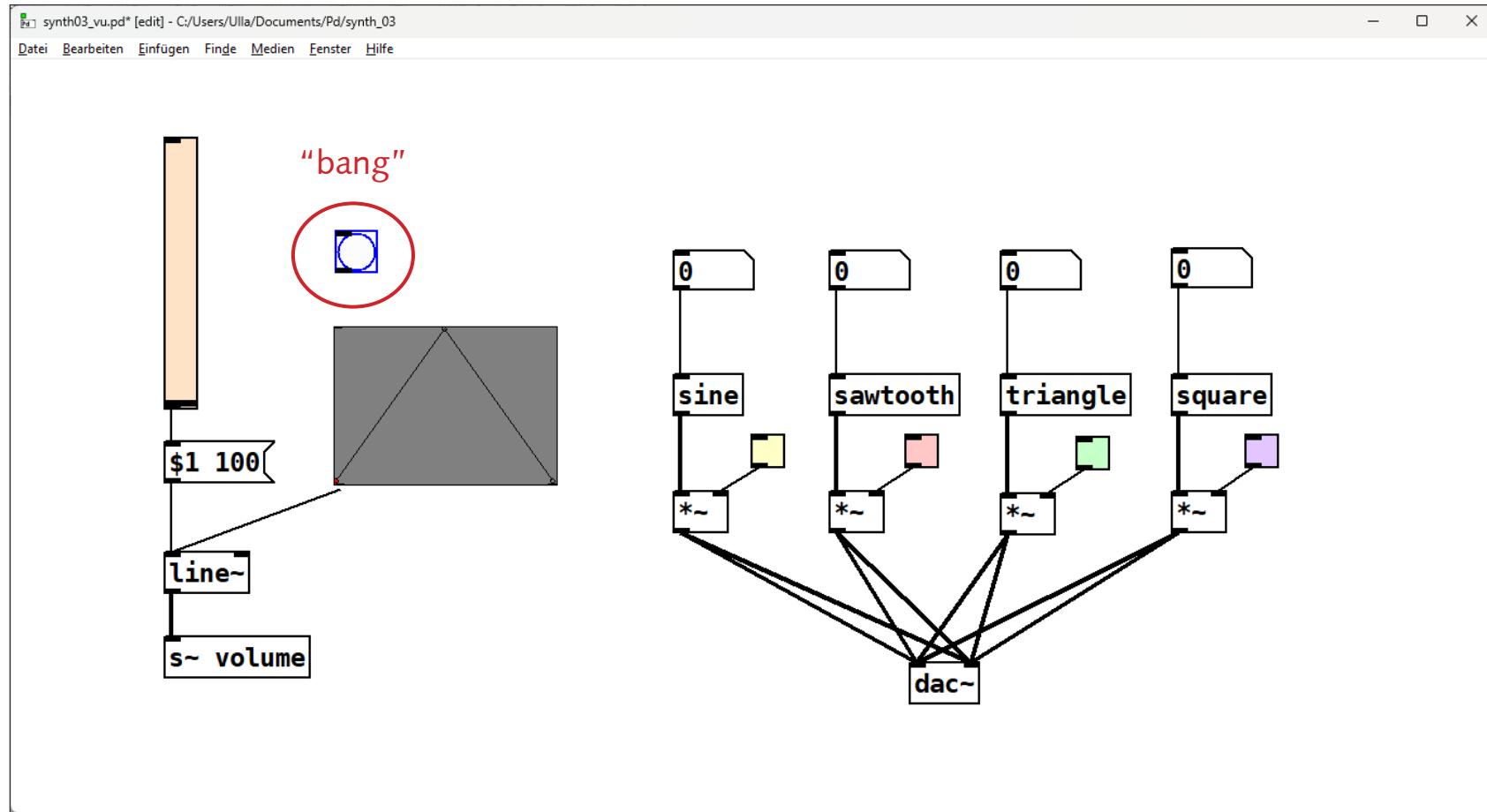


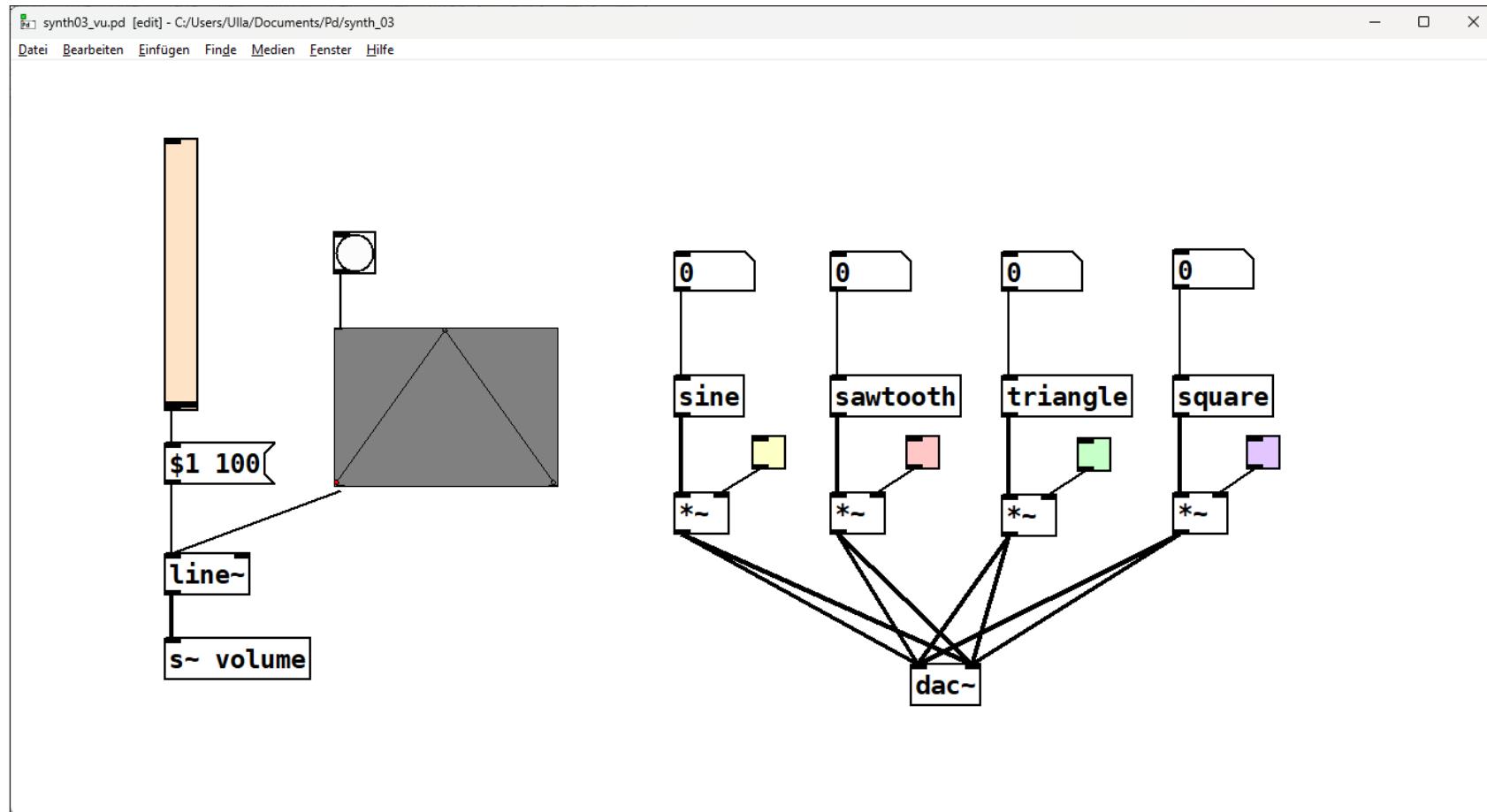


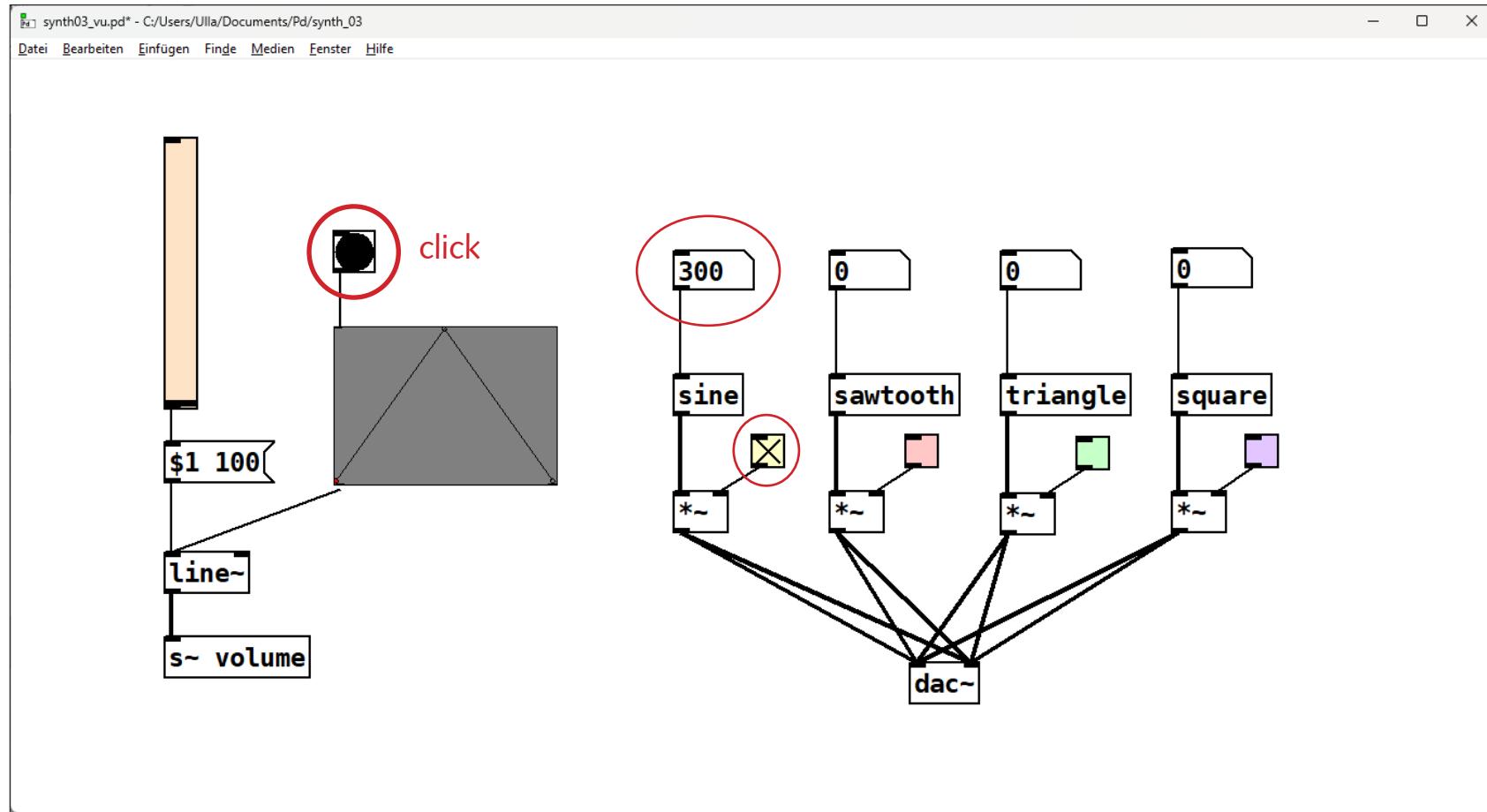


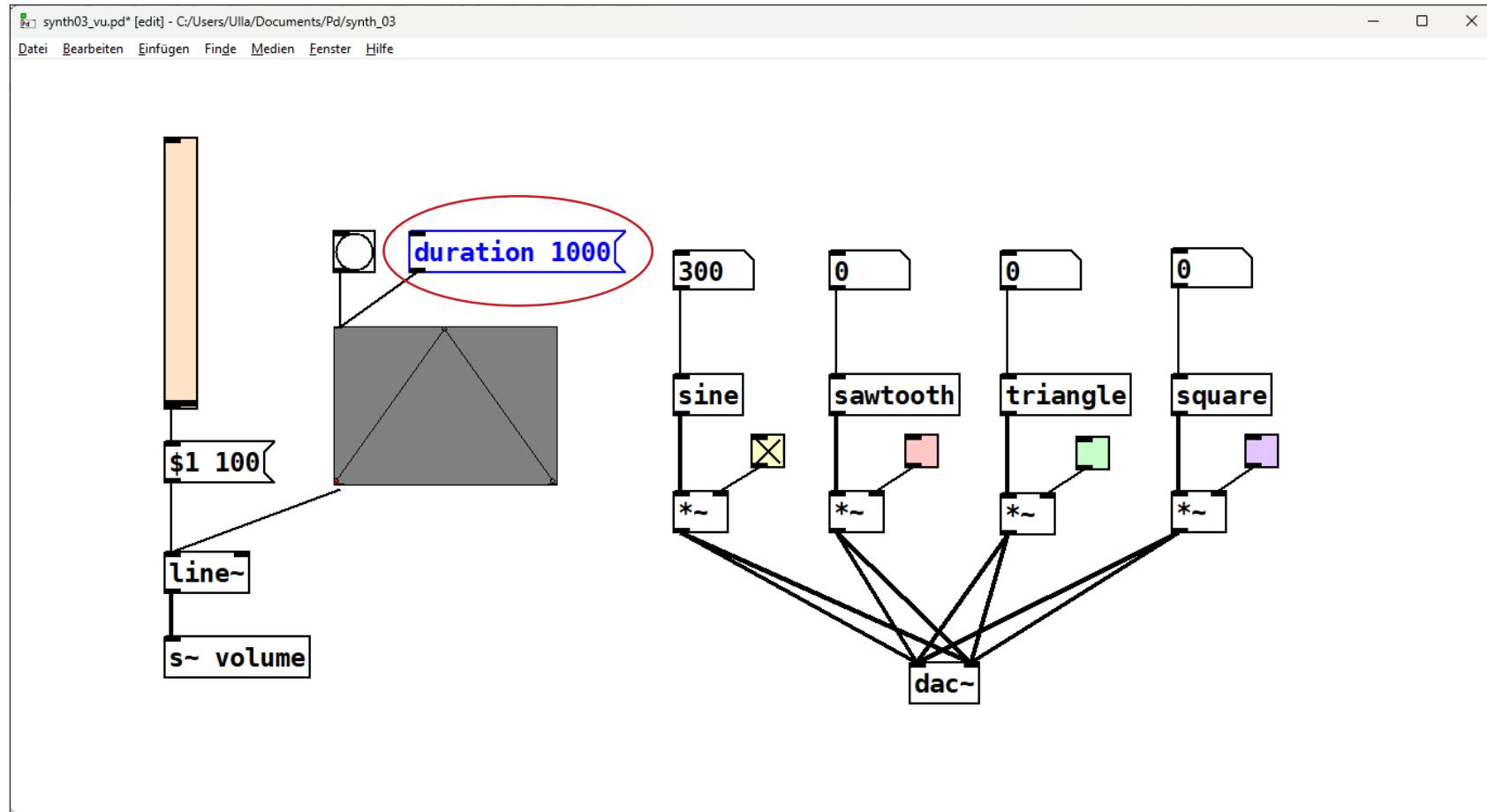


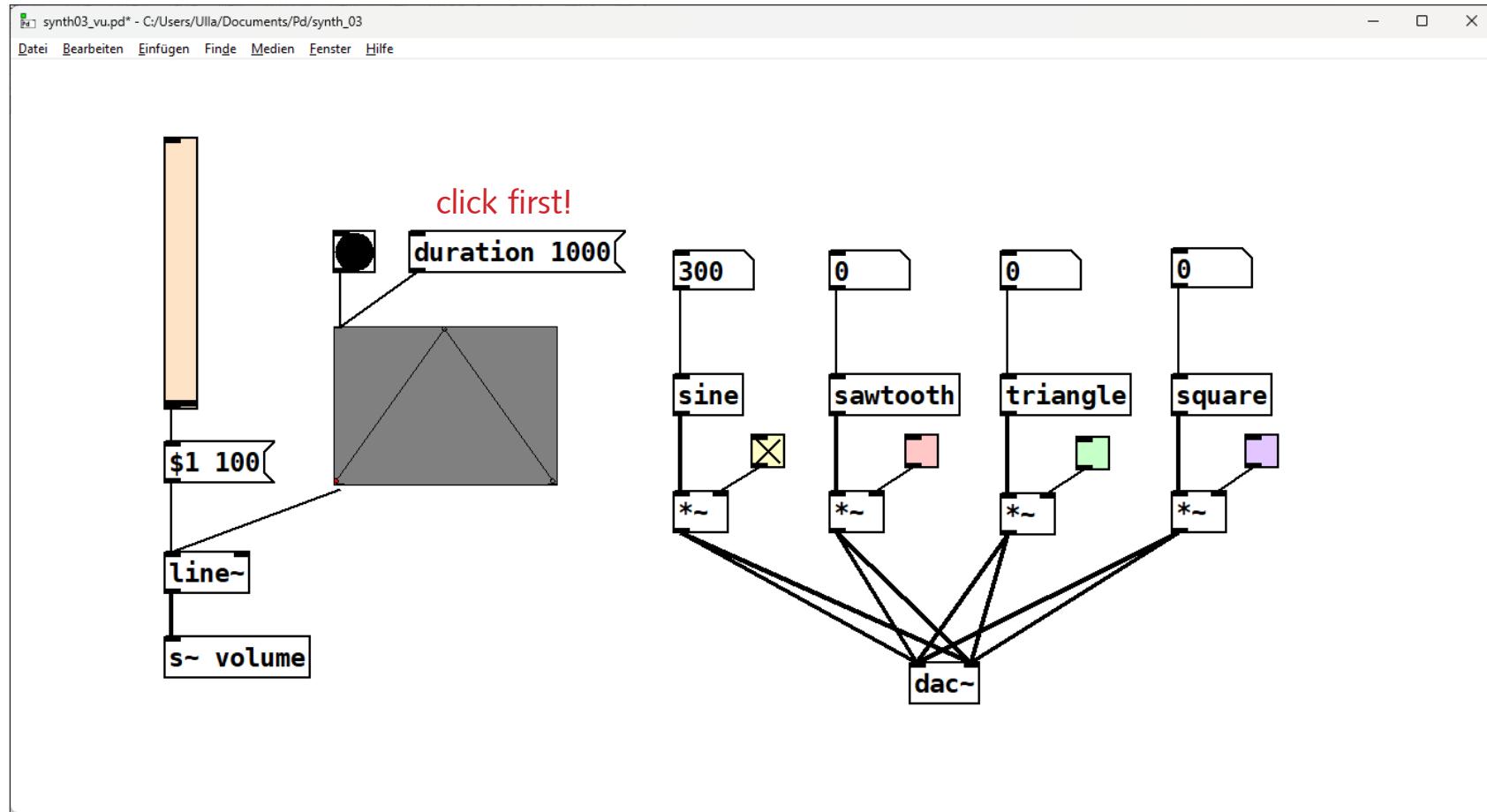


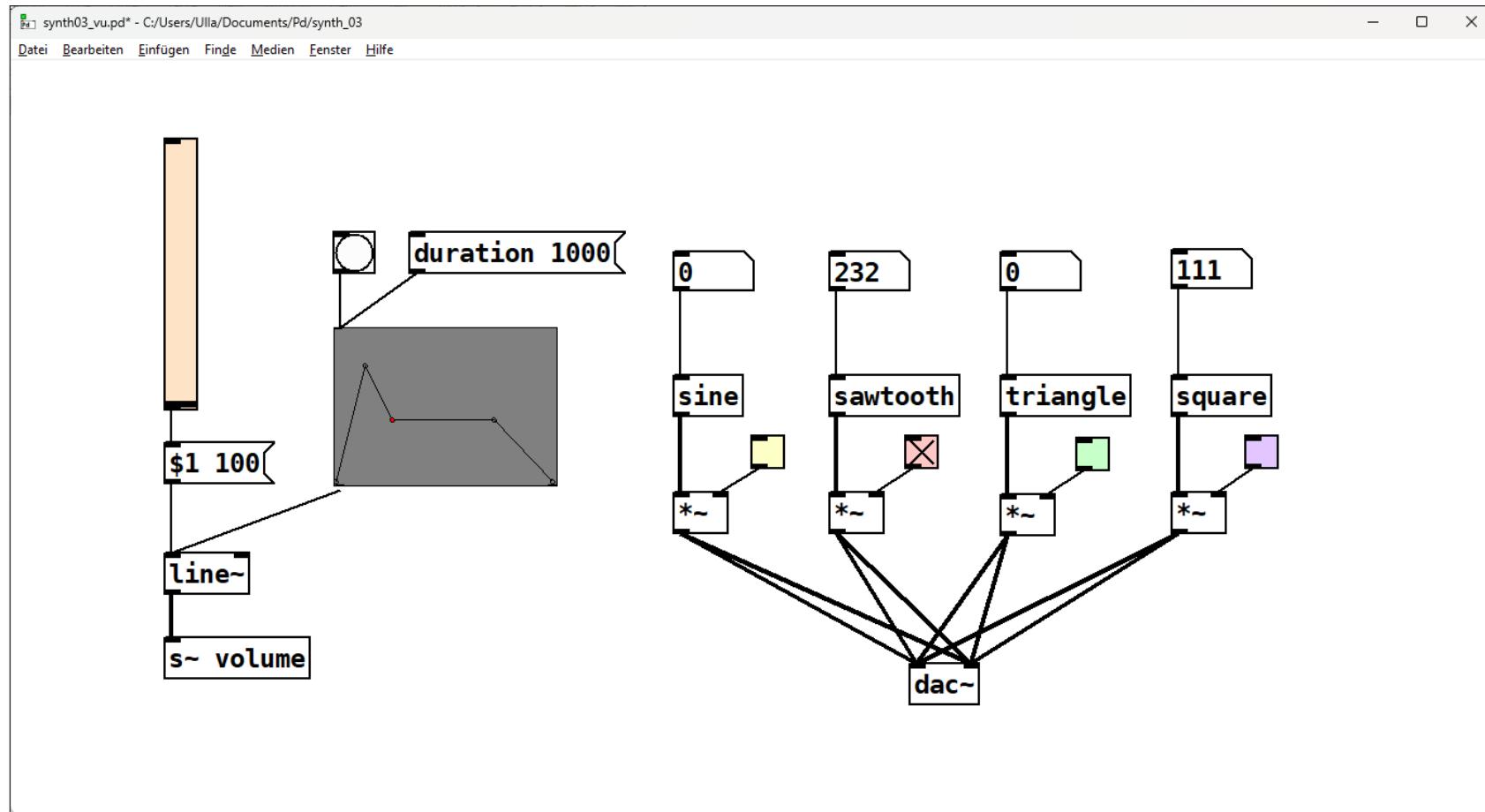


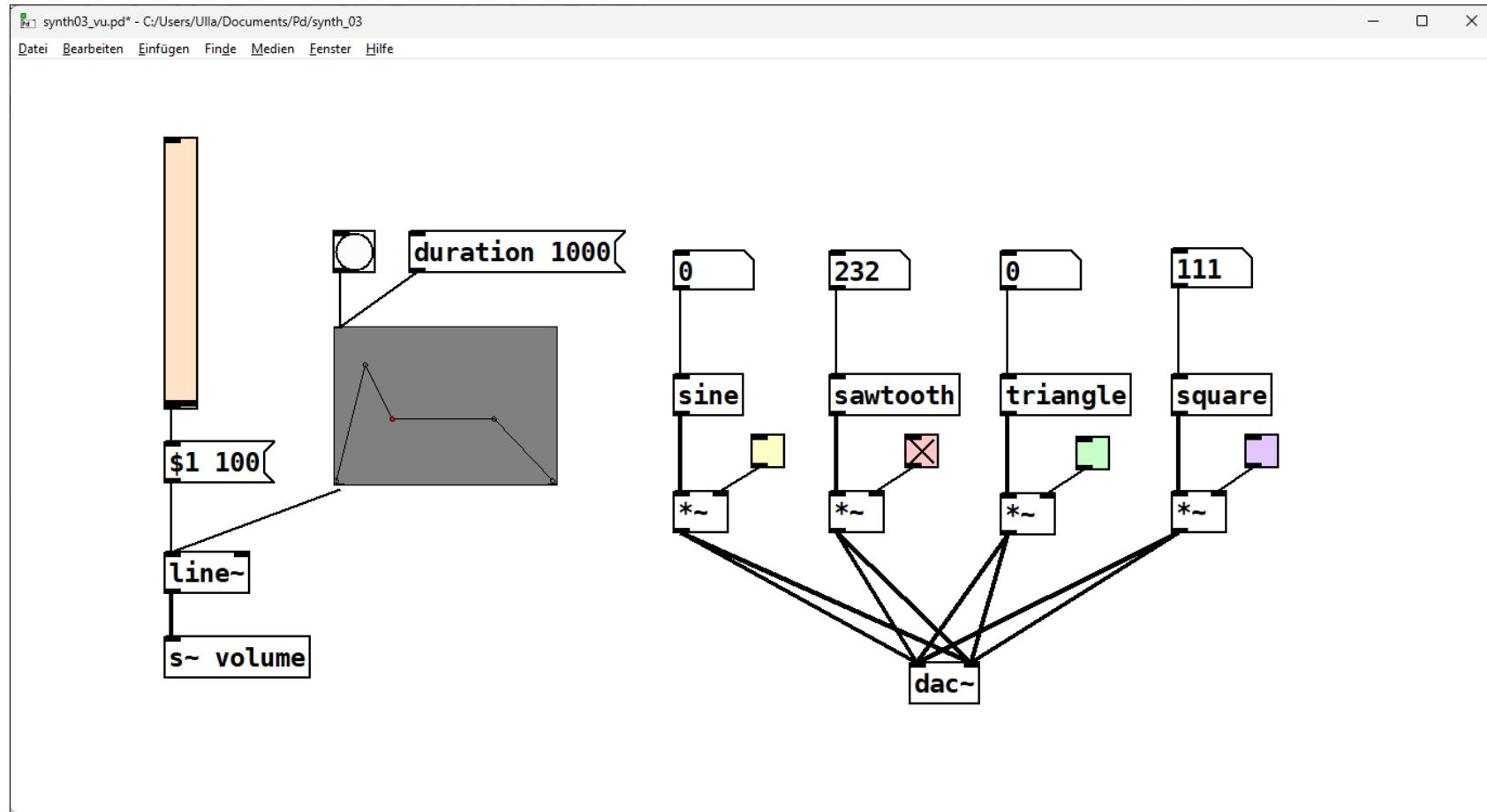


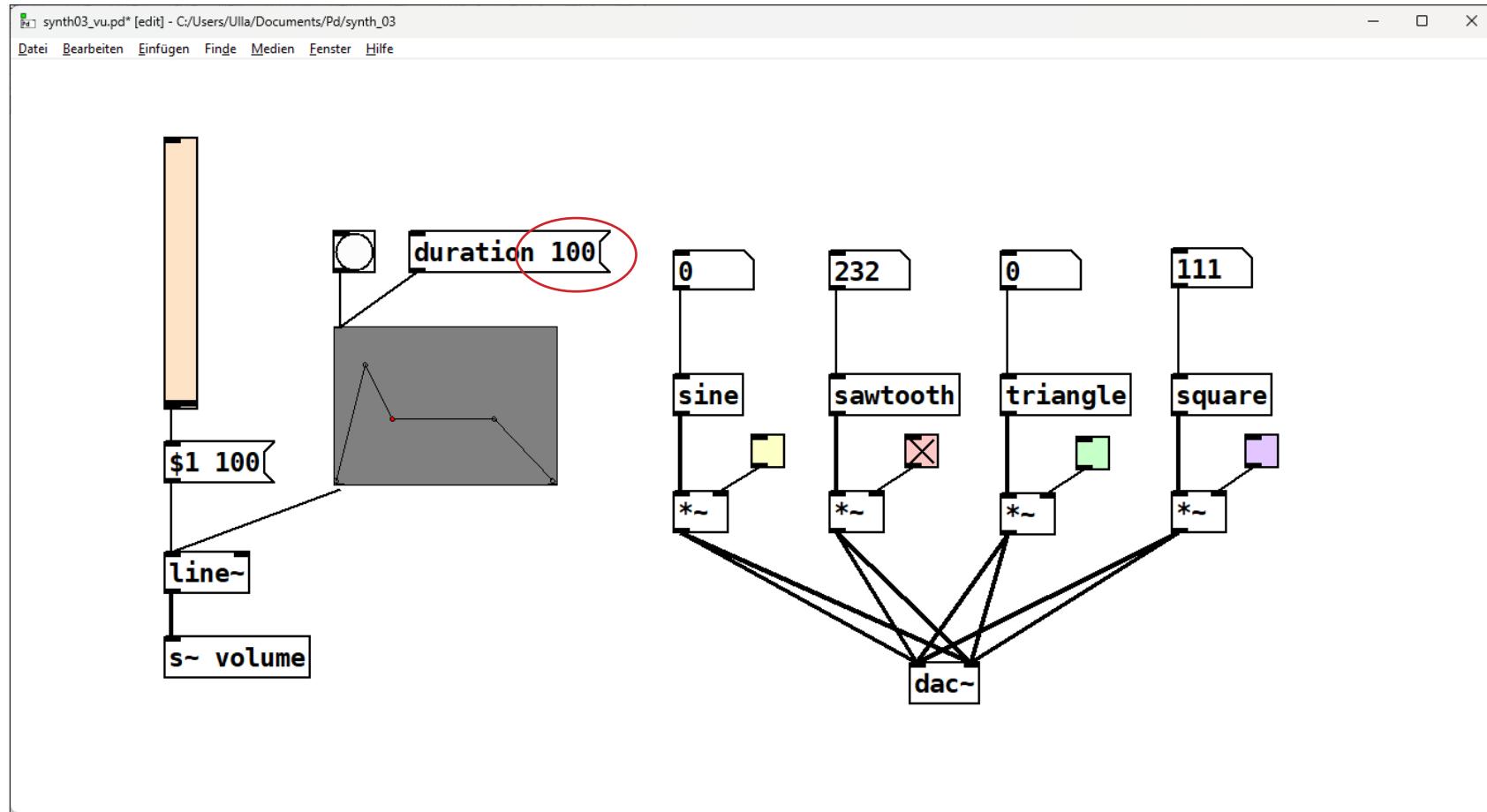


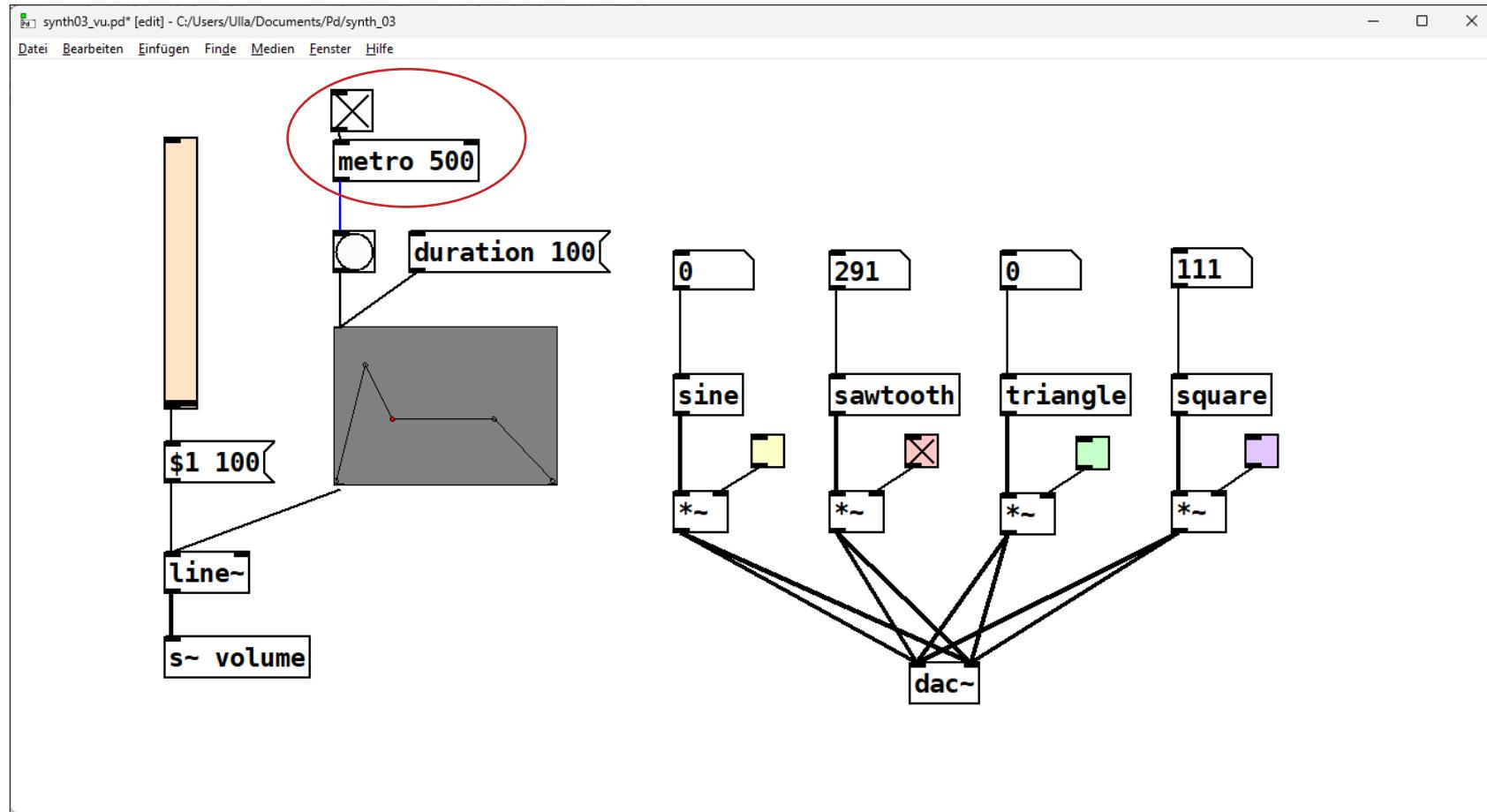


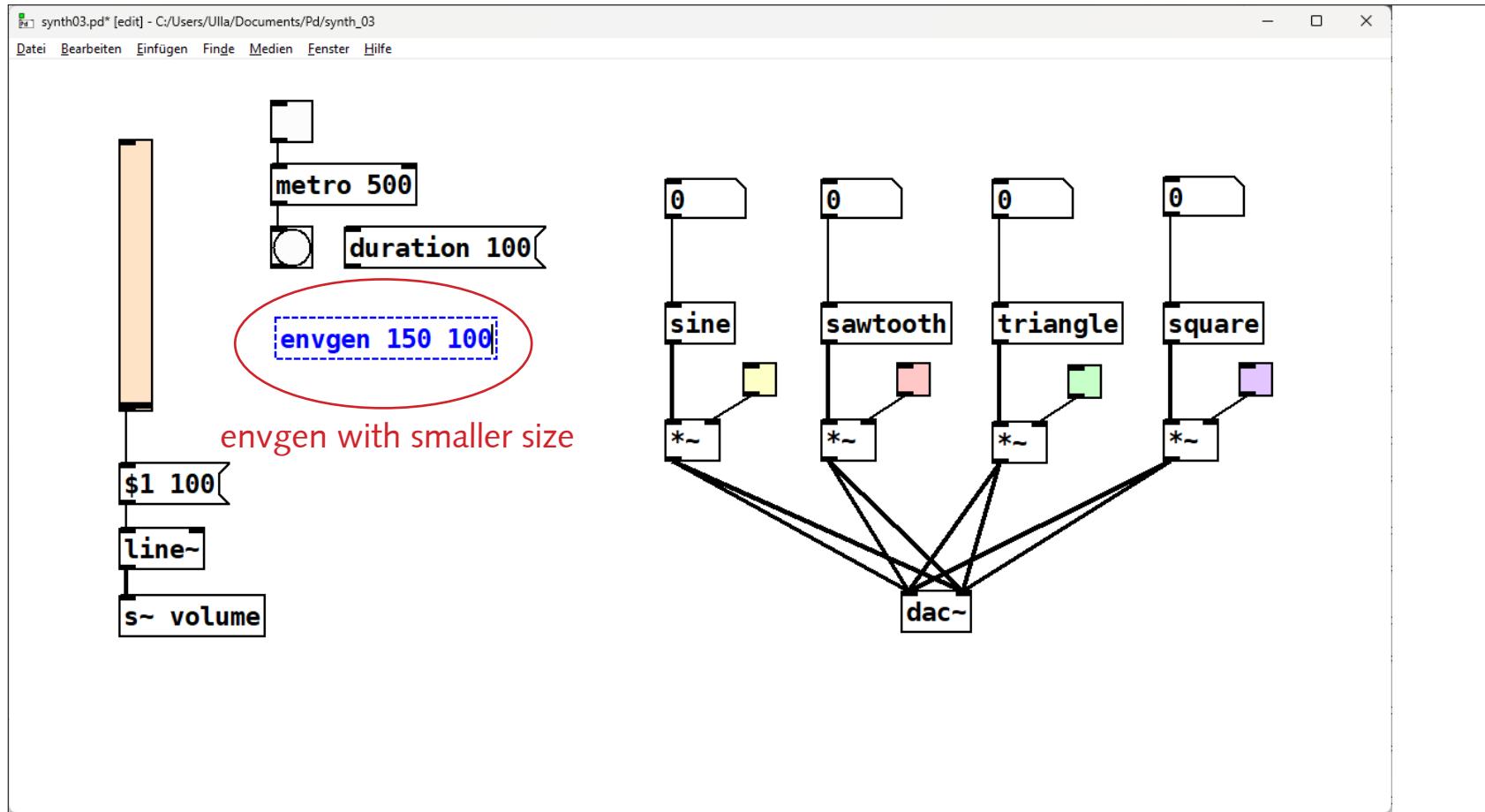


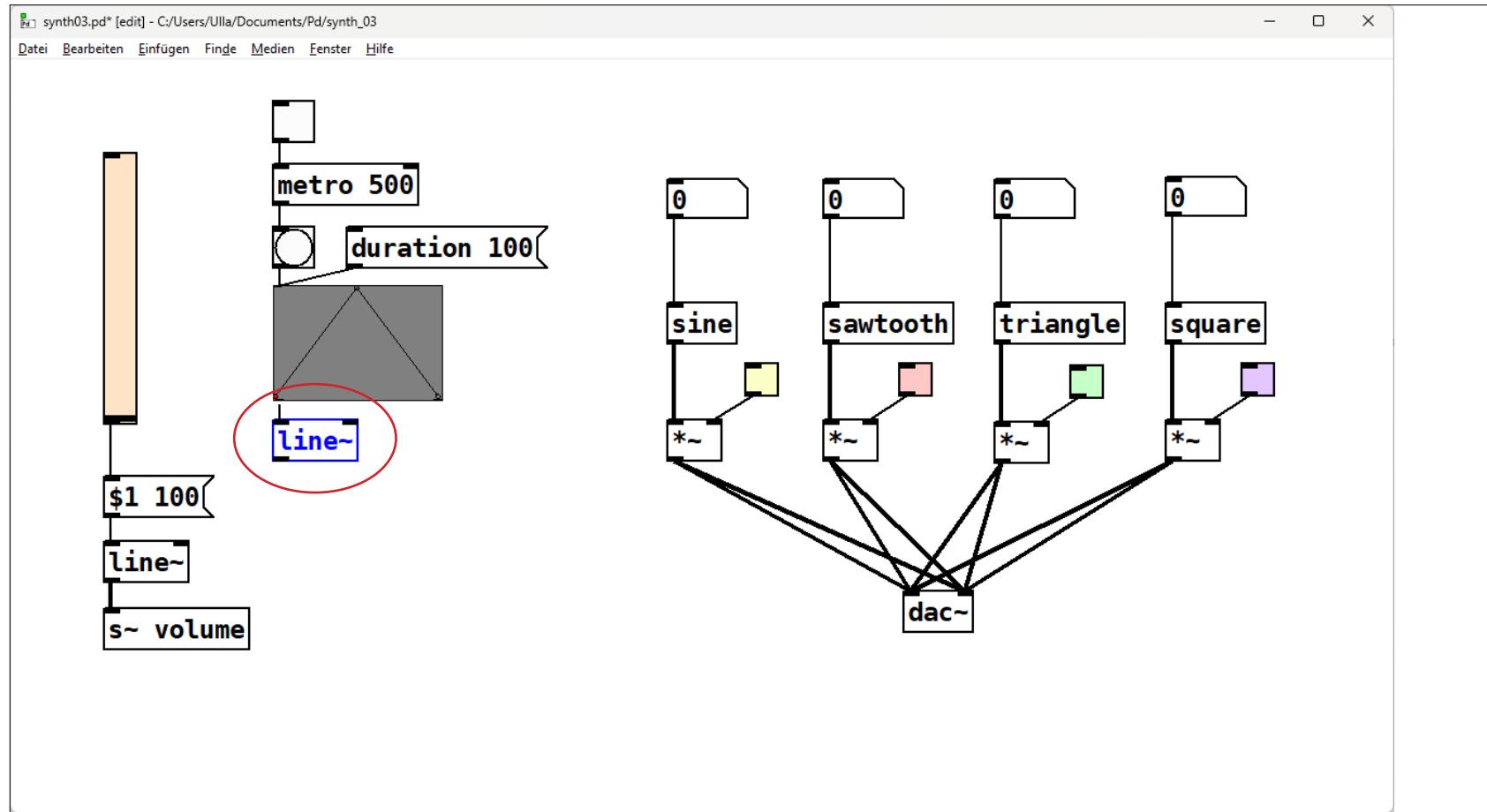


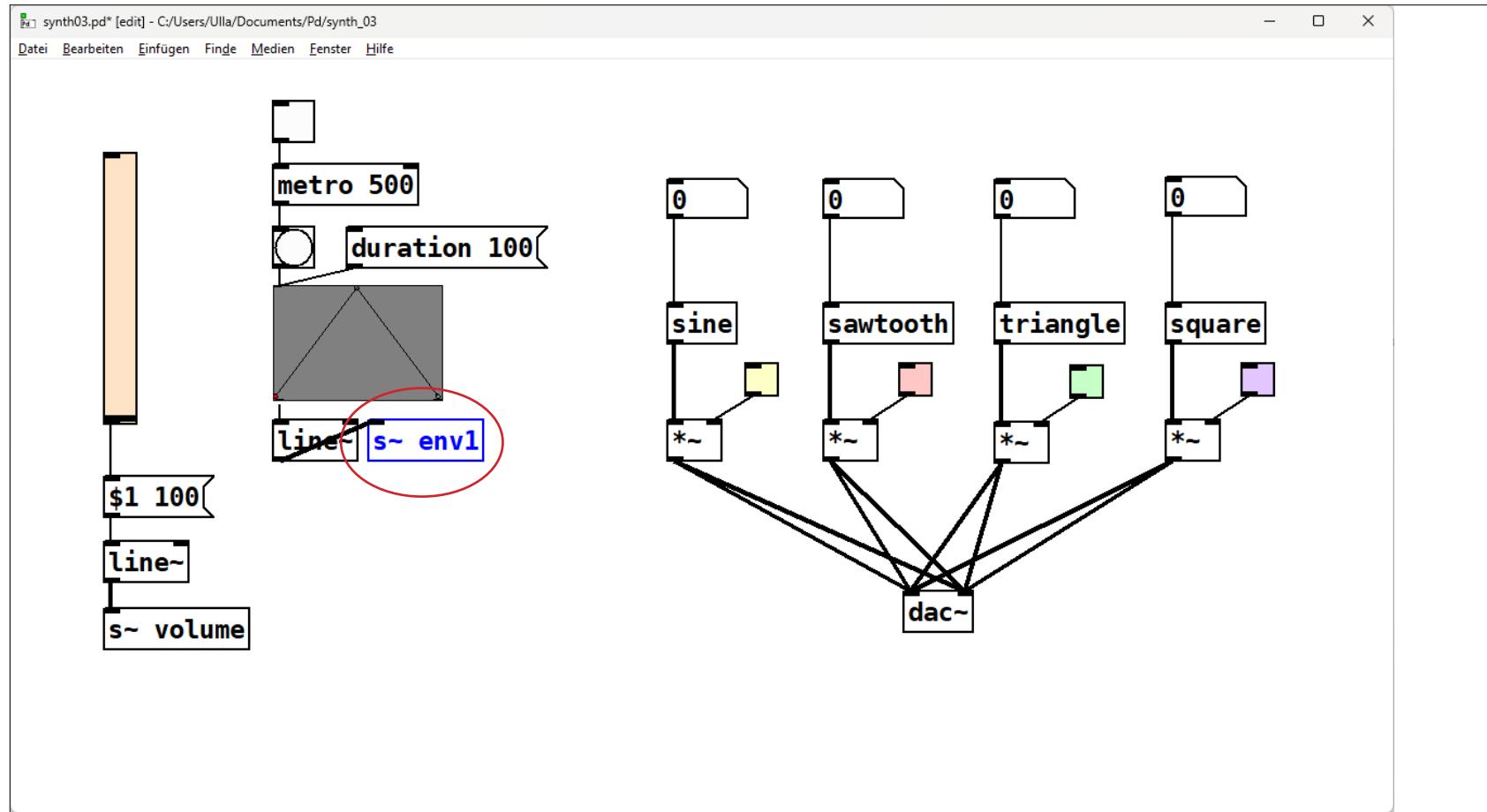


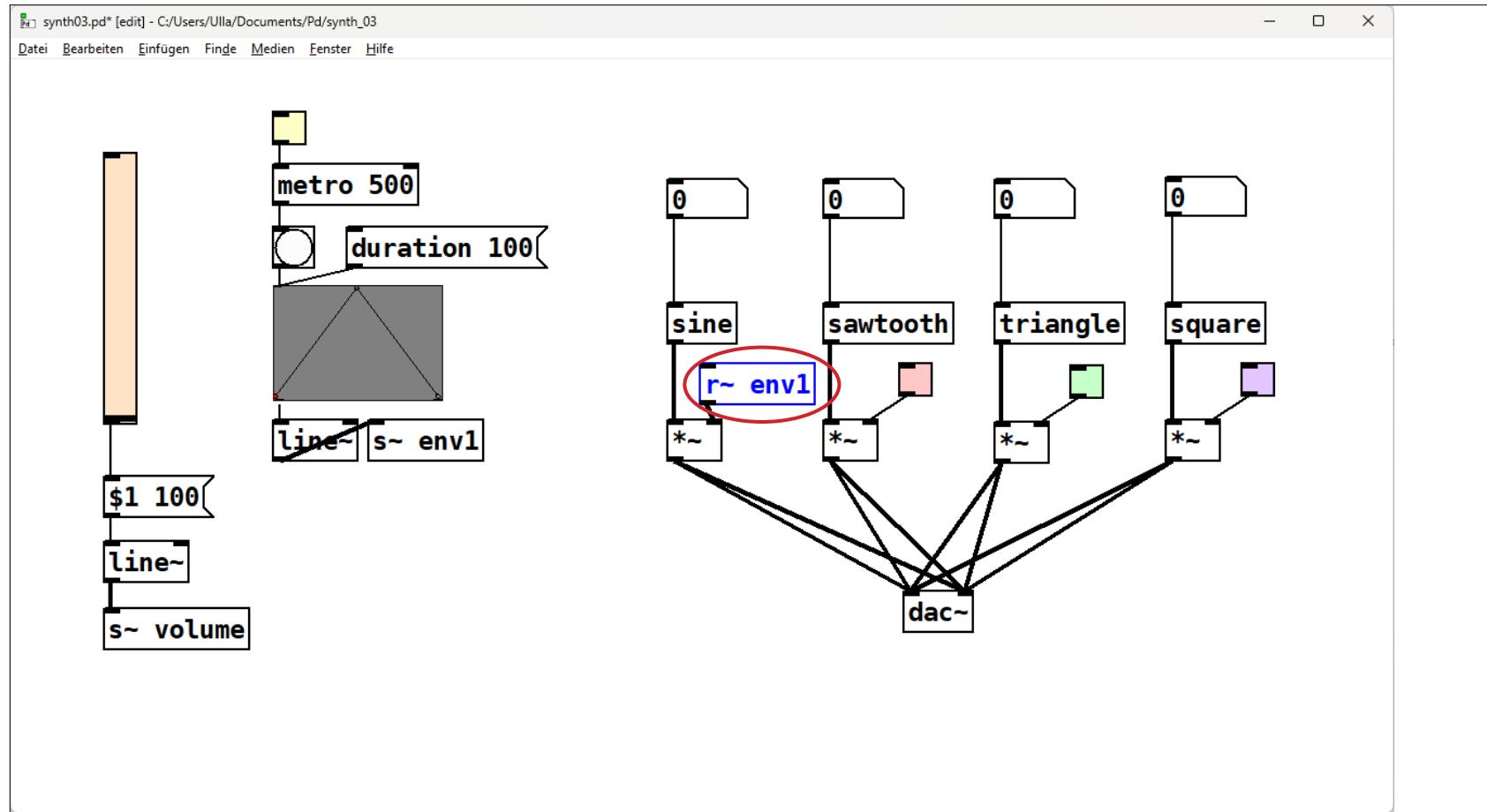


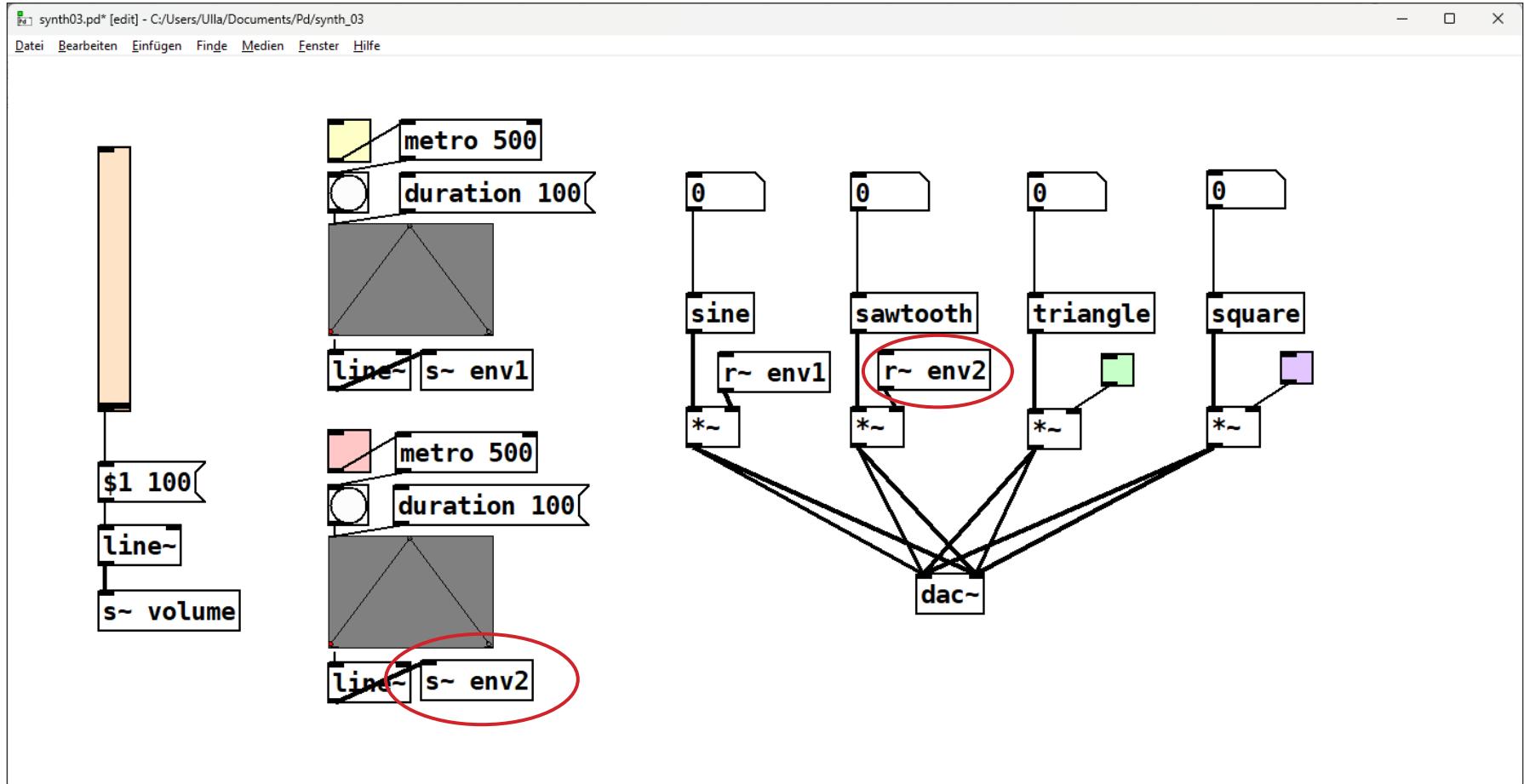


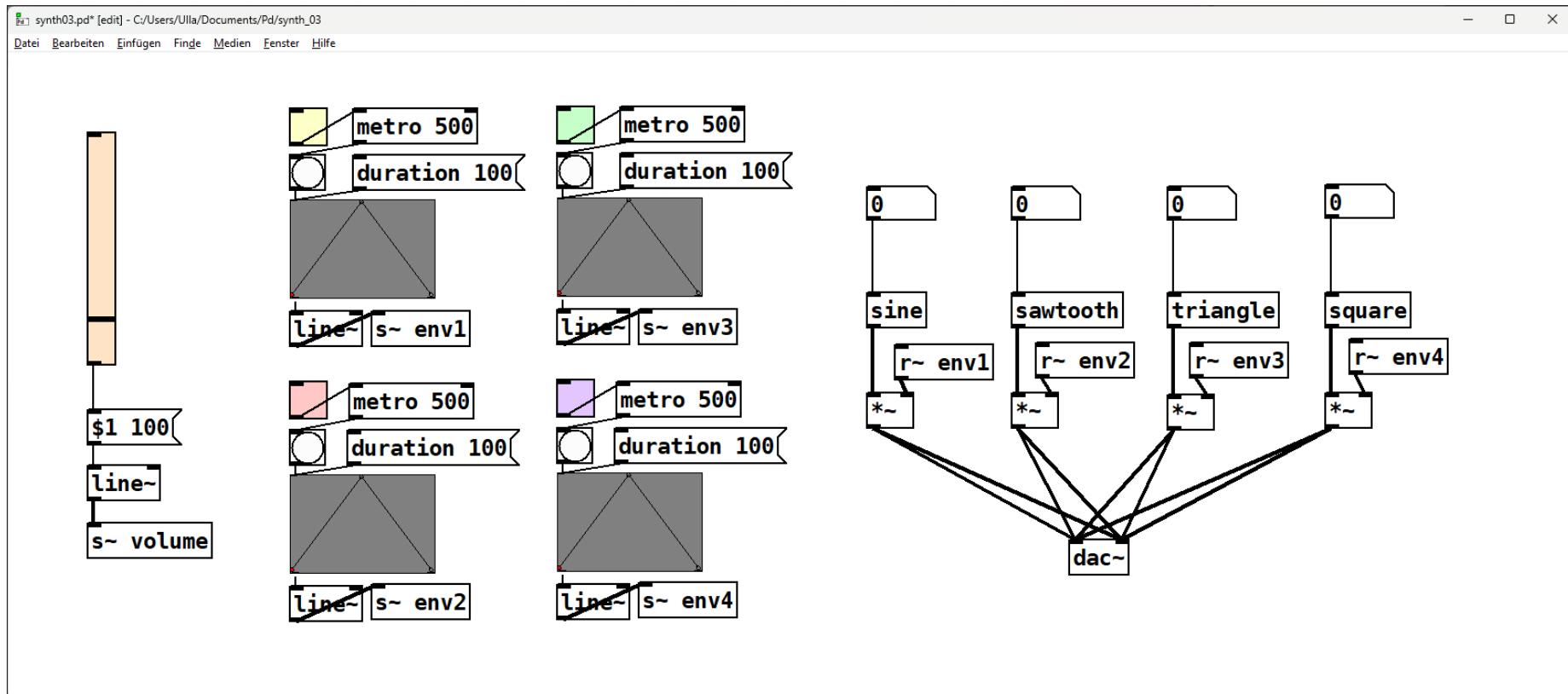


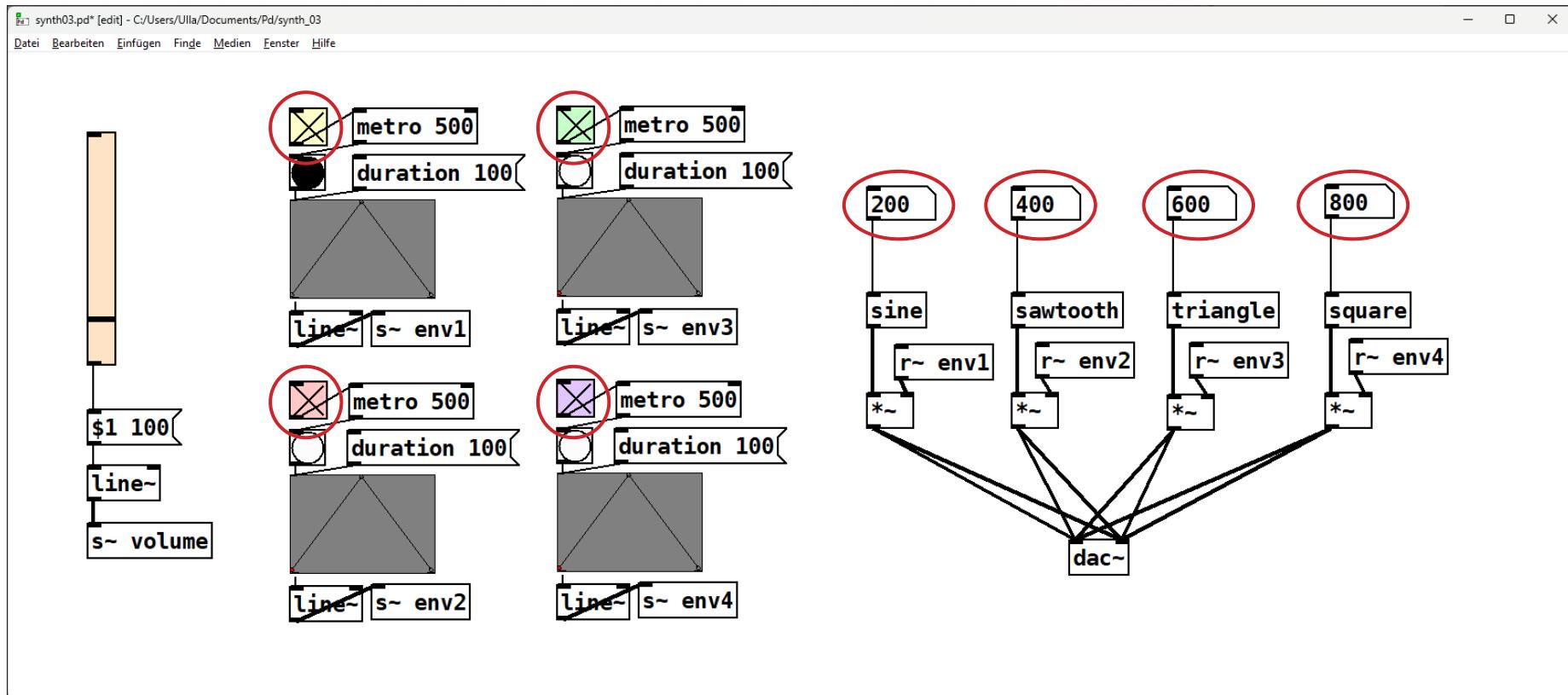


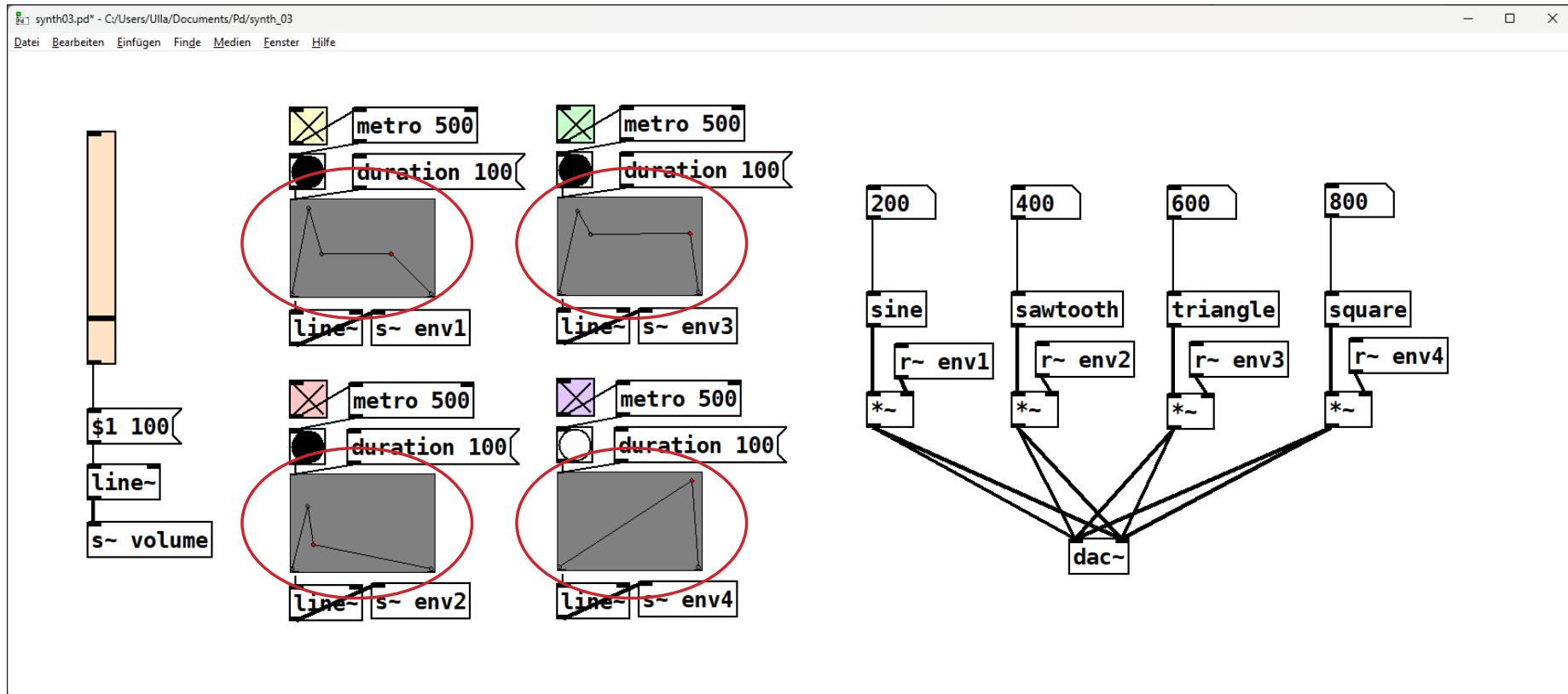




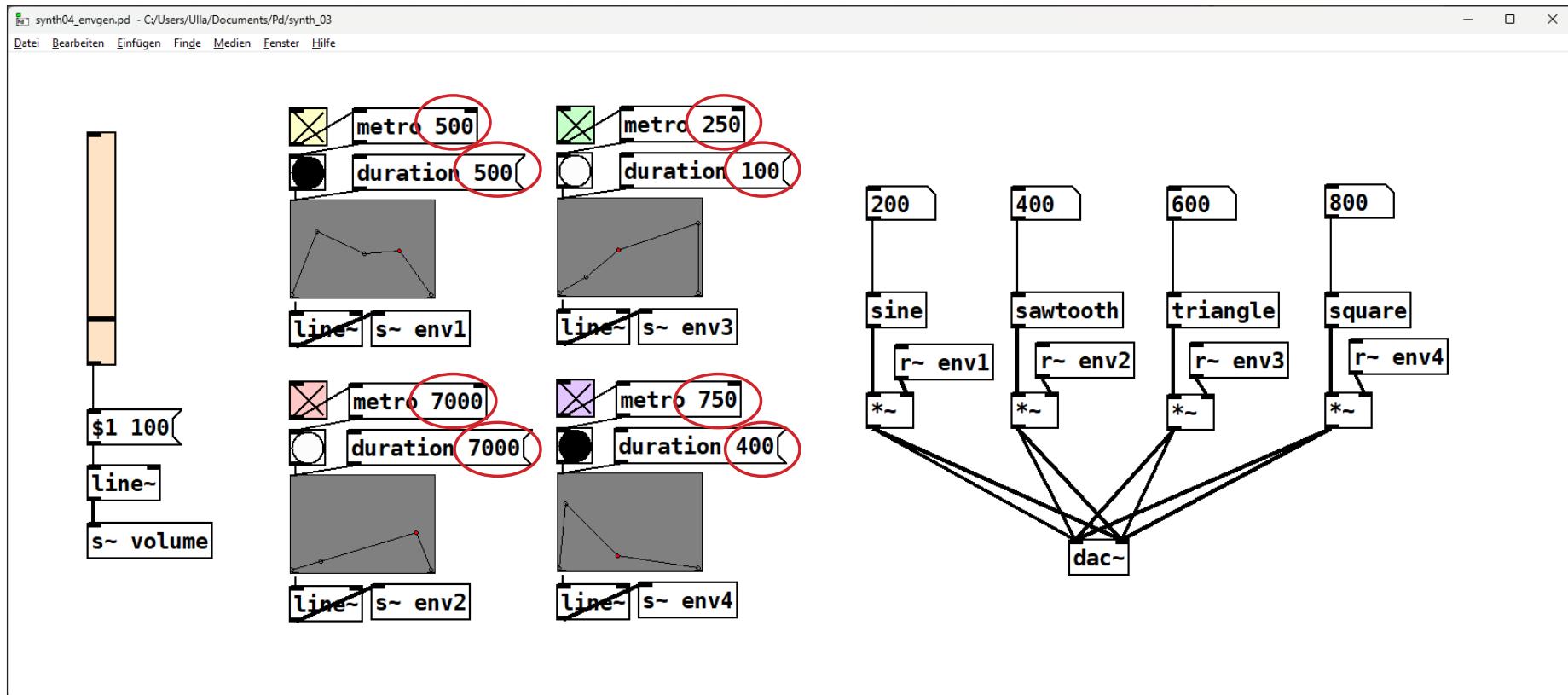




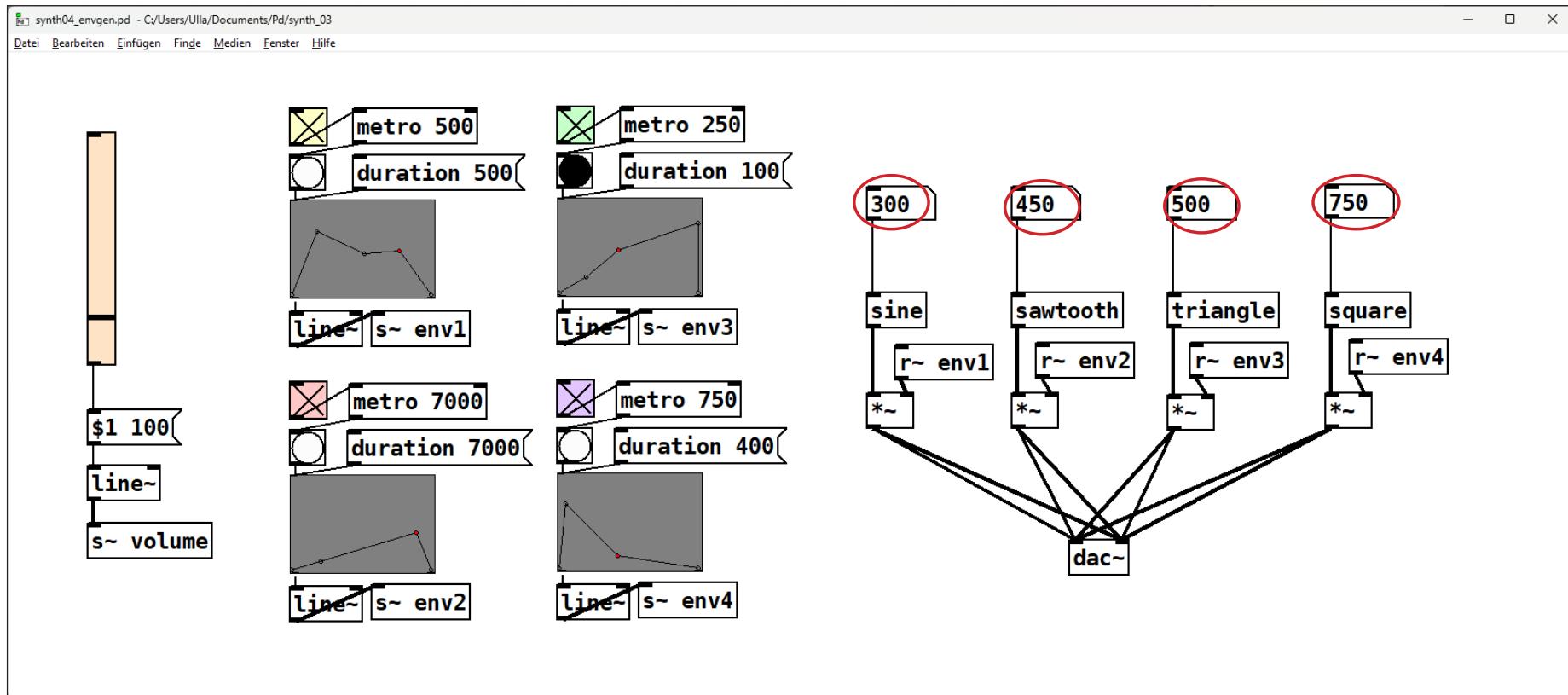




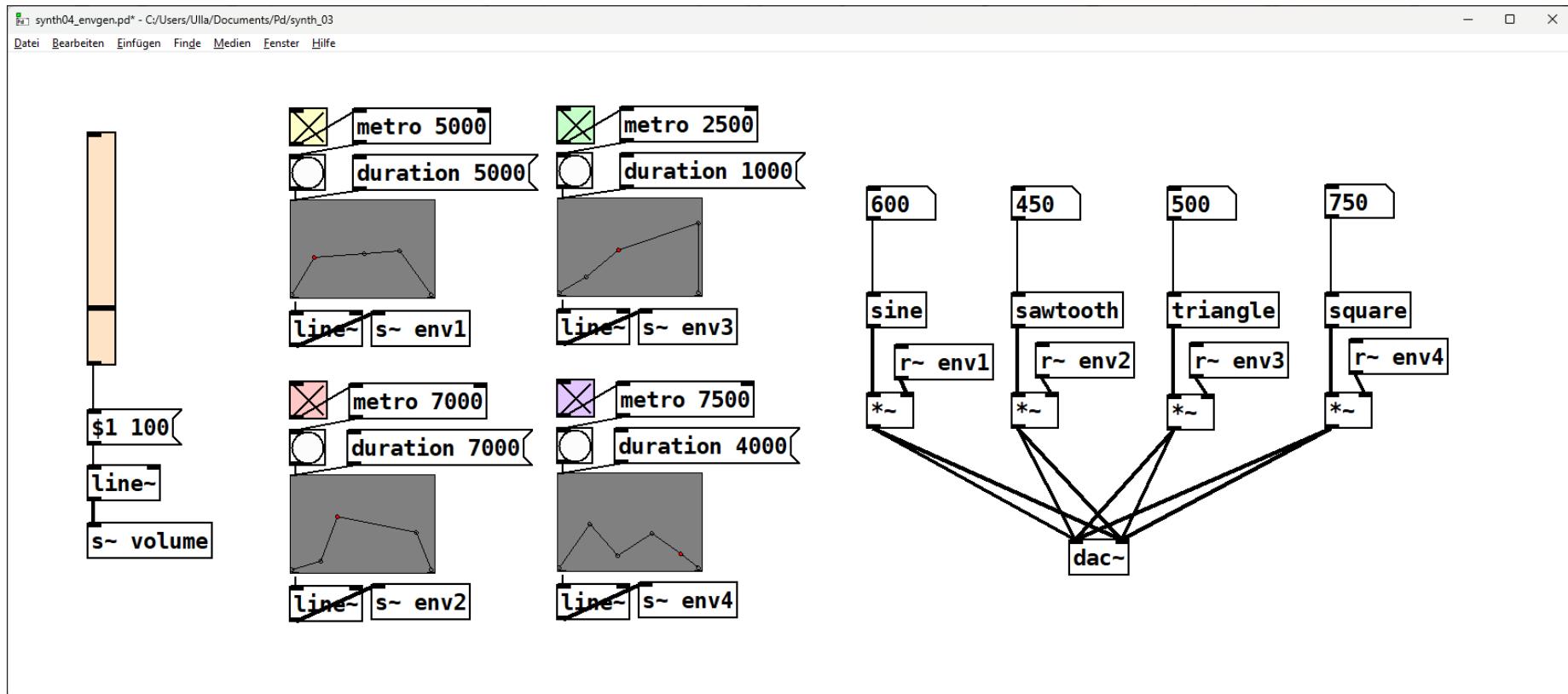
Try different envelopes!



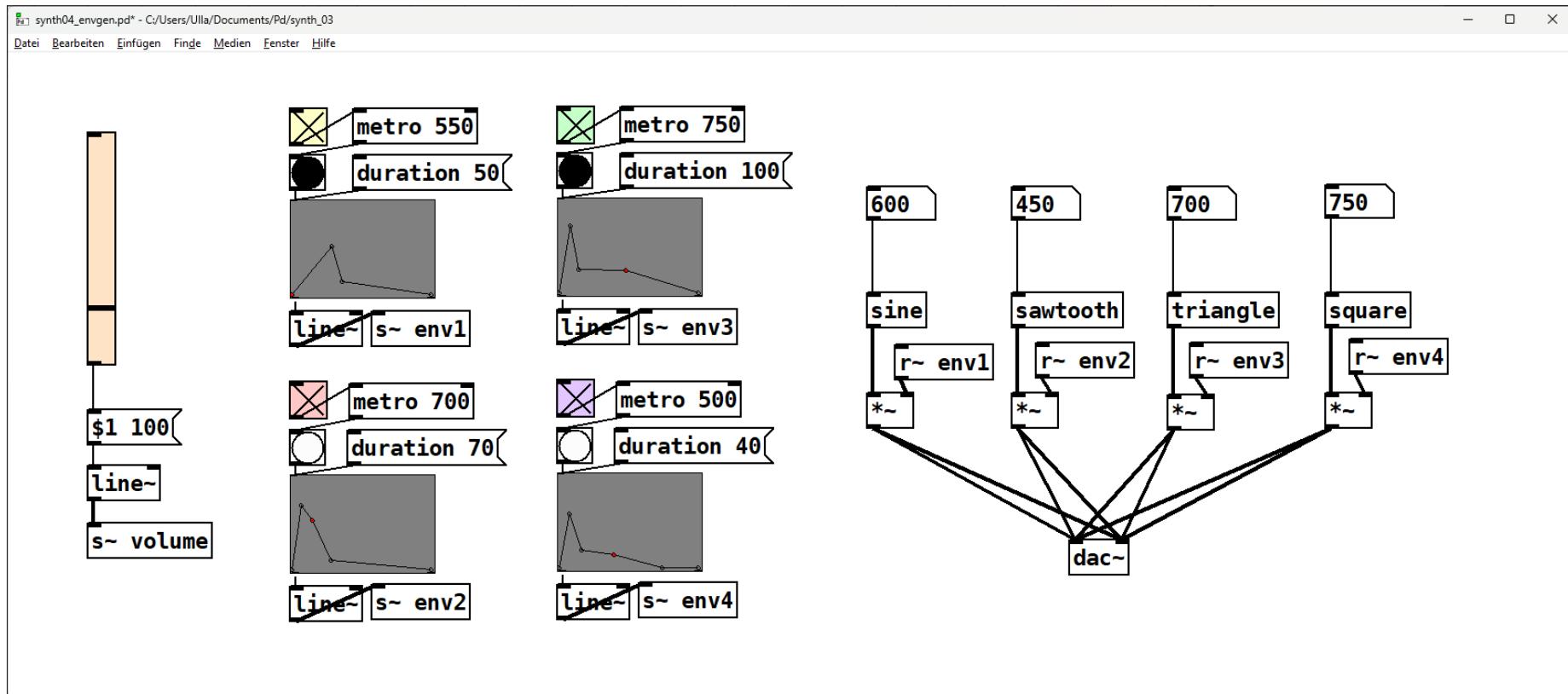
Try different durations & tempos



Try different frequencies → harmonies



get slower ('Legato')!



create short accents ('Pizzicato')