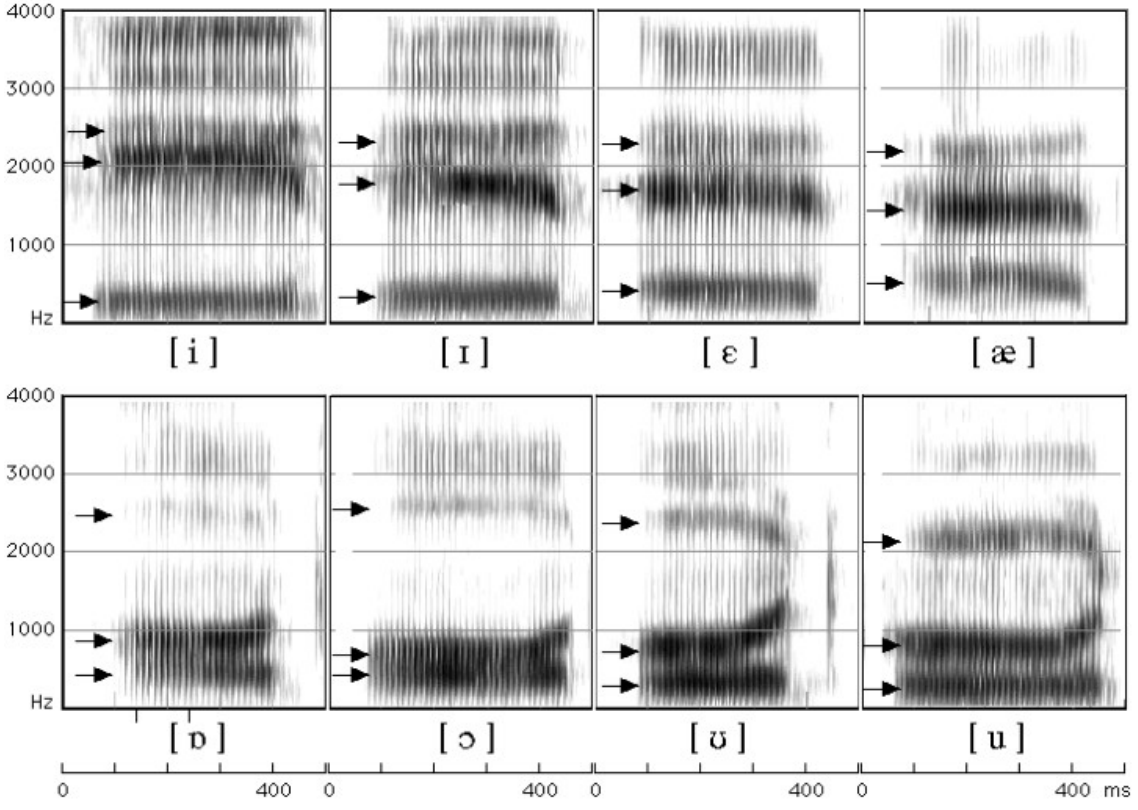
DIGITAL SOUND SYNTHESIS
04_b



Formant synthesis

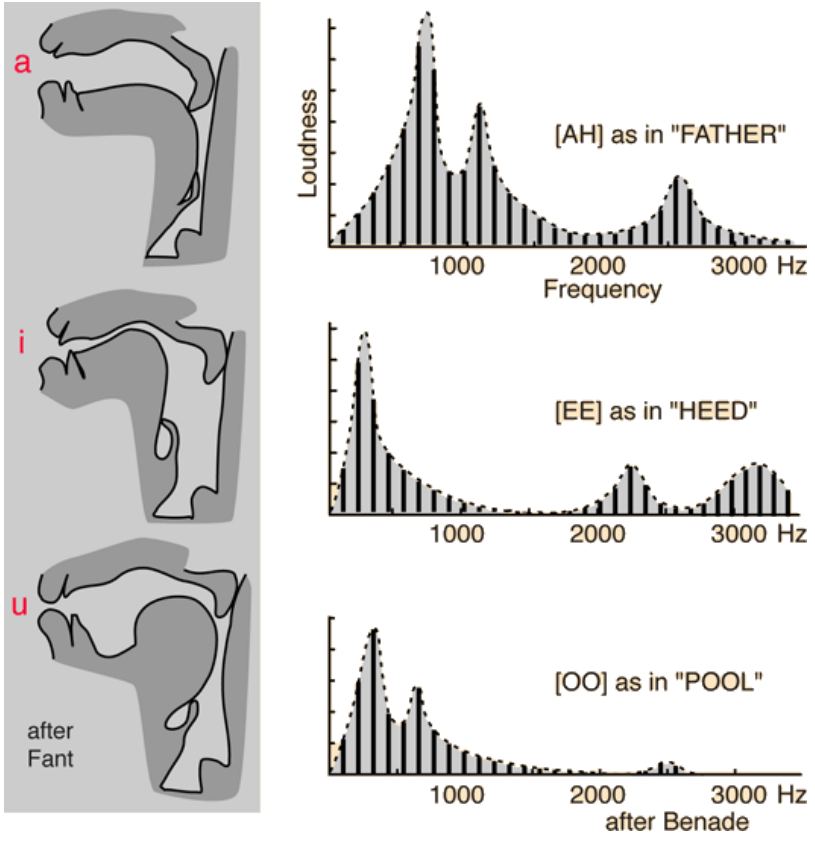
FORMANTS

Concentration of acoustic energy

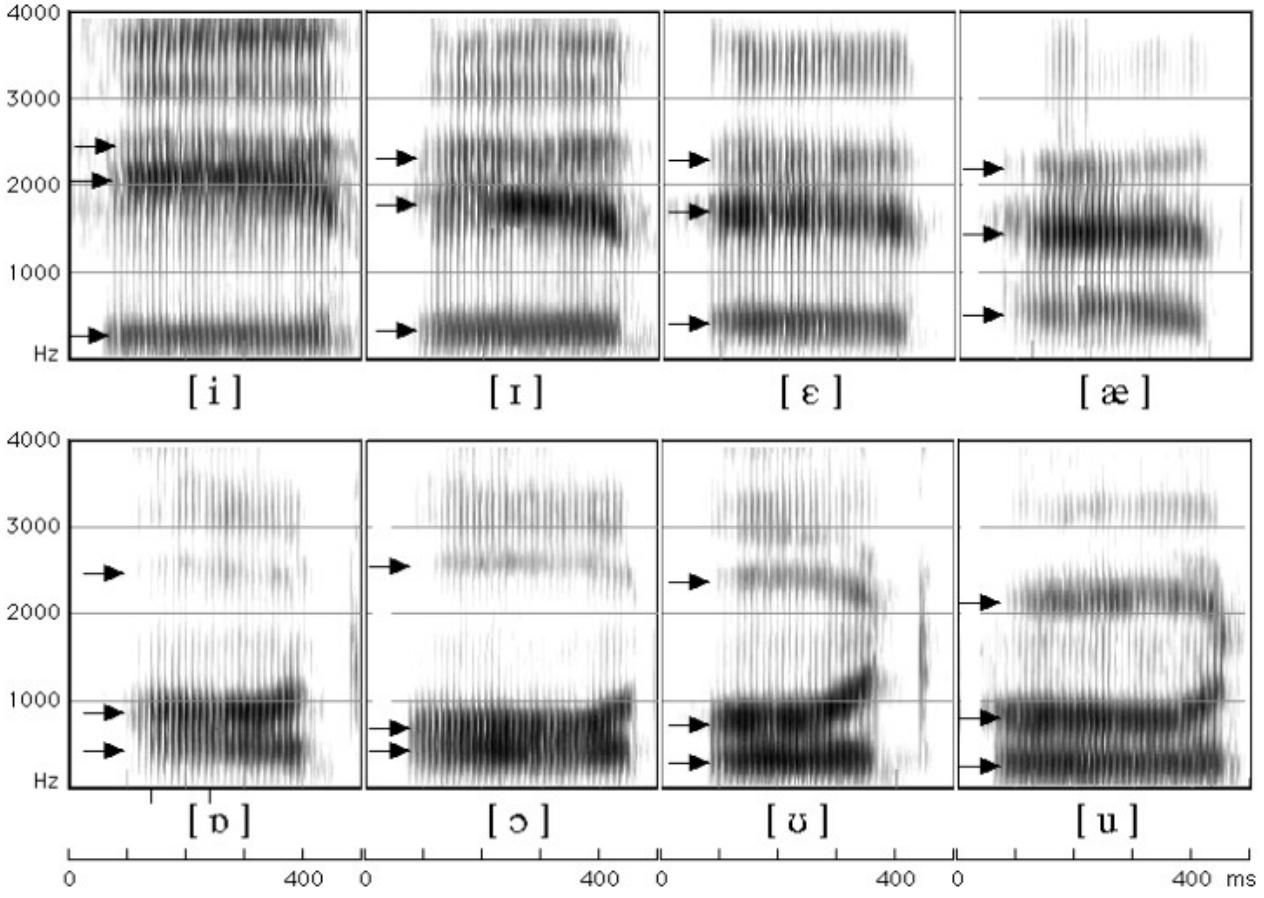
at specific frequencies in a sound.

Responsible for characteristic sound
of speech sounds (vowels) and the timbre
of musical instruments.

DIFFERENT VOWELS AND THEIR FORMANTS



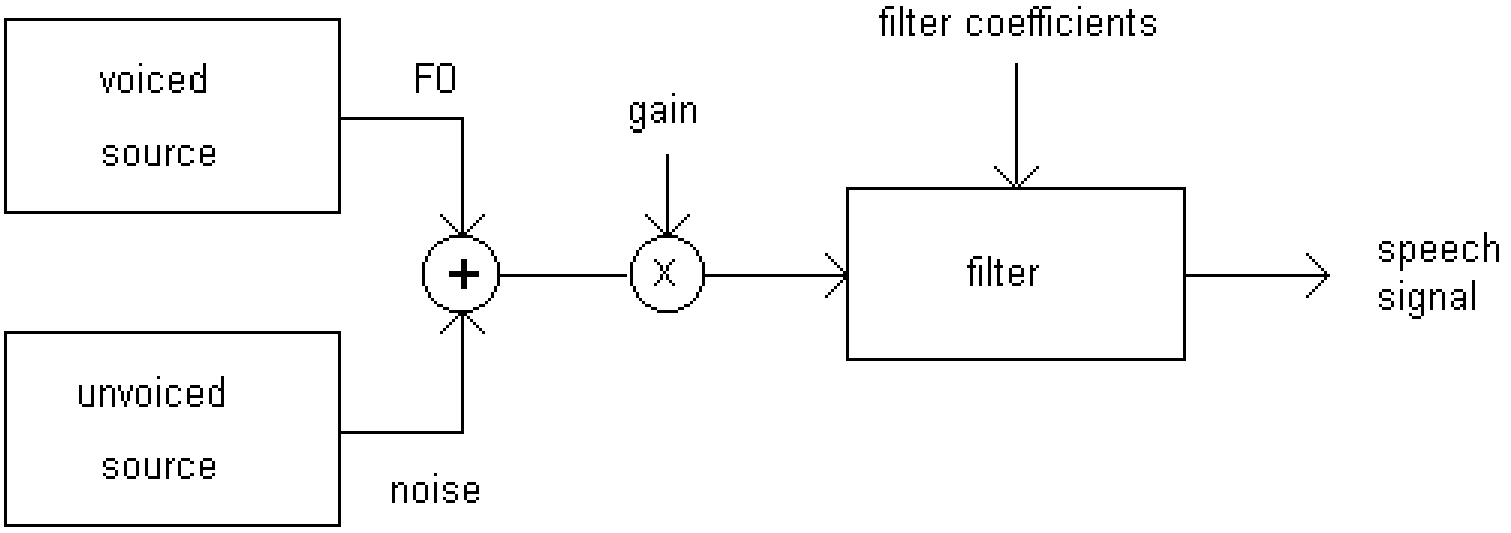
DIFFERENT VOWELS AND THEIR FORMANTS



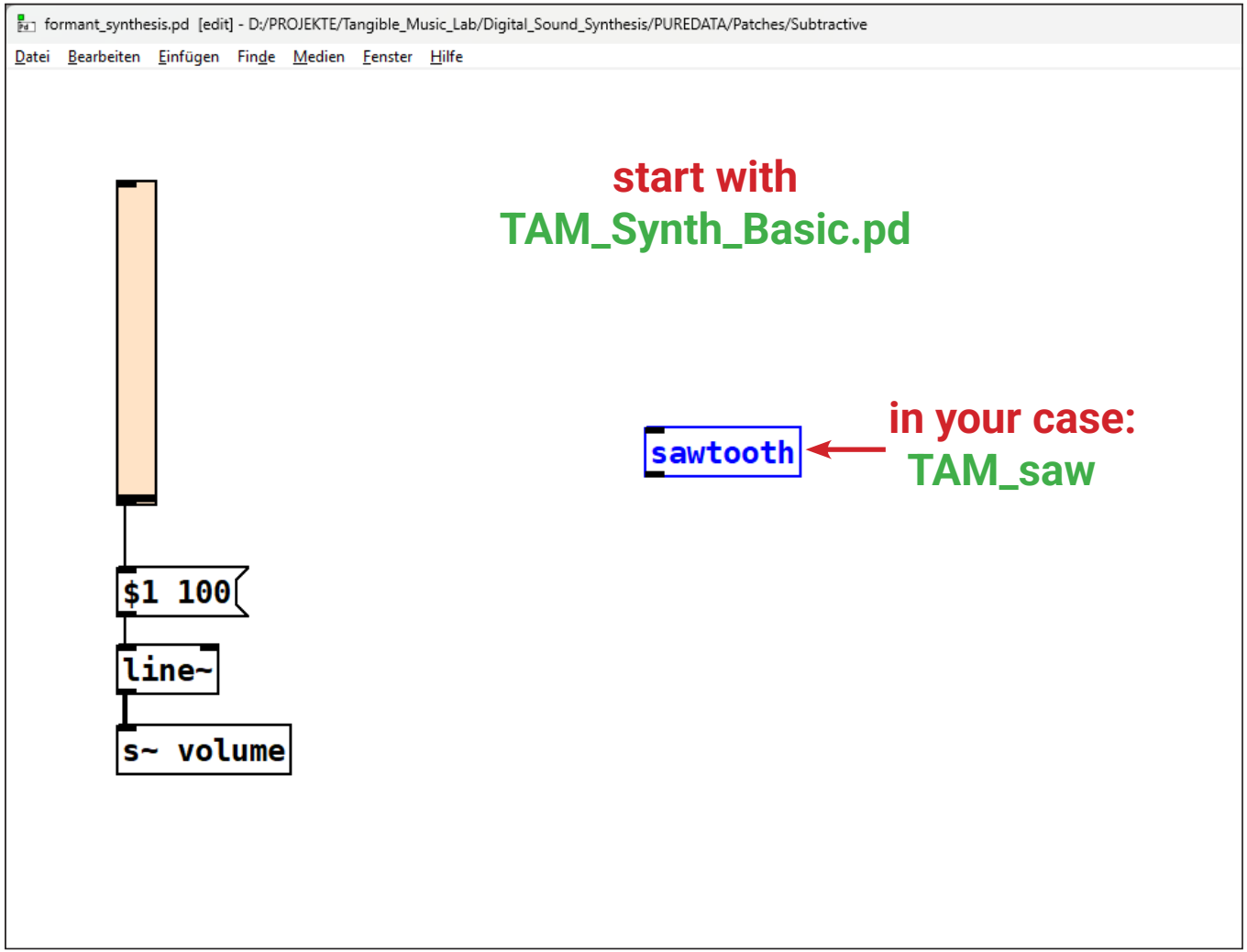
FORMANT TABLE

	Men			Women			Children		
Vowel in	F1	F2	F3	F1	F2	F3	F1	F2	F3
beat	270	2300	3000	300	2800	3300	370	3200	3700
bit	400	2000	2550	430	2500	3100	530	2750	3600
bet	530	1850	2500	600	2350	3000	700	2600	3550
bat	660	1700	2400	860	2050	2850	1000	2300	3300
part	730	1100	2450	850	1200	2800	1030	1350	3200
pot	570	850	2400	590	900	2700	680	1050	3200
boot	440	1000	2250	470	1150	2700	560	1400	3300
book	300	850	2250	370	950	2650	430	1150	3250
but	640	1200	2400	760	1400	2800	850	1600	3350
pert	490	1350	1700	500	1650	1950	560	1650	2150

FORMANT SYNTHESIS –
Source-filter model



https://vimeo.com/39186607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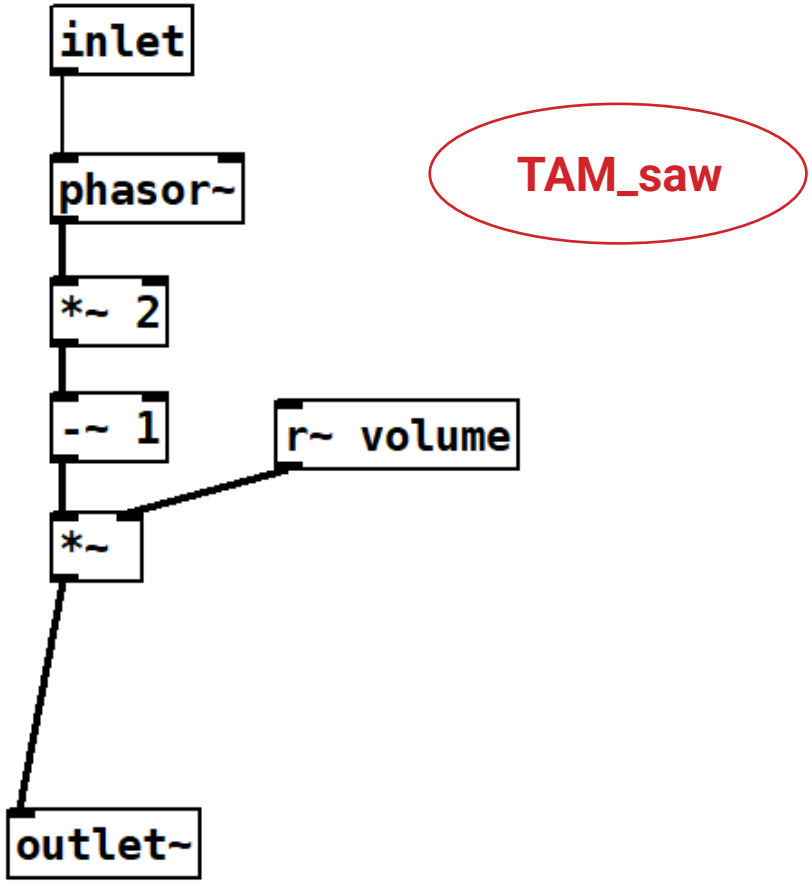
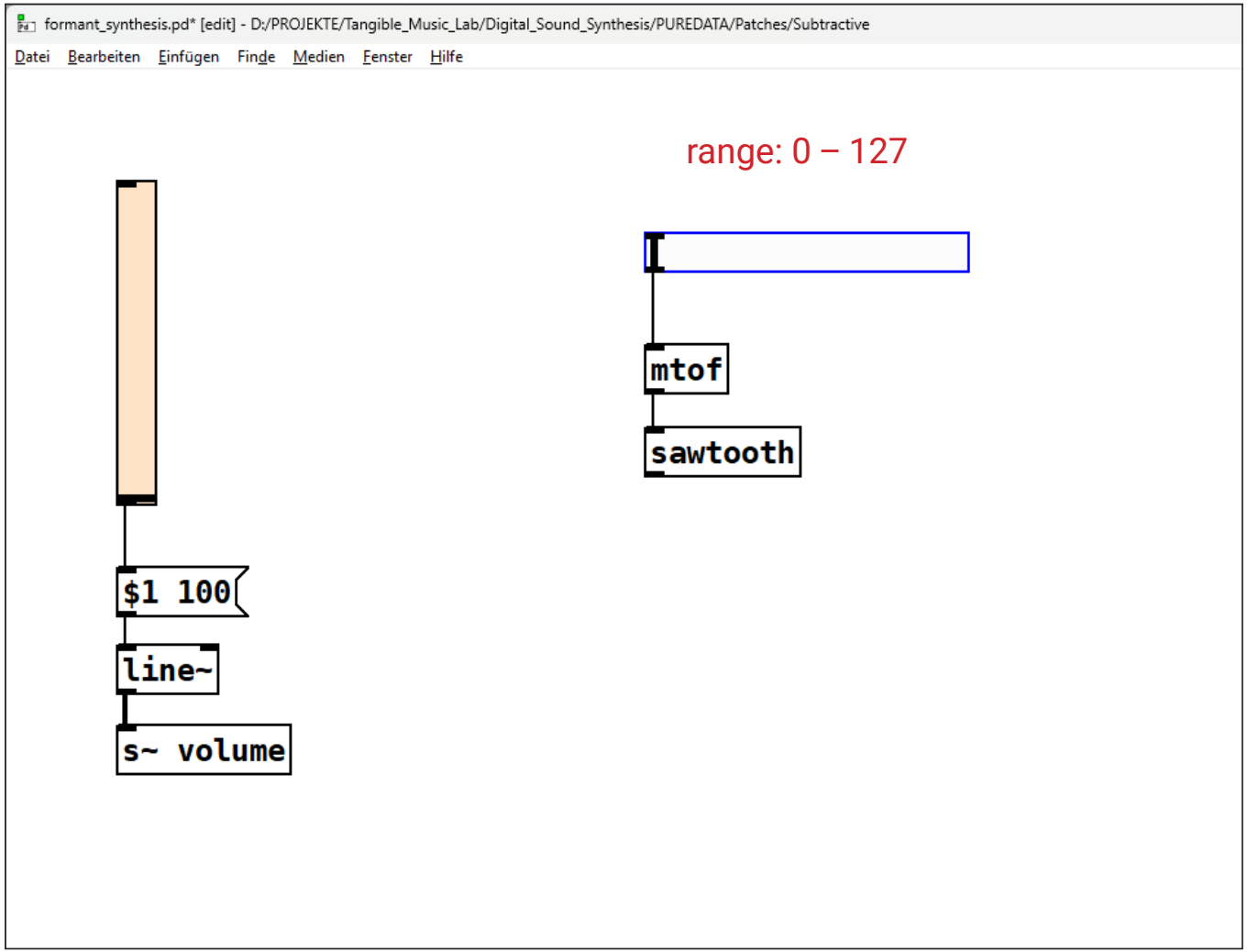
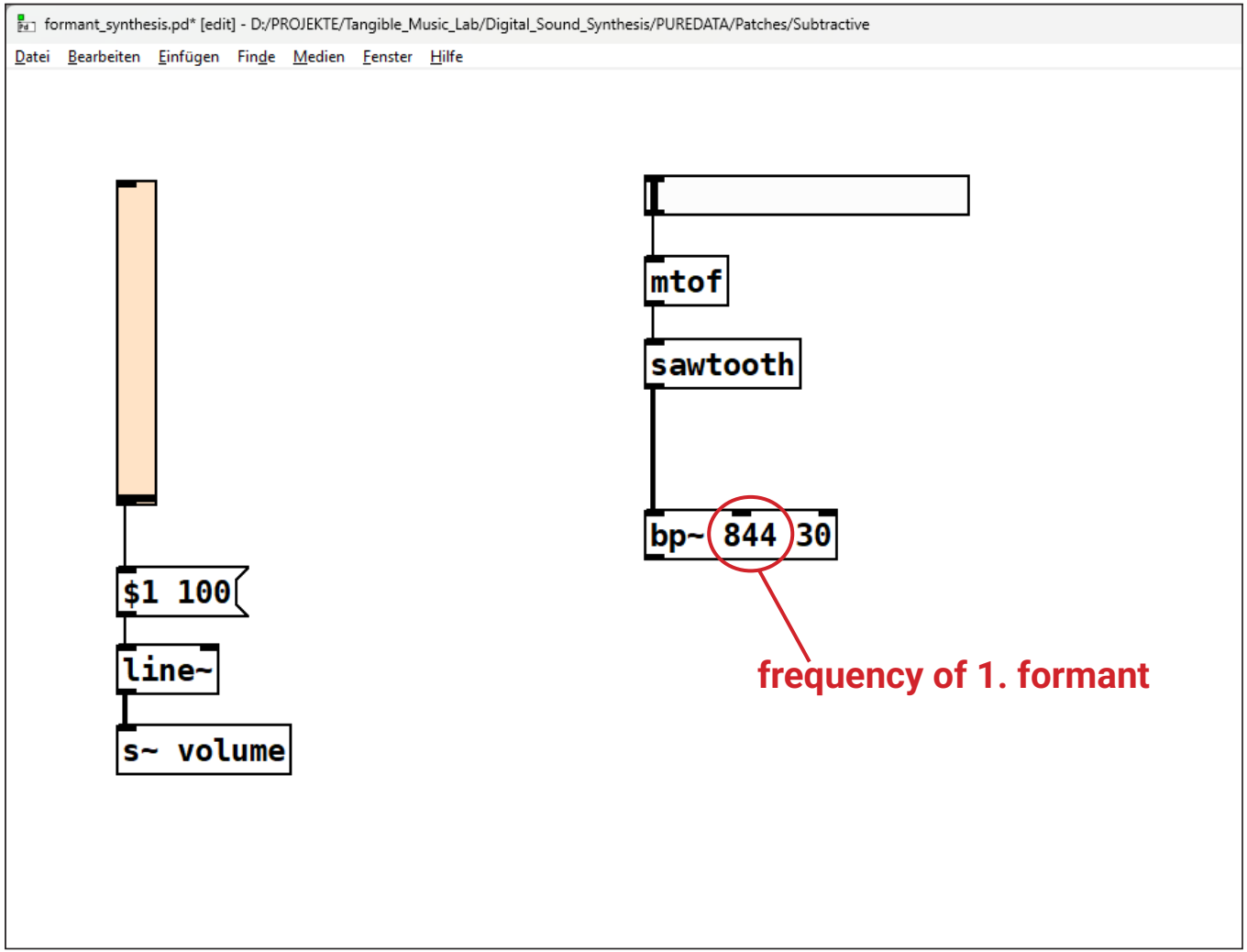
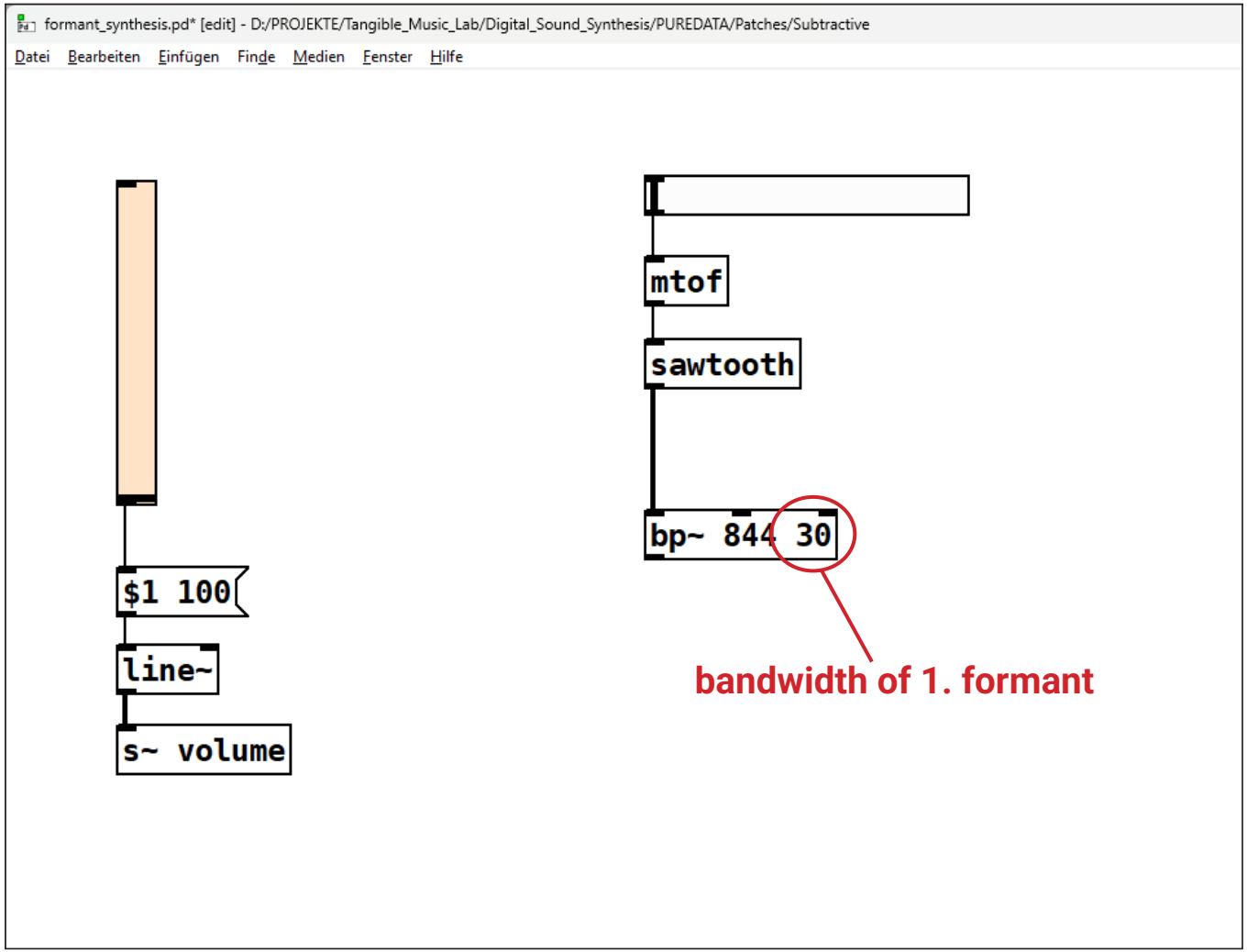
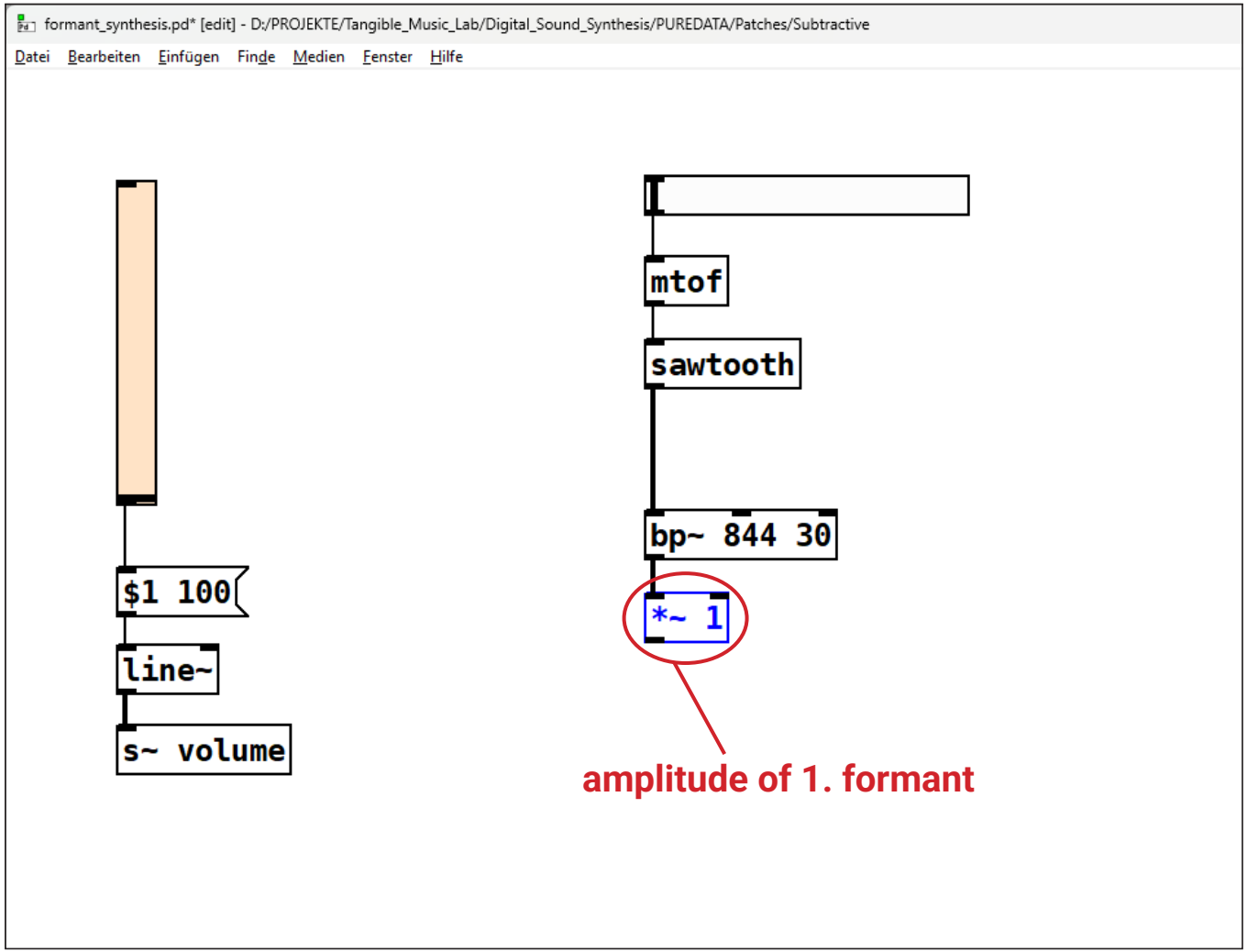
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
start with
TAM_Synth_Basic.pd
sawtooth
in your case:
TAM_saw
$1 100
line~
s~ volume

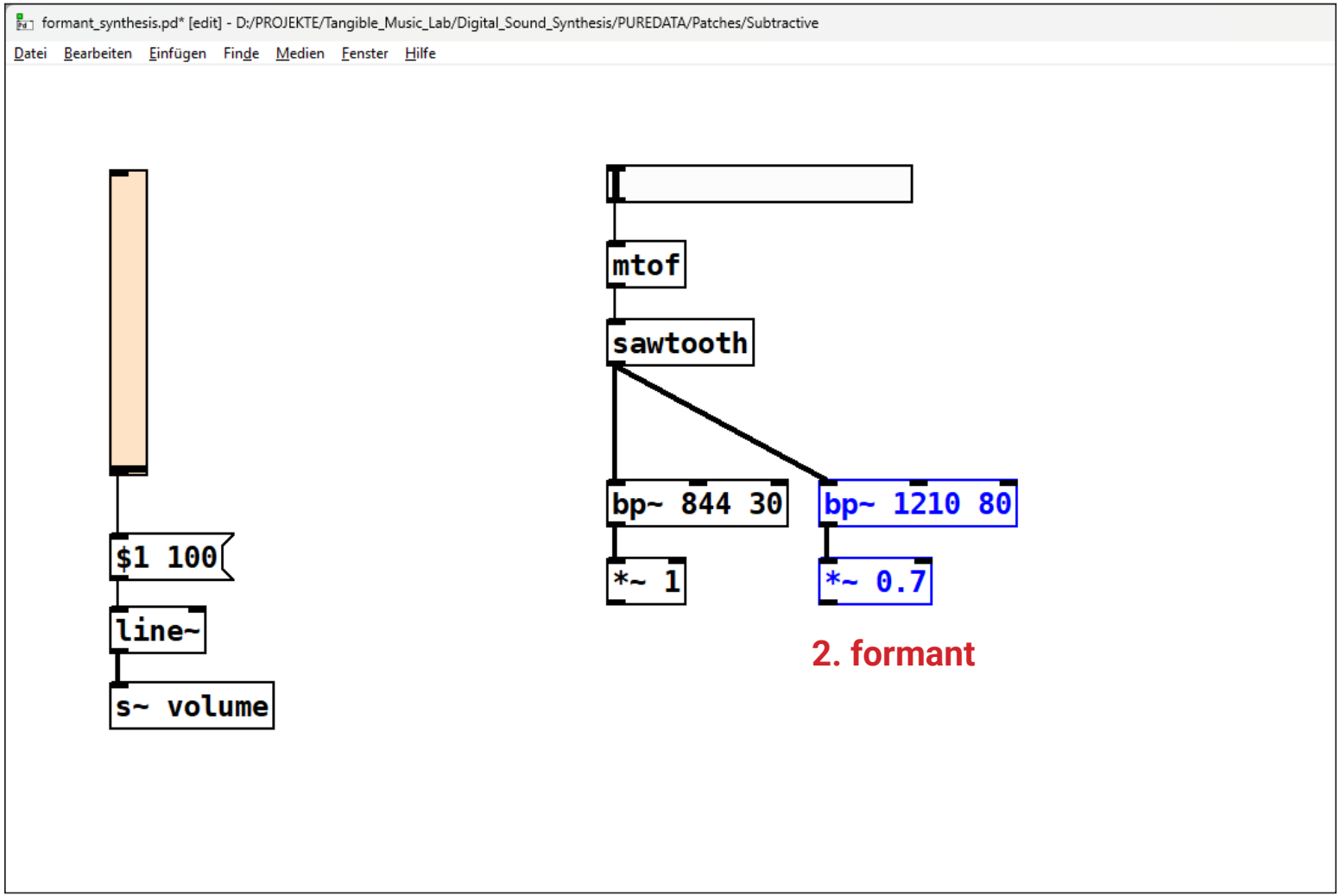

inlet
phasor~
*~ 2
-~ 1
r~ volume
*~
outlet~
TAM_saw


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
range: 0 – 127
mtof
sawtooth
$1 100
line~
s~ volume


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
bp~ 844 30
frequency of 1. formant


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
bp~ 844 30
bandwidth of 1. formant


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
bp~ 844 30
*~ 1
amplitude of 1. formant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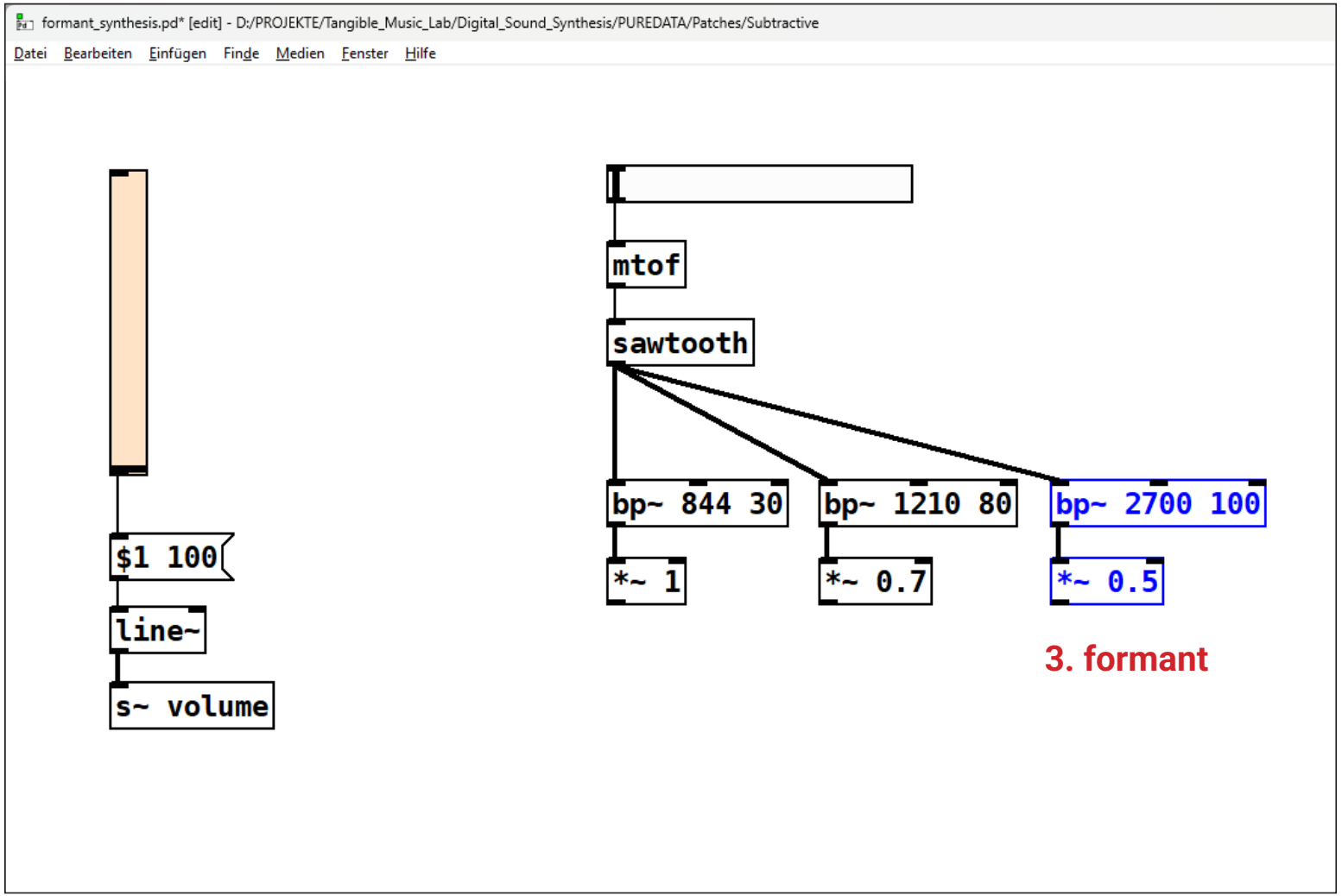
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
bp~ 844 30
bp~ 1210 80
*~ 1
*~ 0.7
2. formant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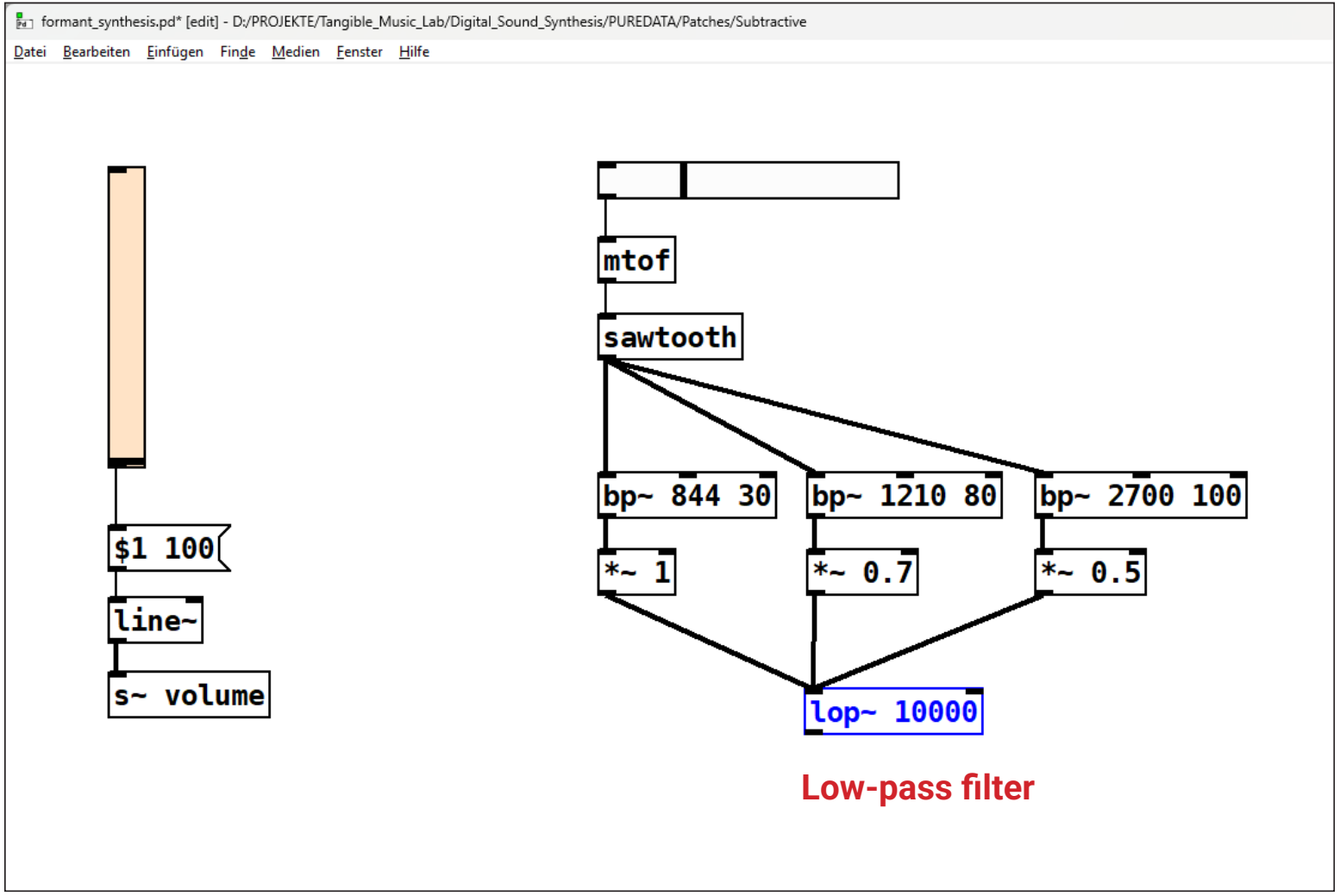
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~ 1
*~ 0.7
*~ 0.5
3. formant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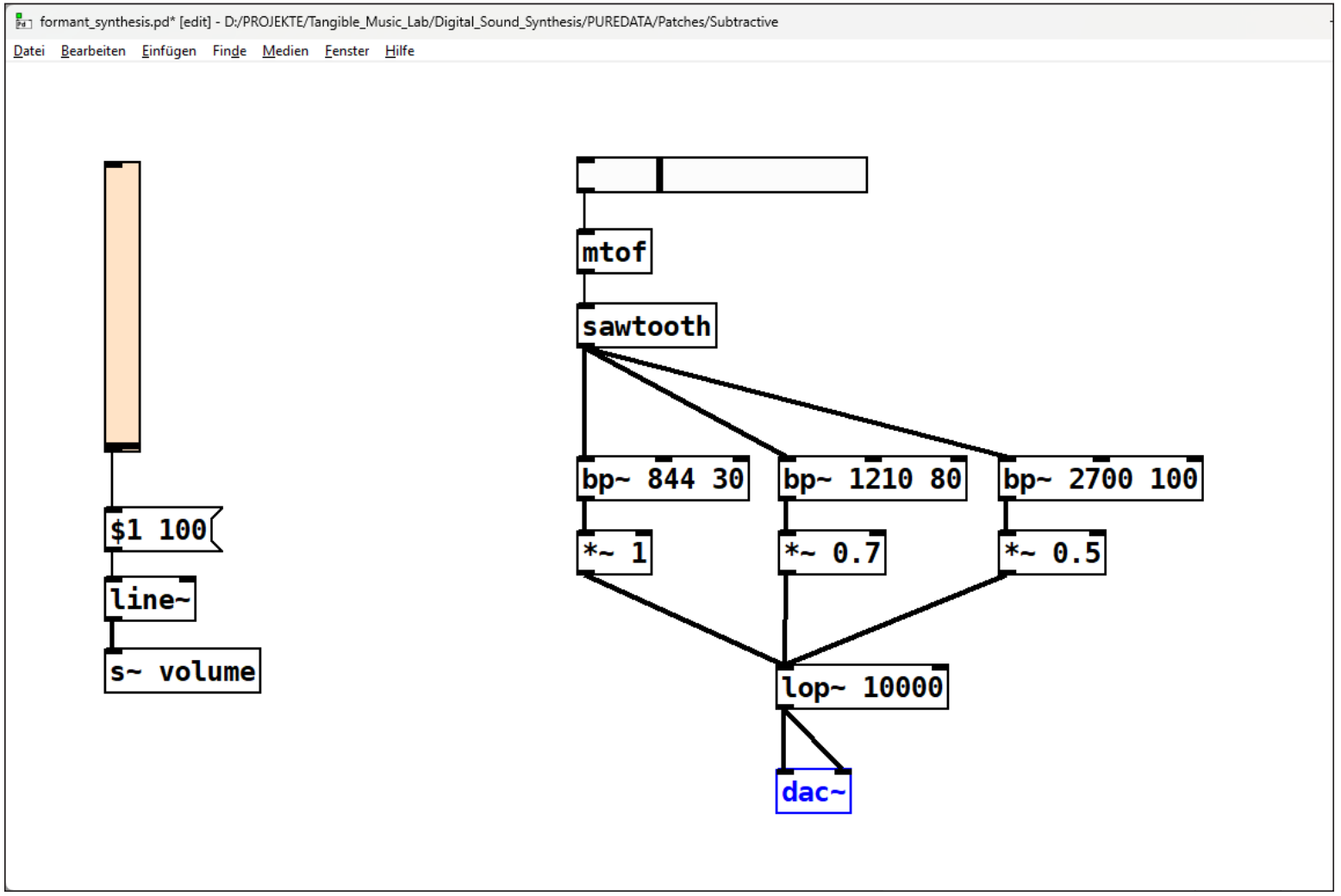
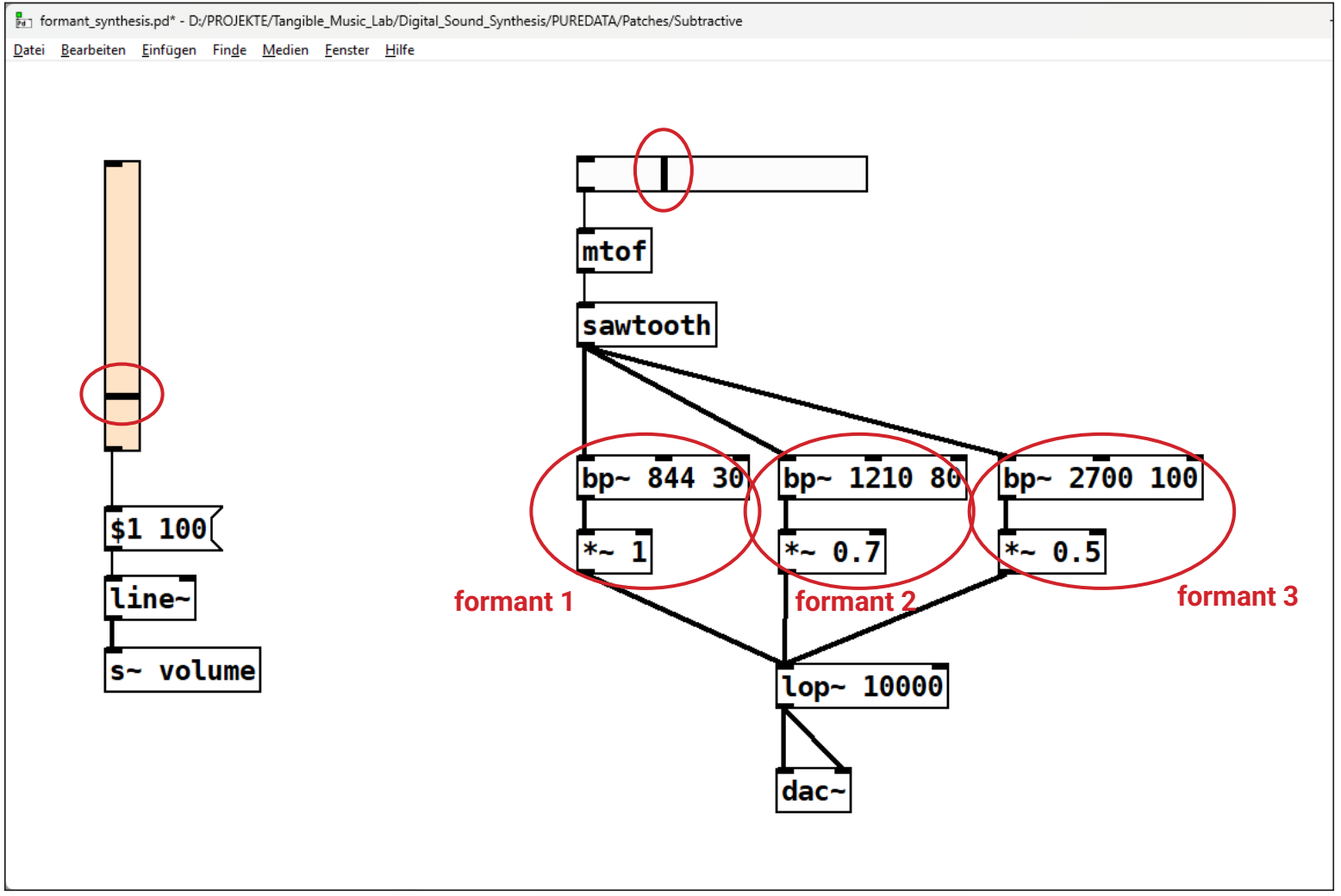
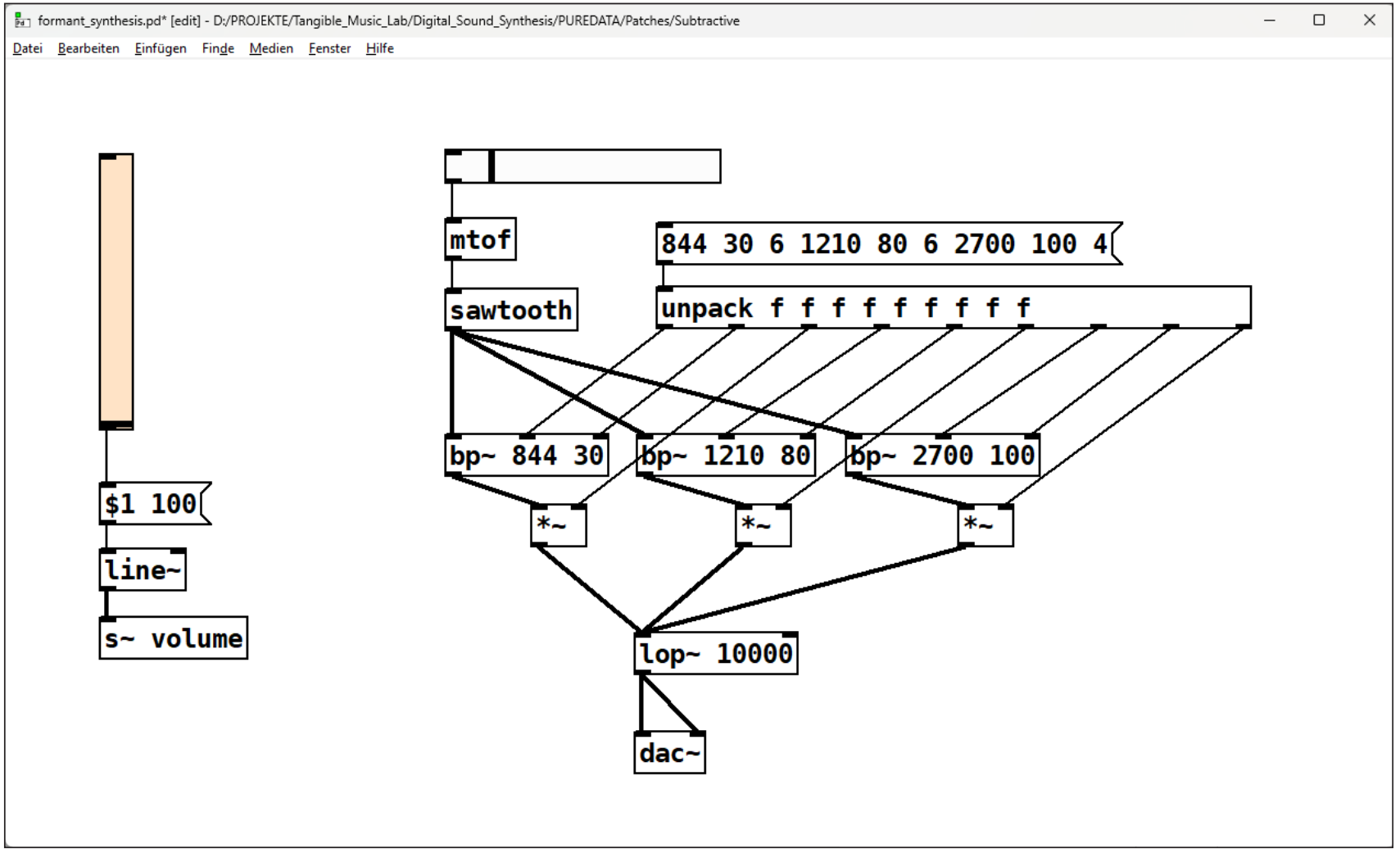
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~ 1
*~ 0.7
*~ 0.5
lop~ 10000
Low-pass filter


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~ 1
*~ 0.7
*~ 0.5
lop~ 10000
dac~


formant_synthesis.pd* - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~ 1
*~ 0.7
*~ 0.5
formant 1
formant 2
formant 3
lop~ 10000
dac~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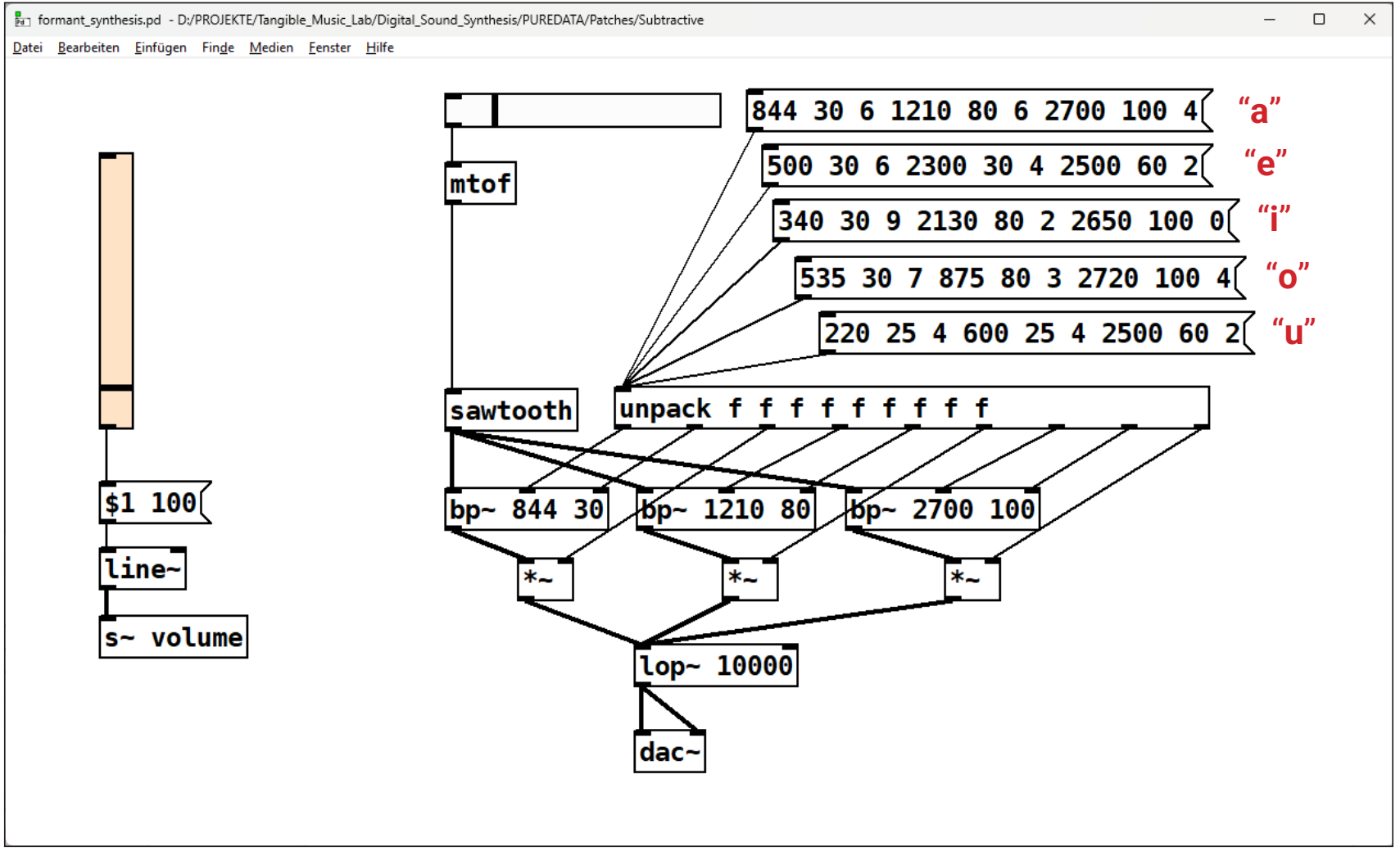
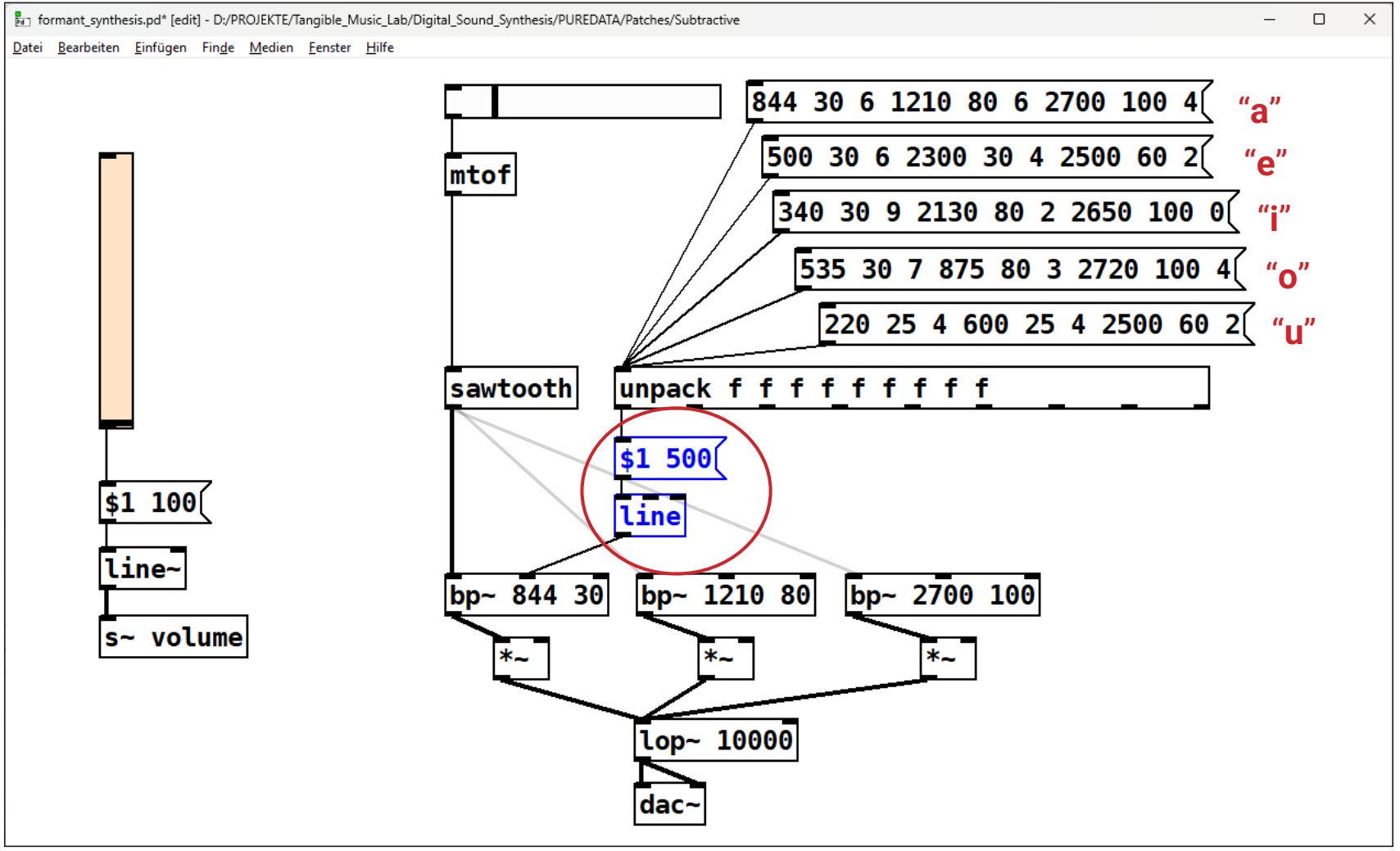
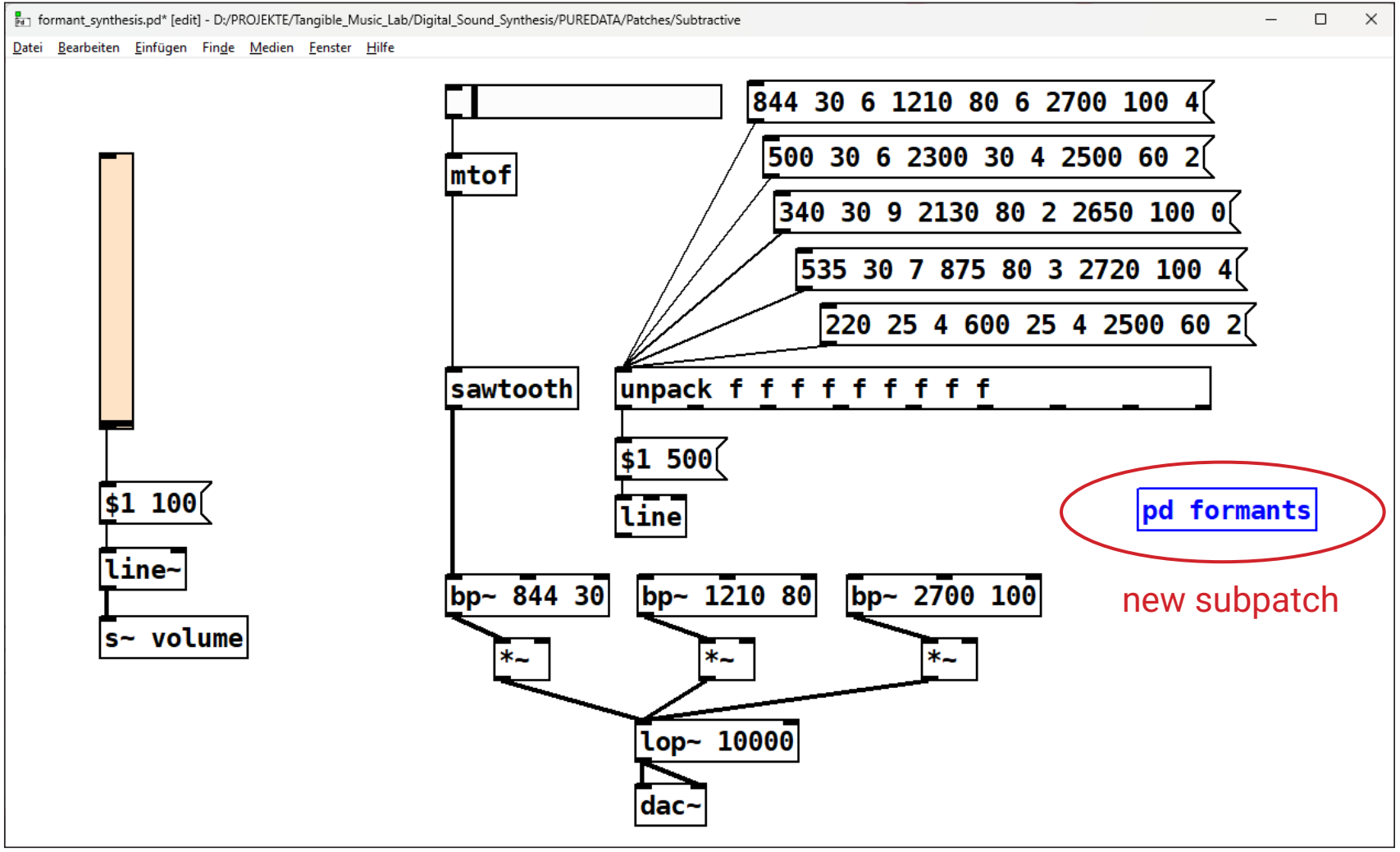
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
844 30 6 1210 80 6 2700 100 4
sawtooth
unpack f f f f f f f f f
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~
*~
*~
lop~ 10000
dac~


formant_synthesis.pd - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
844 30 6 1210 80 6 2700 100 4
"a"
500 30 6 2300 30 4 2500 60 2
"e"
340 30 9 2130 80 2 2650 100 0
"i"
535 30 7 875 80 3 2720 100 4
"o"
220 25 4 600 25 4 2500 60 2
"u"
mtof
sawtooth
unpack f f f f f f f f f
$1 100
line~
s~ volume
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~
*~
*~
lop~ 10000
dac~


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
844 30 6 1210 80 6 2700 100 4
"a"
500 30 6 2300 30 4 2500 60 2
"e"
340 30 9 2130 80 2 2650 100 0
"i"
535 30 7 875 80 3 2720 100 4
"o"
220 25 4 600 25 4 2500 60 2
"u"
sawtooth
unpack f f f f f f f f
$1 500
line
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~
*~
*~
lop~ 10000
dac~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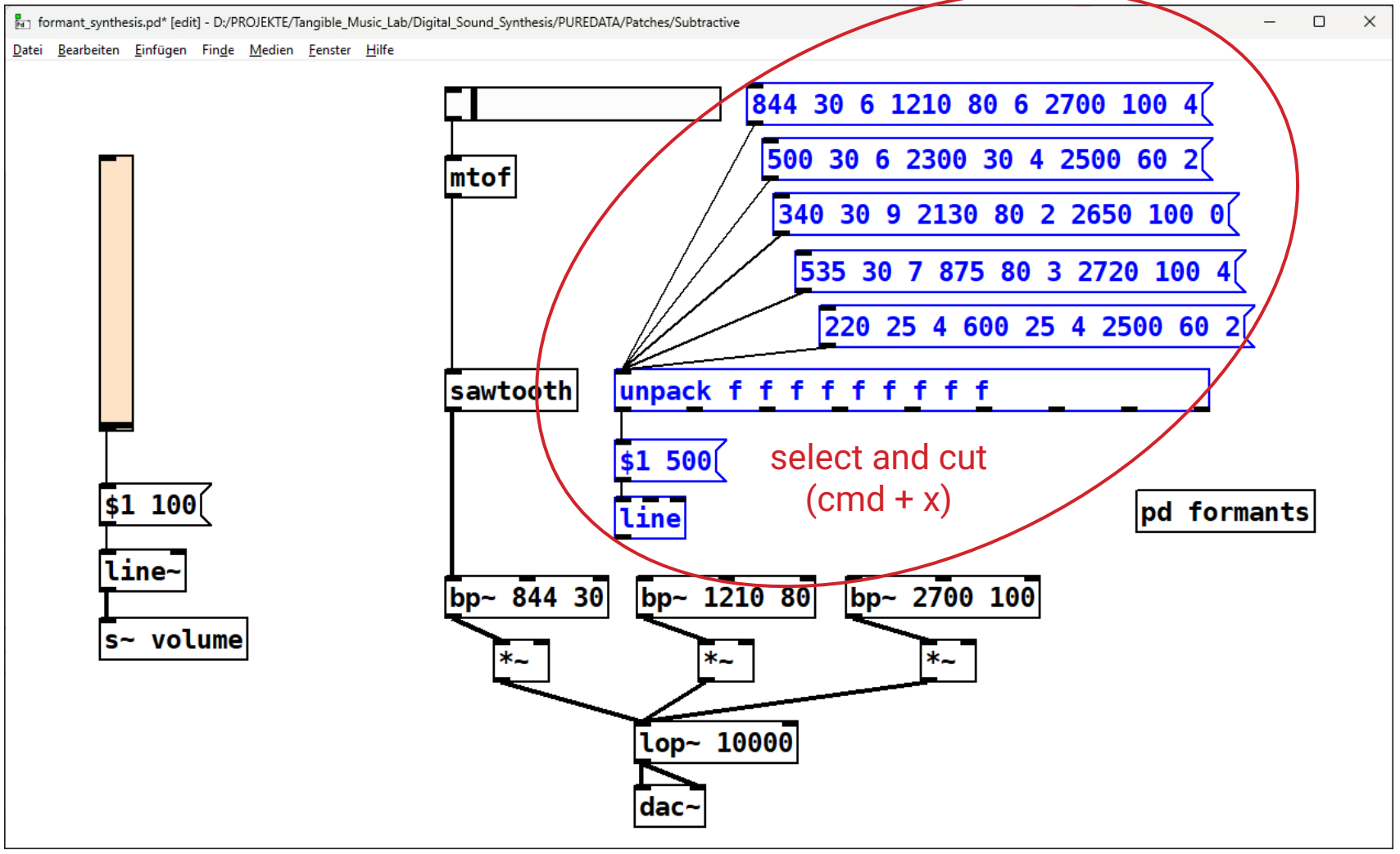
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
844 30 6 1210 80 6 2700 100 4
500 30 6 2300 30 4 2500 60 2
340 30 9 2130 80 2 2650 100 0
535 30 7 875 80 3 2720 100 4
220 25 4 600 25 4 2500 60 2
mtof
sawtooth
unpack f f f f f f f f
$1 500
line
$1 100
line~
s~ volume
pd formants
new subpatch
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~
*~
*~
lop~ 10000
dac~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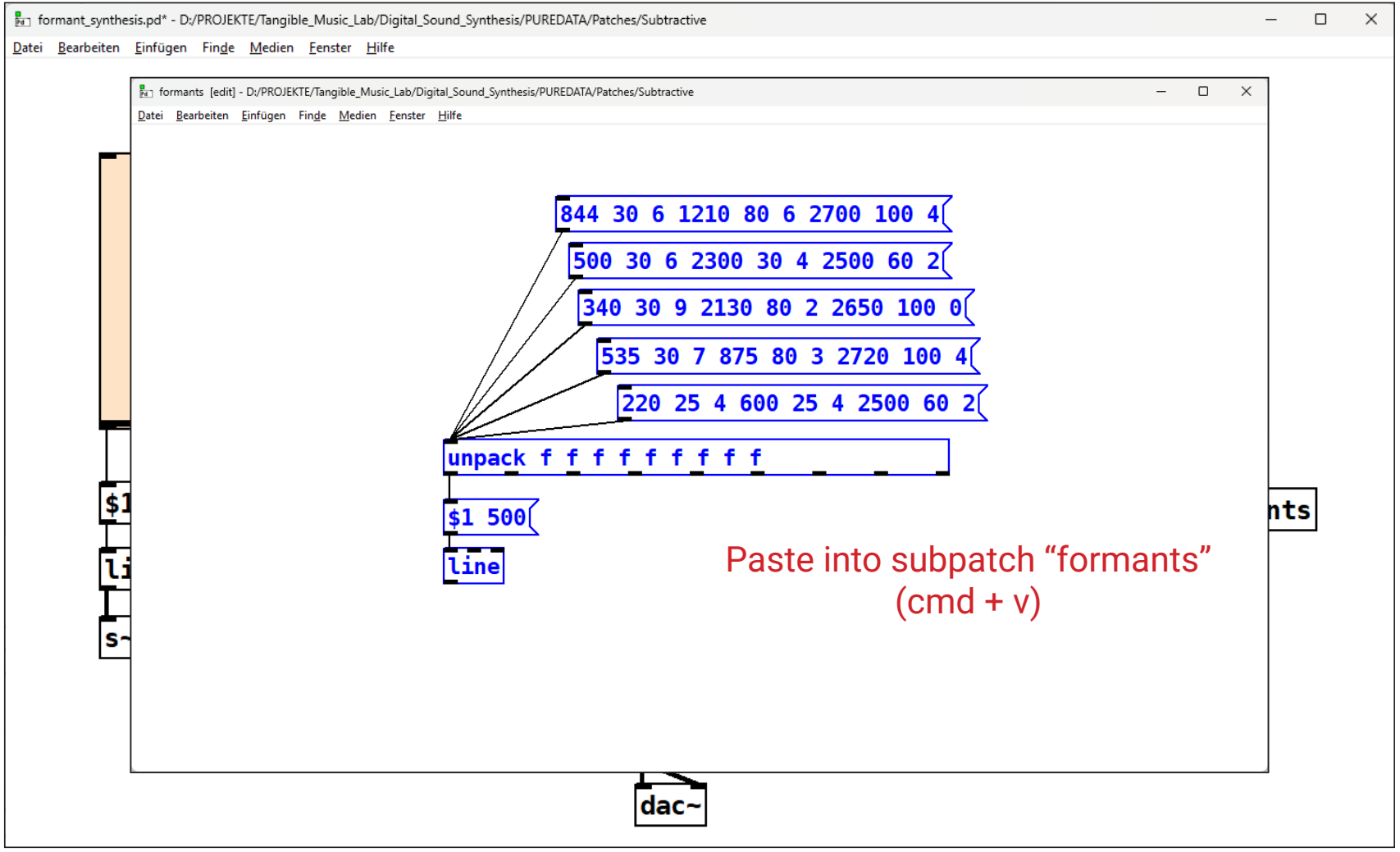
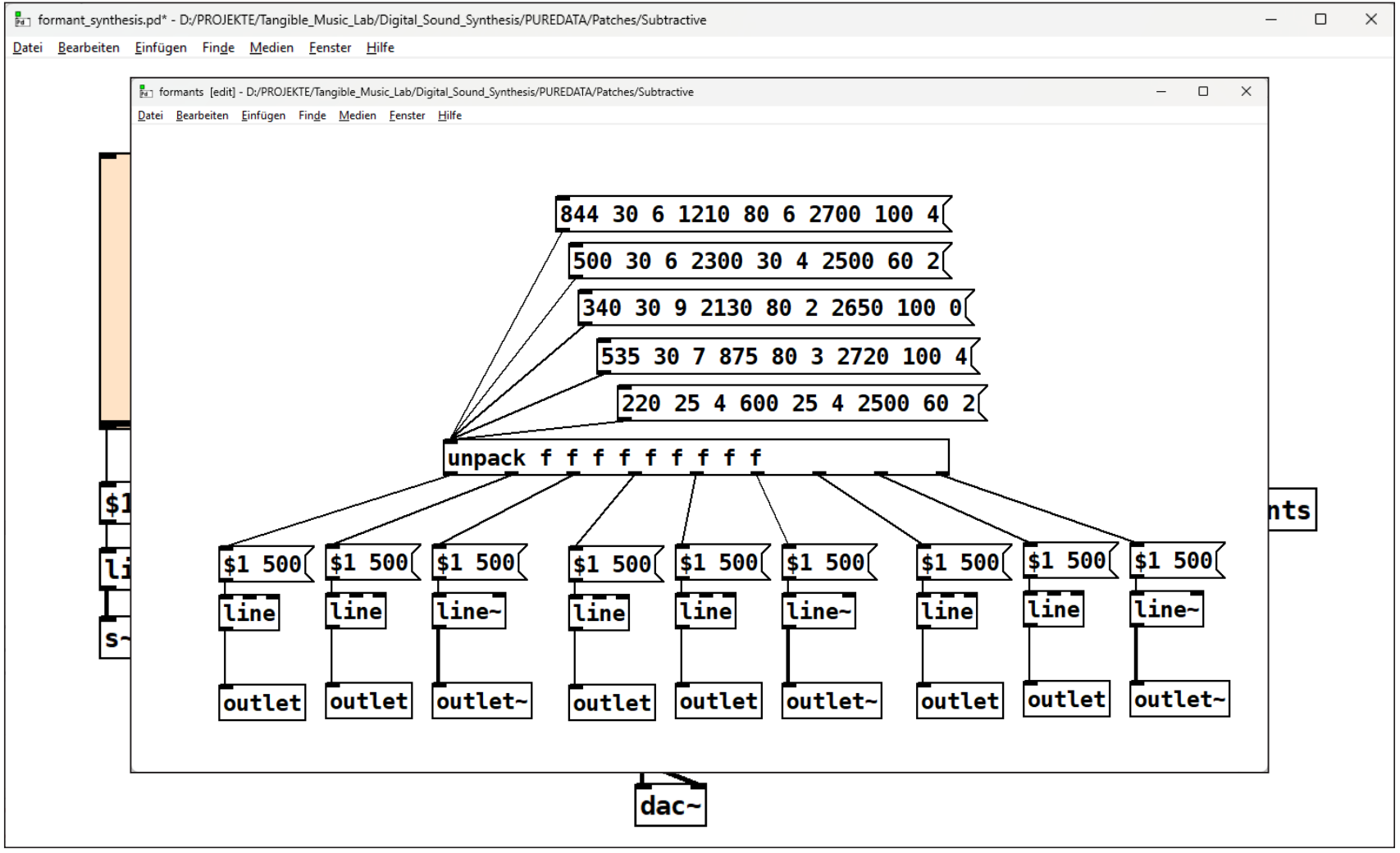
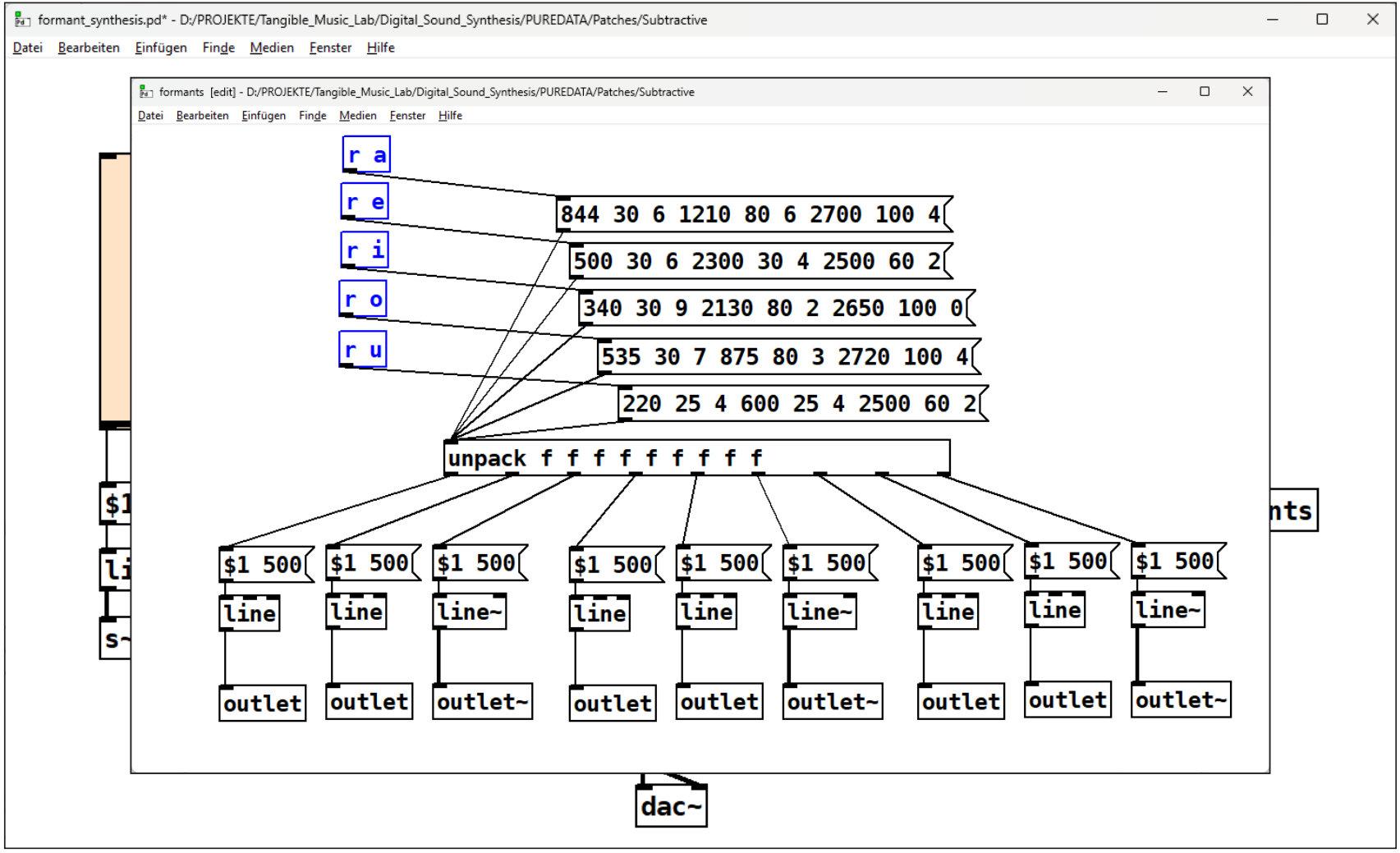
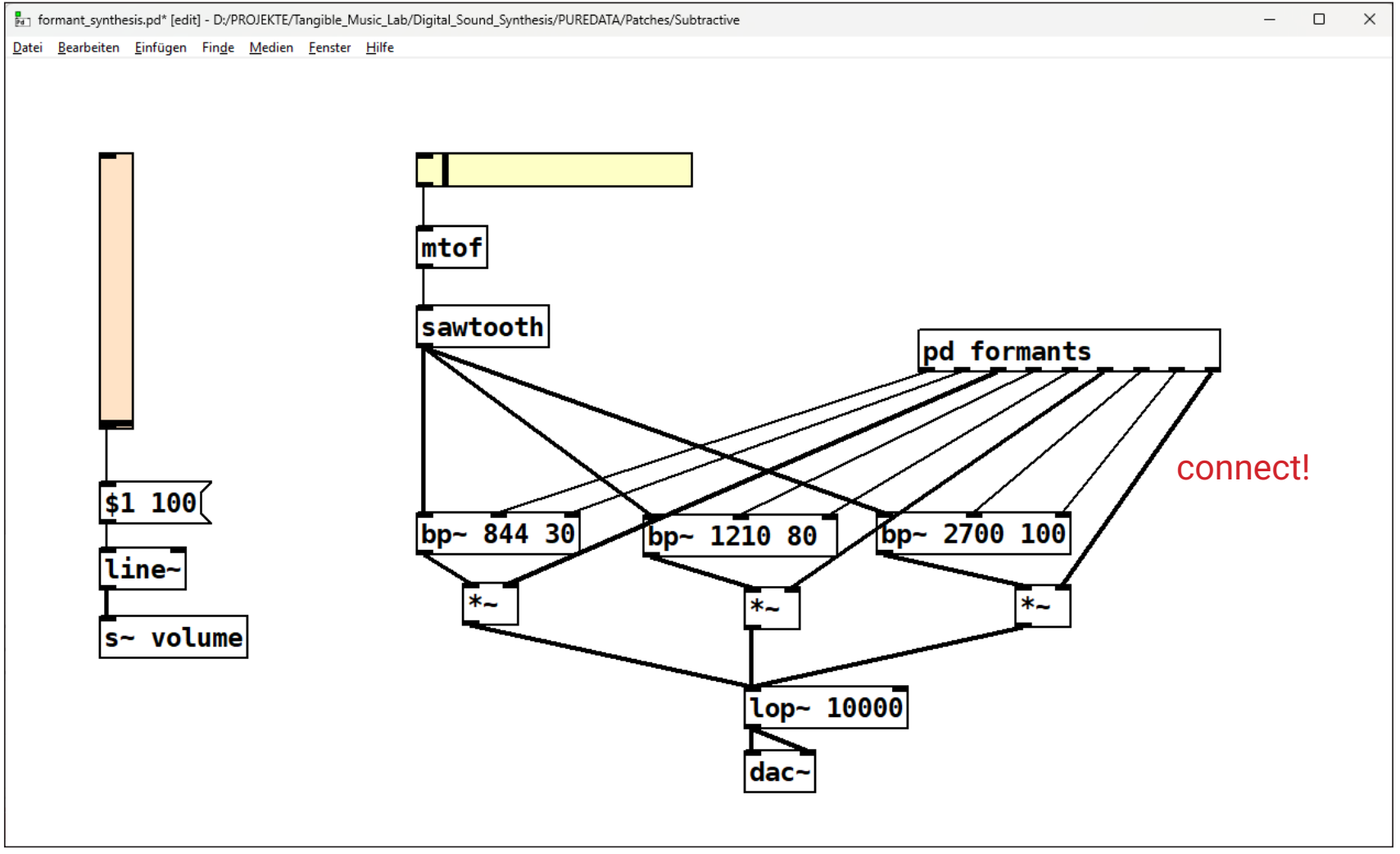
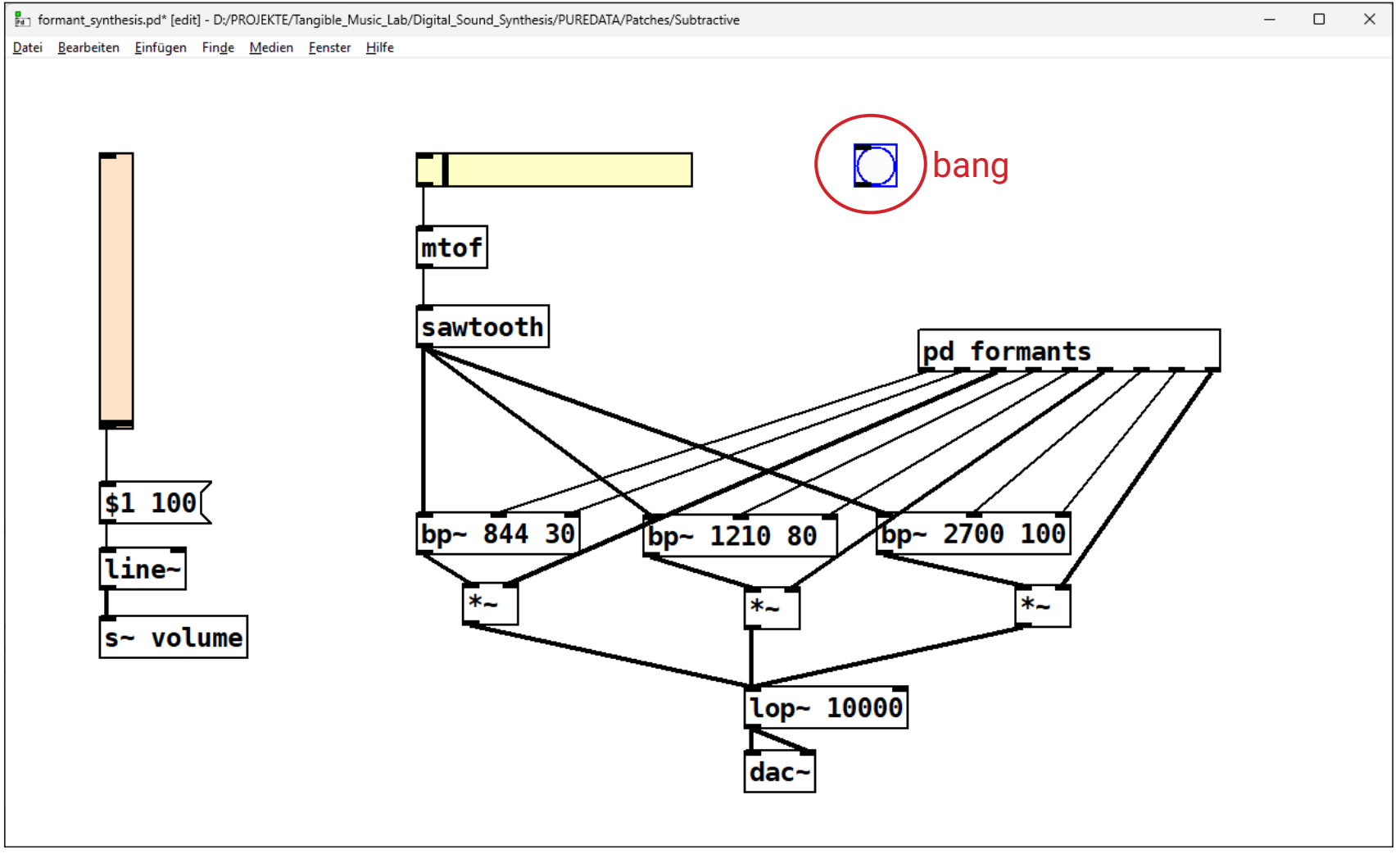
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
844 30 6 1210 80 6 2700 100 4
500 30 6 2300 30 4 2500 60 2
340 30 9 2130 80 2 2650 100 0
535 30 7 875 80 3 2720 100 4
220 25 4 600 25 4 2500 60 2
mtof
sawtooth
unpack f f f f f f f f
$1 500
line
select and cut
(cmd + x)
pd formants
$1 100
line~
s~ volume
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~
*~
*~
lop~ 10000
dac~

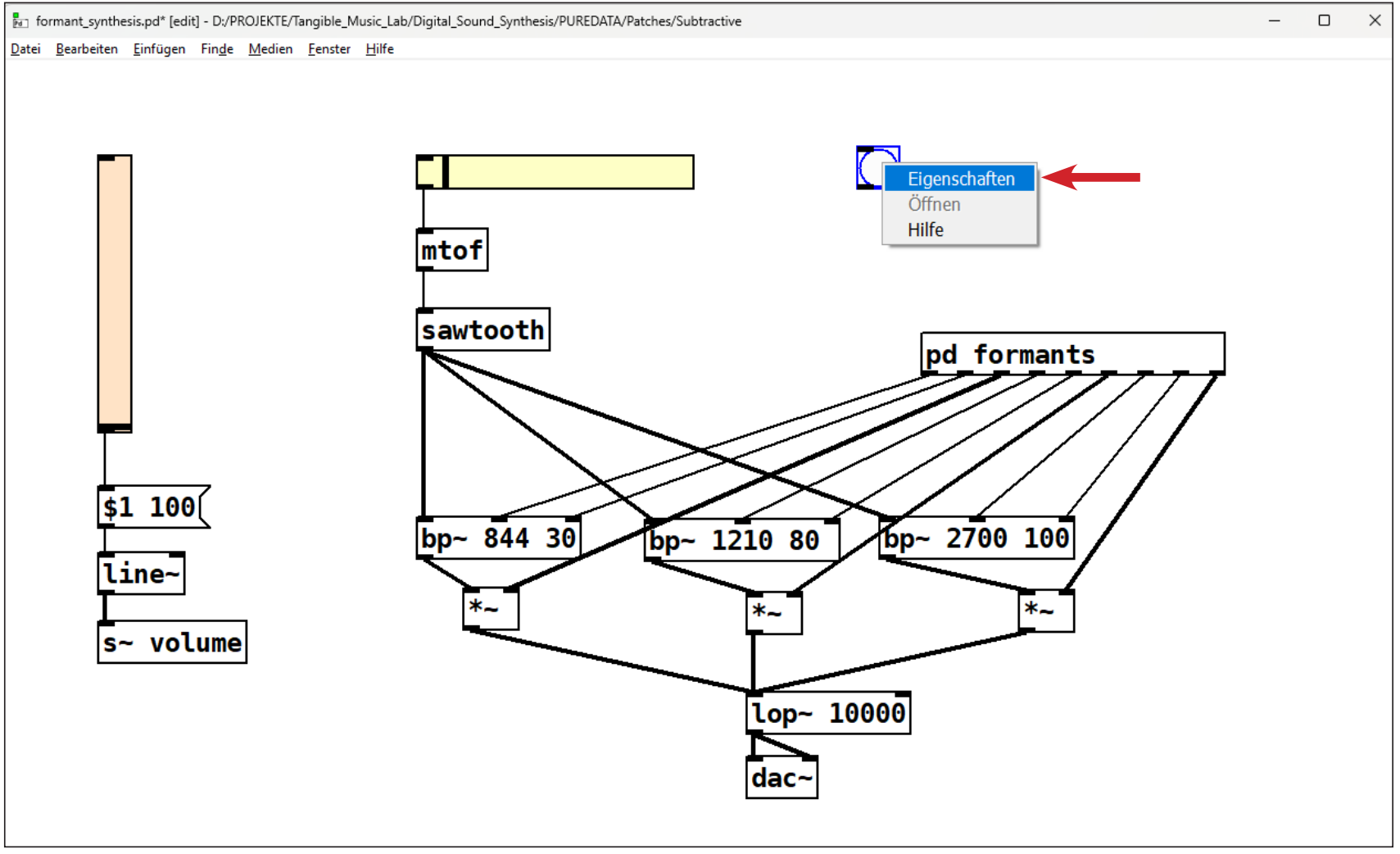

formant_synthesis.pd* - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
formants [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
844 30 6 1210 80 6 2700 100 4
500 30 6 2300 30 4 2500 60 2
340 30 9 2130 80 2 2650 100 0
535 30 7 875 80 3 2720 100 4
220 25 4 600 25 4 2500 60 2
unpack f f f f f f f f f
$1 500
line
Paste into subpatch “formants”
(cmd + v)
dac~

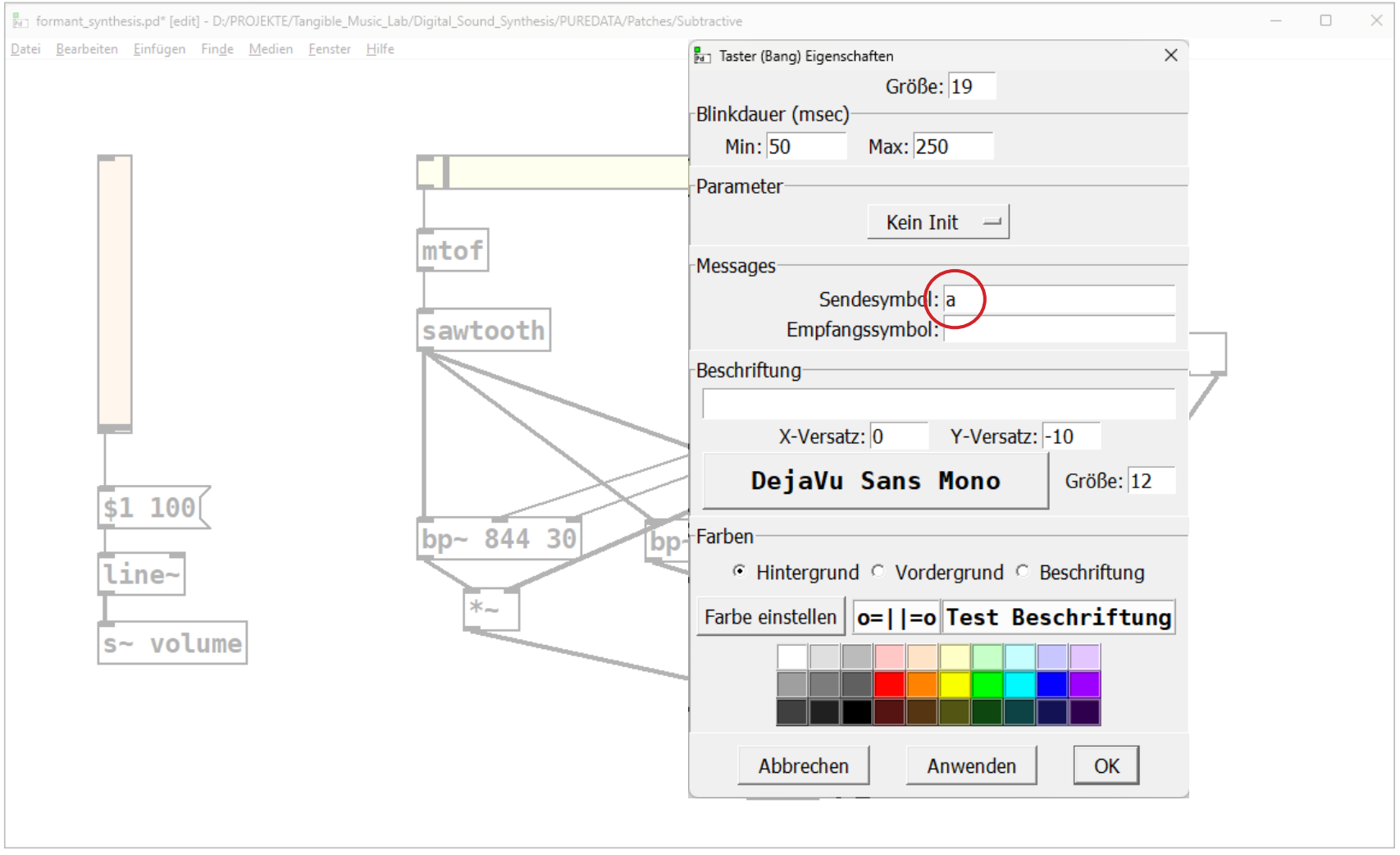

formant_synthesis.pd* - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
formants [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
844 30 6 1210 80 6 2700 100 4
500 30 6 2300 30 4 2500 60 2
340 30 9 2130 80 2 2650 100 0
535 30 7 875 80 3 2720 100 4
220 25 4 600 25 4 2500 60 2
unpack f f f f f f f f f
$1 500
line
line~
outlet
outlet~
dac~

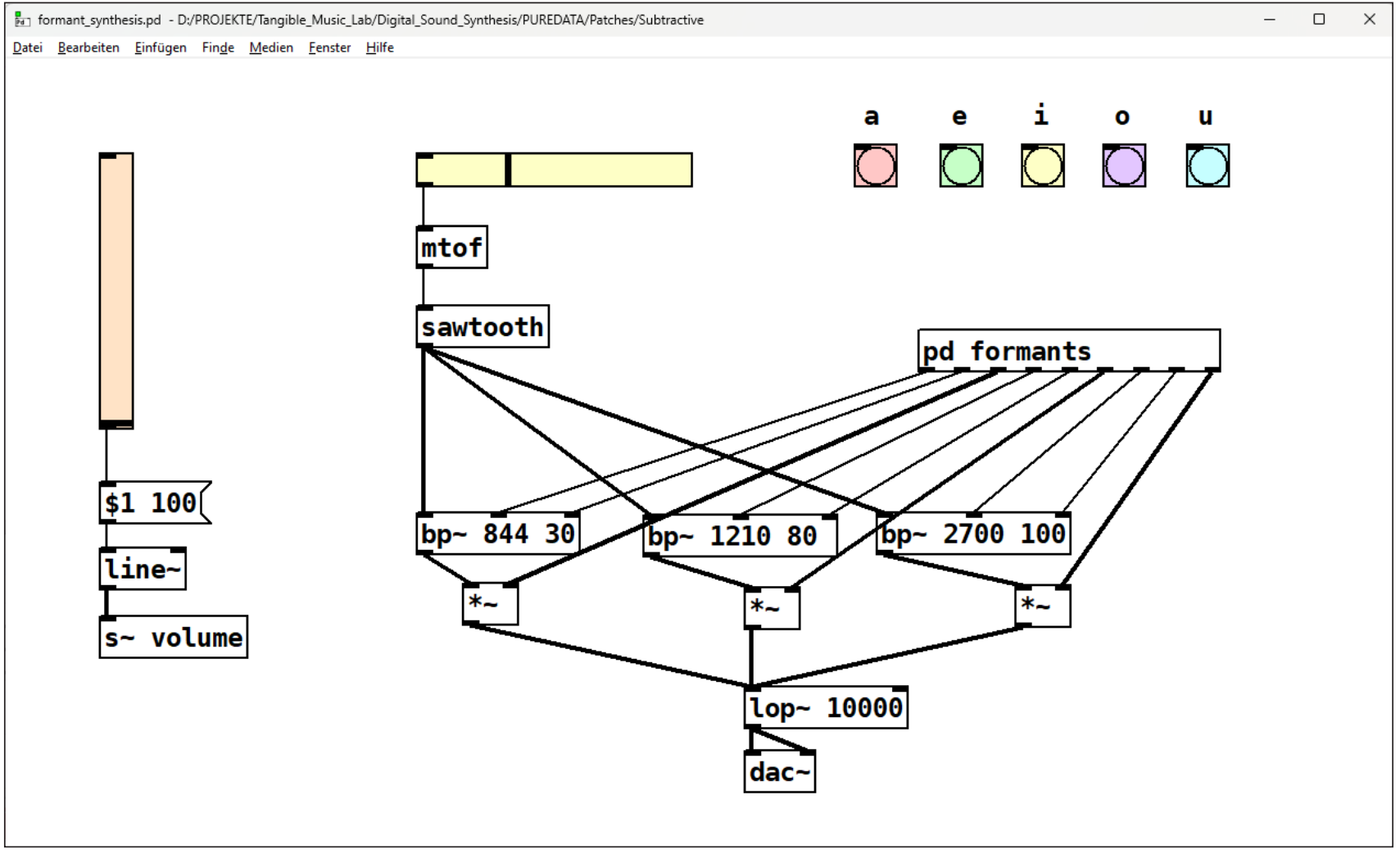

formant_synthesis.pd* - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
formants [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
r a
r e
r i
r o
r u
844 30 6 1210 80 6 2700 100 4
500 30 6 2300 30 4 2500 60 2
340 30 9 2130 80 2 2650 100 0
535 30 7 875 80 3 2720 100 4
220 25 4 600 25 4 2500 60 2
unpack f f f f f f f f f
$1 500
line
line~
outlet
outlet~
dac~


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
$1 100
line~
s~ volume
mtof
sawtooth
pd formants
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~
*~
*~
lop~ 10000
dac~
connect!


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
bang
mtof
sawtooth
pd formants
$1 100
line~
s~ volume
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~
*~
*~
lop~ 10000
dac~


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
Eigenschaften
Öffnen
Hilfe
mtof
sawtooth
pd formants
$1 100
line~
s~ volume
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
*~
*~
*~
lop~ 10000
dac~


formant_synthesis.pd* [edit] - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
mtof
sawtooth
$1 100
line~
s~ volume
bp~ 844 30
*~
Taster (Bang) Eigenschaften
Größe: 19
Blinkdauer (msec)
Min: 50
Max: 250
Parameter
Kein Init
Messages
Sendesymbol: a
Empfangssymbol:
Beschriftung
X-Versatz: 0
Y-Versatz: -10
DejaVu Sans Mono
Größe: 12
Farben
Hintergrund
Vordergrund
Beschriftung
Farbe einstellen
o=||=o Test Beschriftung
Abbrechen
Anwenden
OK


formant_synthesis.pd - D:/PROJEKTE/Tangible_Music_Lab/Digital_Sound_Synthesis/PUREDATA/Patches/Subtractive
Datei Bearbeiten Einfügen Finde Medien Fenster Hilfe
a e i o u
mtof
sawtooth
pd formants
$1 100
line~
s~ volume
bp~ 844 30
bp~ 1210 80
bp~ 2700 100
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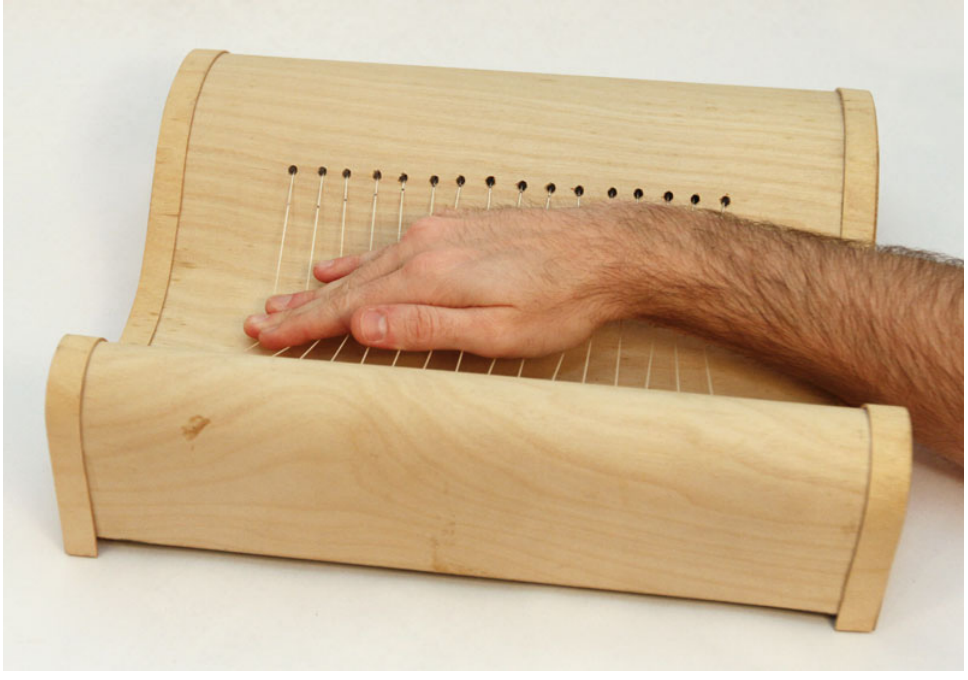
lop~ 10000
dac~

CANTOR DIGITALIS

https://www.lam.jussieu.fr/cantordigitalis/

GESTURAL SPEECH SYNTH

Matt Gilbert