Software 2 WS 2016 #7

Chikashi Miyama

Waveform Segment Techniques

# Waveform Segment Techniques

✤ Waveform segment techniques?

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Waveform segment techniques constitute a collection of methods for building up sounds from individual samples and wave fragments that are linked together to create larger waveforms, sections, and entire pieces.

Waveform Segment Techniques

✤ Waveform segment techniques?
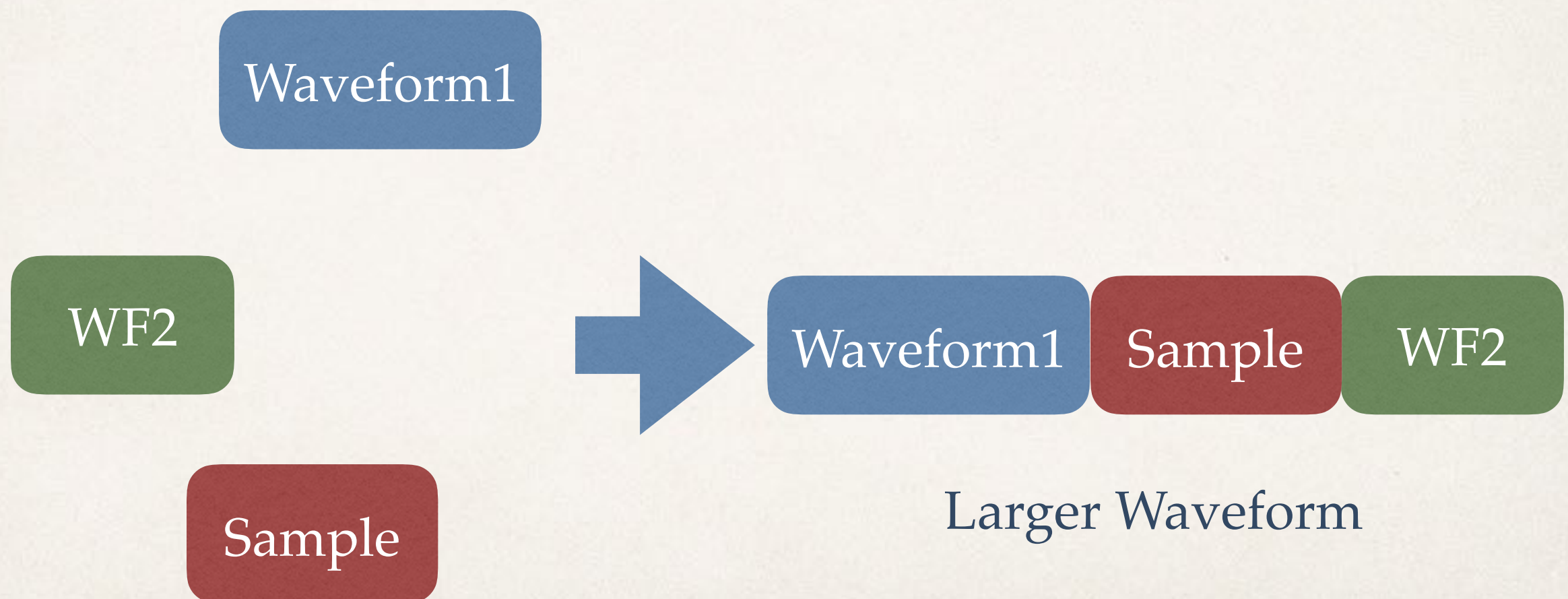
Vier Techniken

* (   )

* (   )

* (   )

* (   )

Vier Techniken

✤ (Waveform Interpolation)

✤ (SAWDUST)

✤ (SSP)

✤ (Instruction Synthesis)
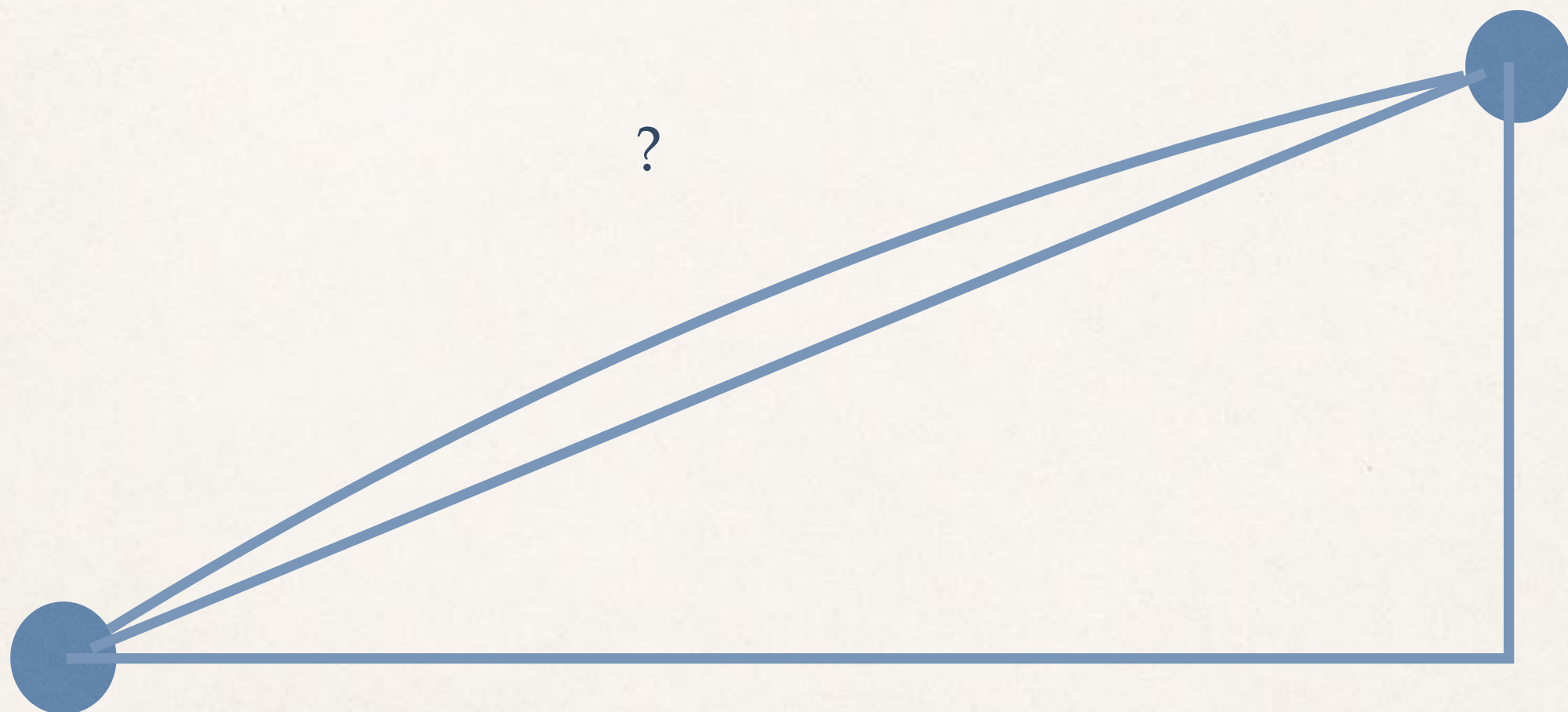
Waveform Interpolation

Interpolation

* Definition?

Interpolation

✤ Definition?

der Begriff **Interpolation** bezeichnet eine Klasse von Problemen und Verfahren. Zu gegebenen diskreten Daten soll eine stetige Funktion gefunden werden, die diese Daten abbildet. Man sagt dann, die Funktion *interpoliert* die Daten.

Interpolation

?

Waveform interpolation

* Interpolation Typen

    * (   )

    * (   )

    * (   )

    * (   )

    * (   )

    * (   )

Waveform interpolation

✤ Interpolation Typen

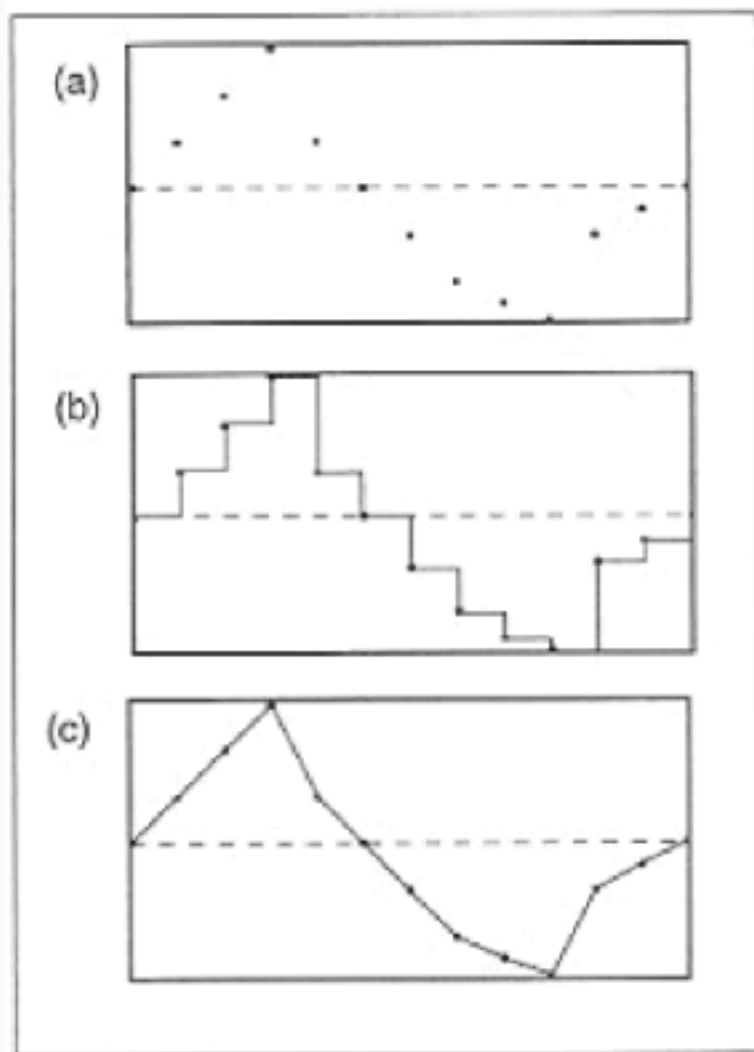   ✤ constant

   ✤ linear

   ✤ exponential

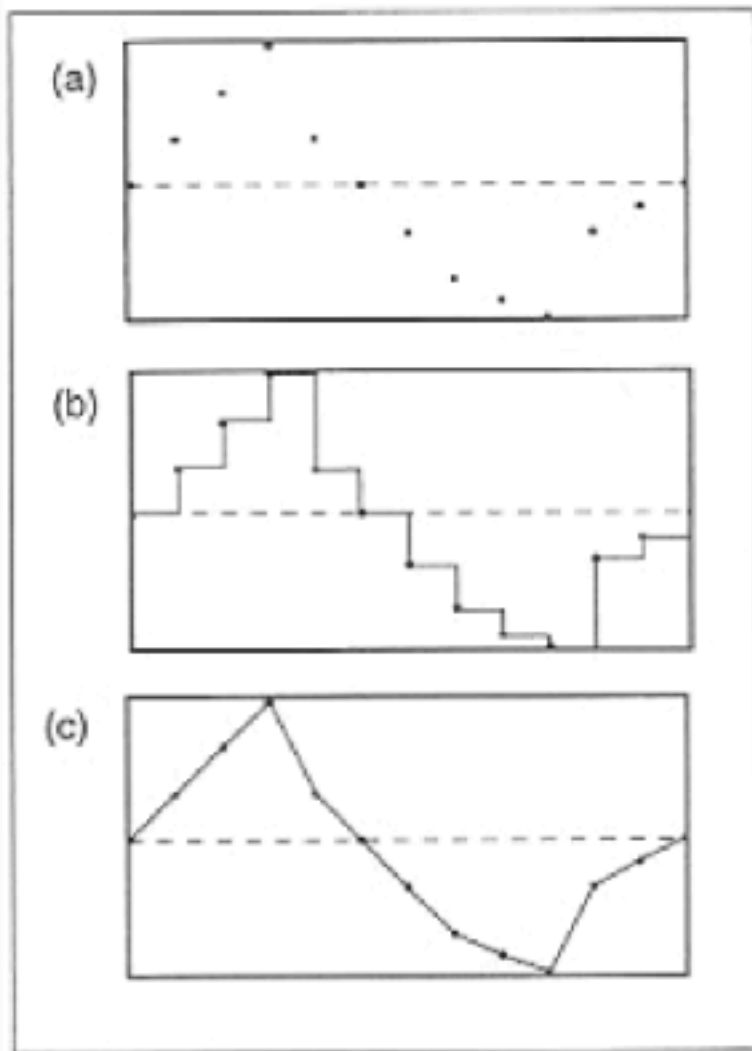   ✤ logarithmic

   ✤ half-cosine

   ✤ polynominal

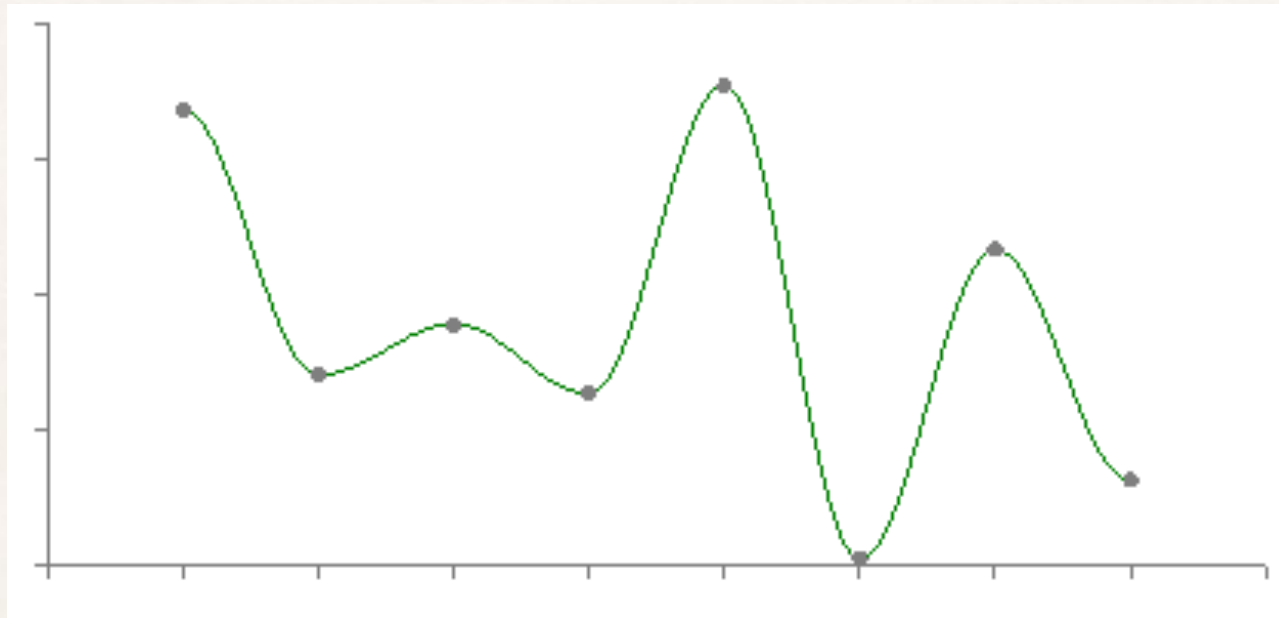# Waveform interpolation

( )

( )

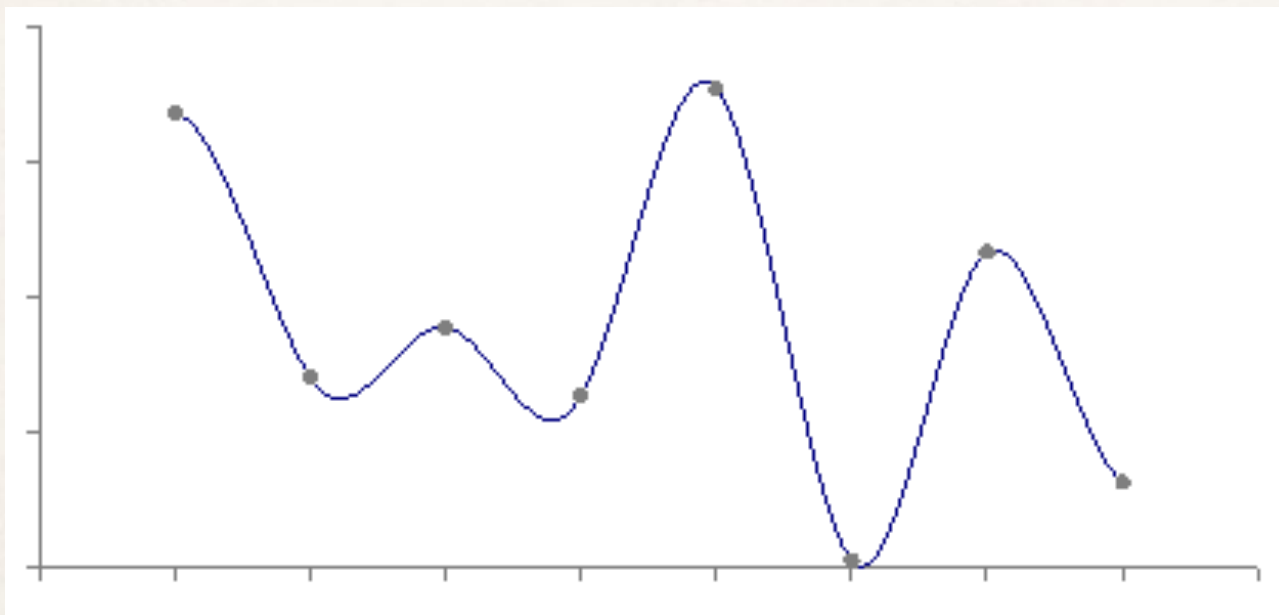# Waveform interpolation

(Constant)

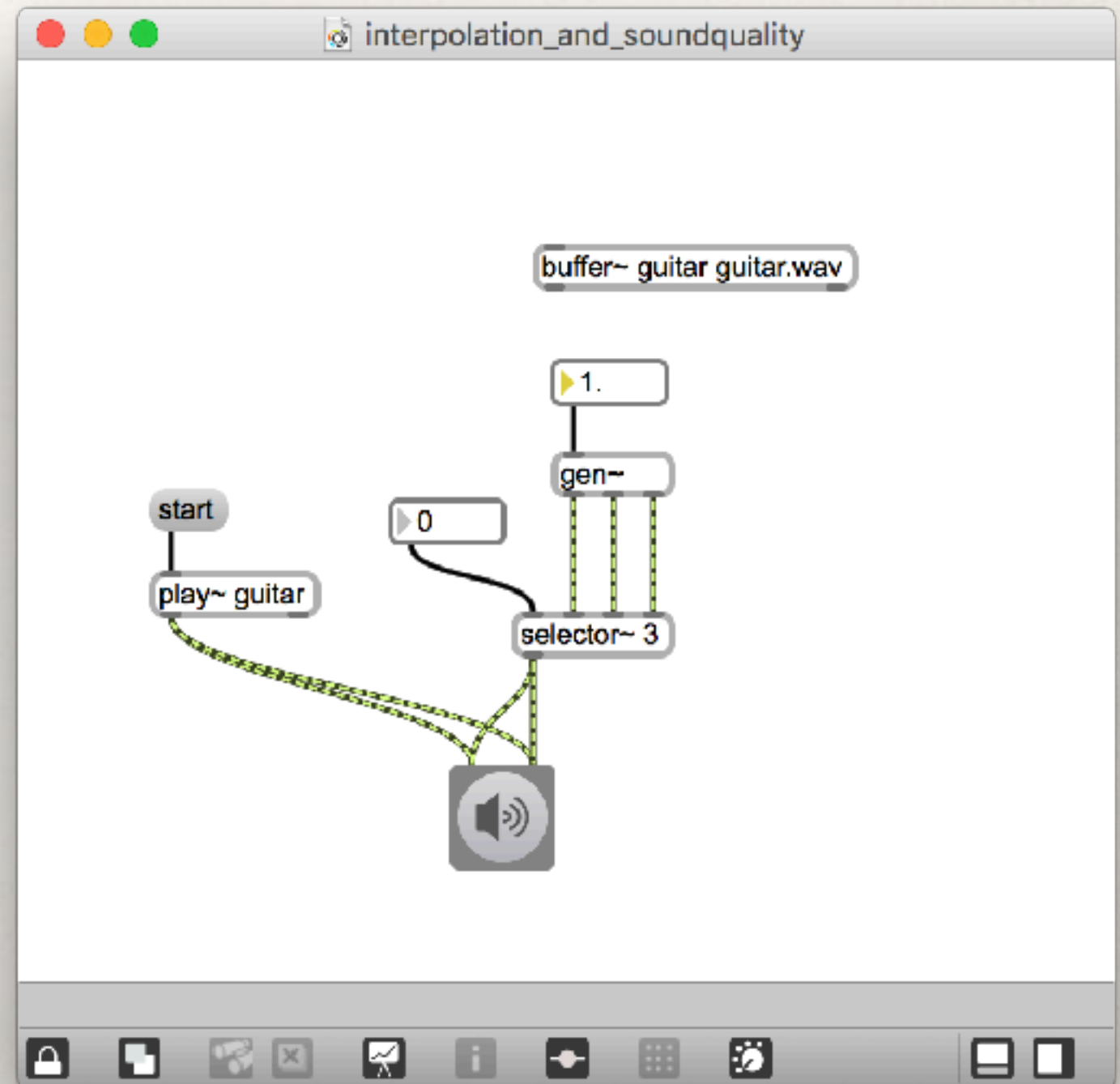(Linear)

Waveform interpolation
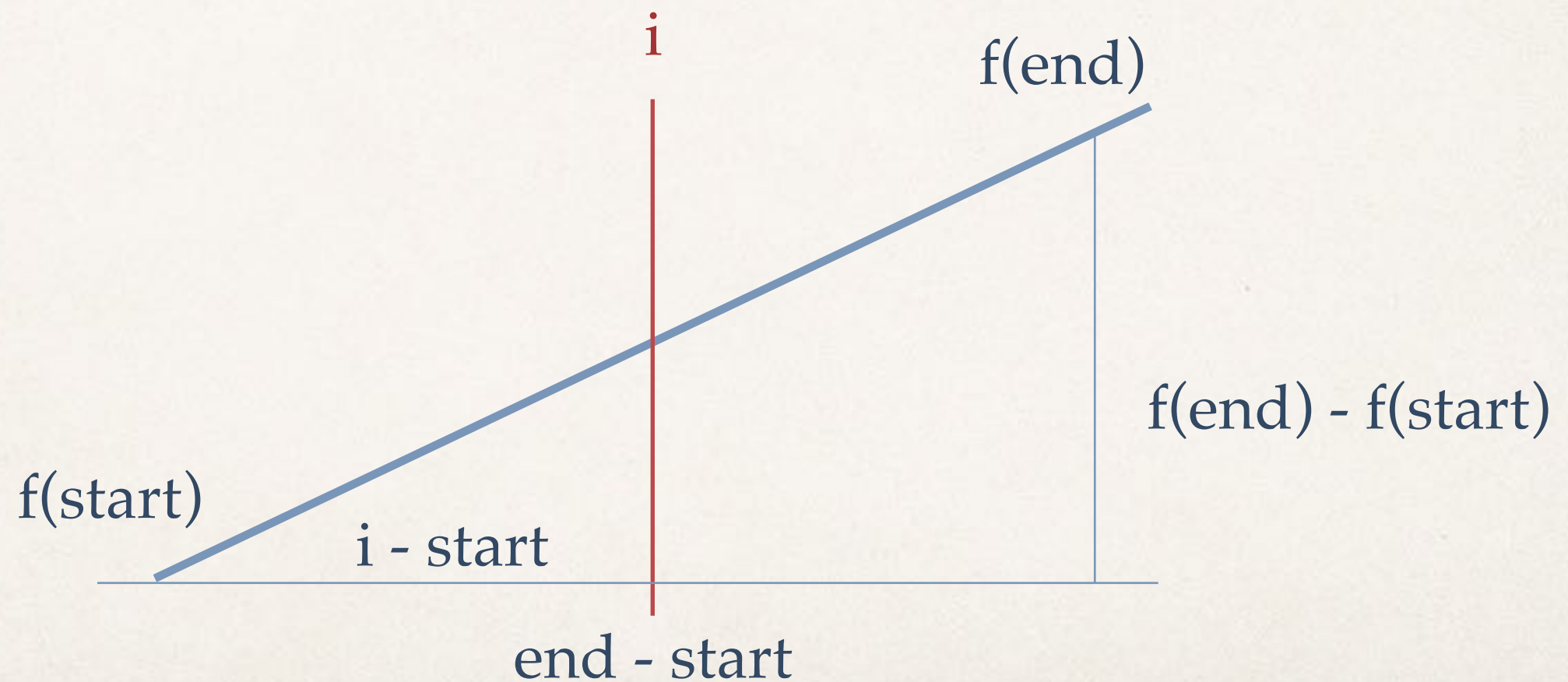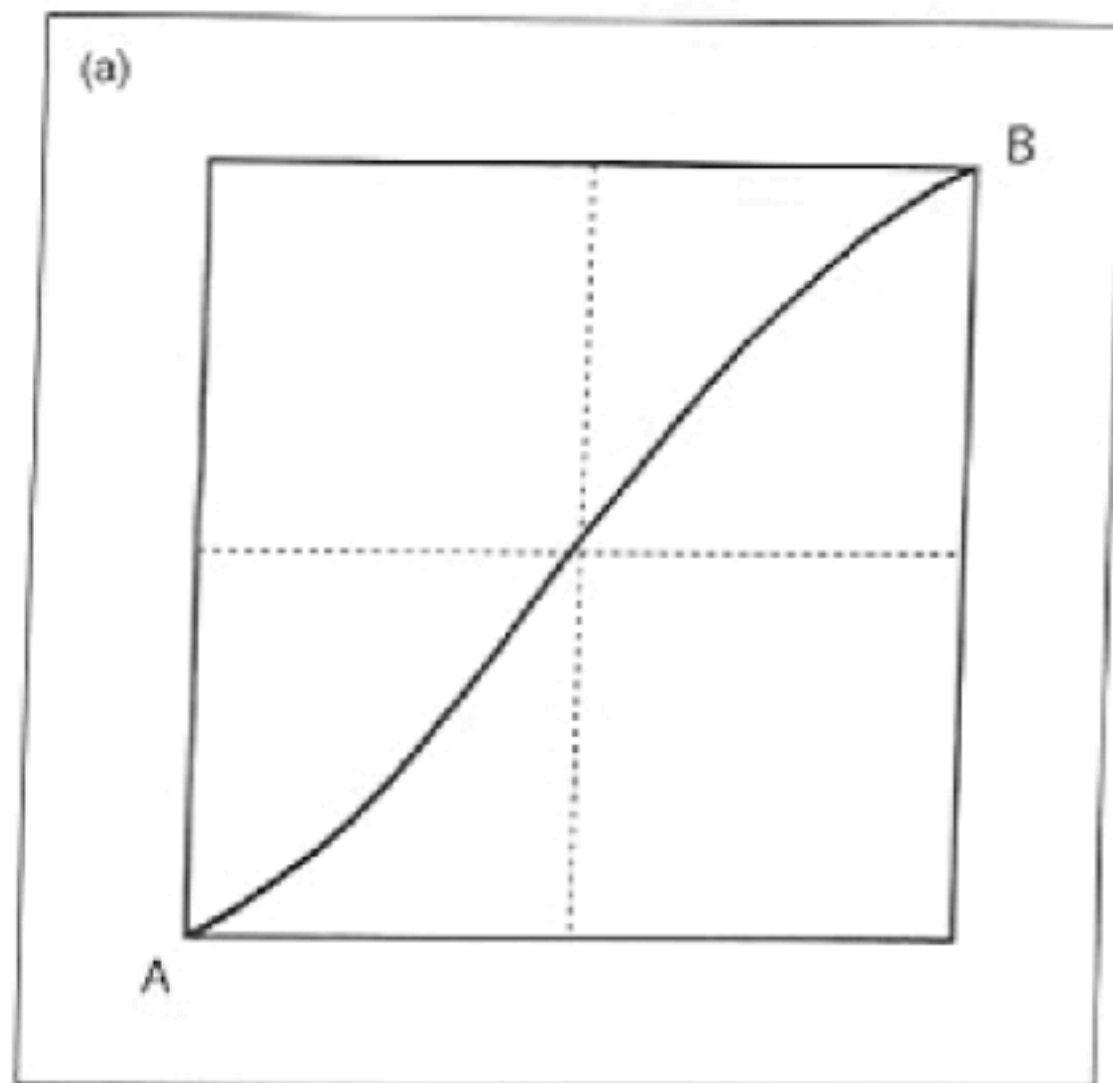

half-cosine

cubic

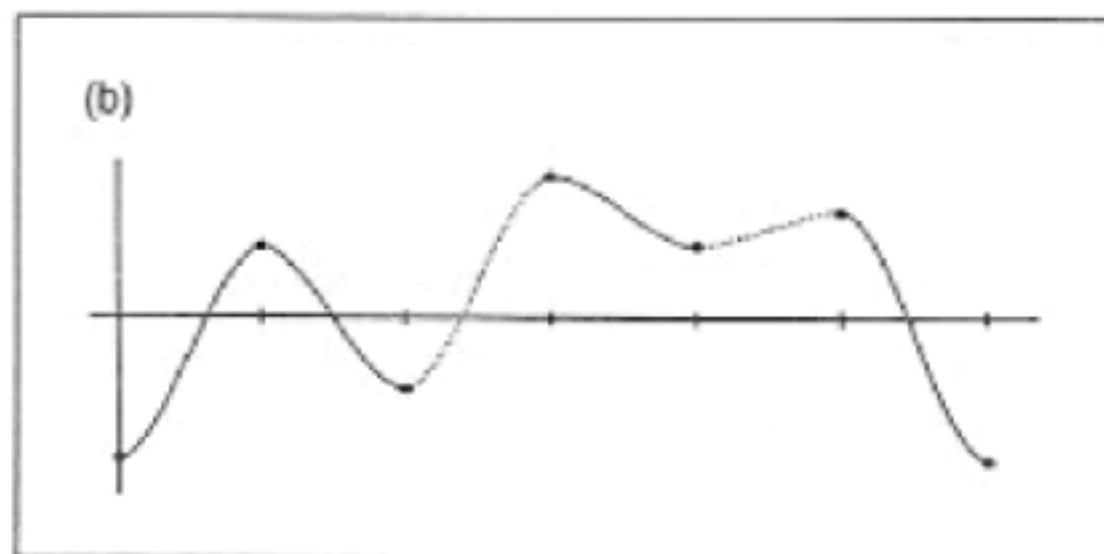# Experiment mit Max
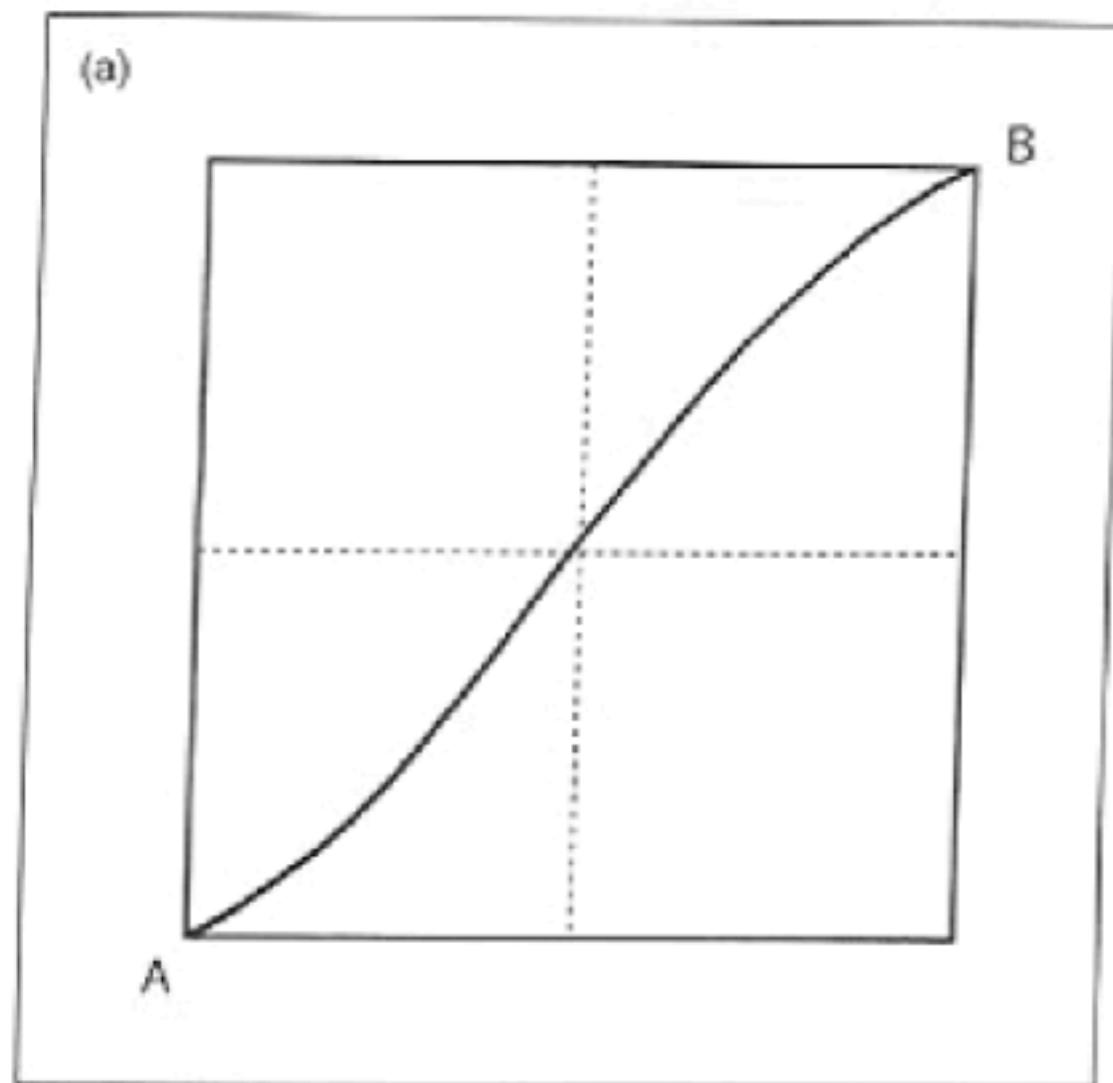
Klangqualität und Interpolation

Linear Interpolation

$$f(i) = f(start) + \{([i - start]/[end - start]) \times [f(end) - f(start)]\}$$

i

f(end)

f(end) - f(start)

f(start)

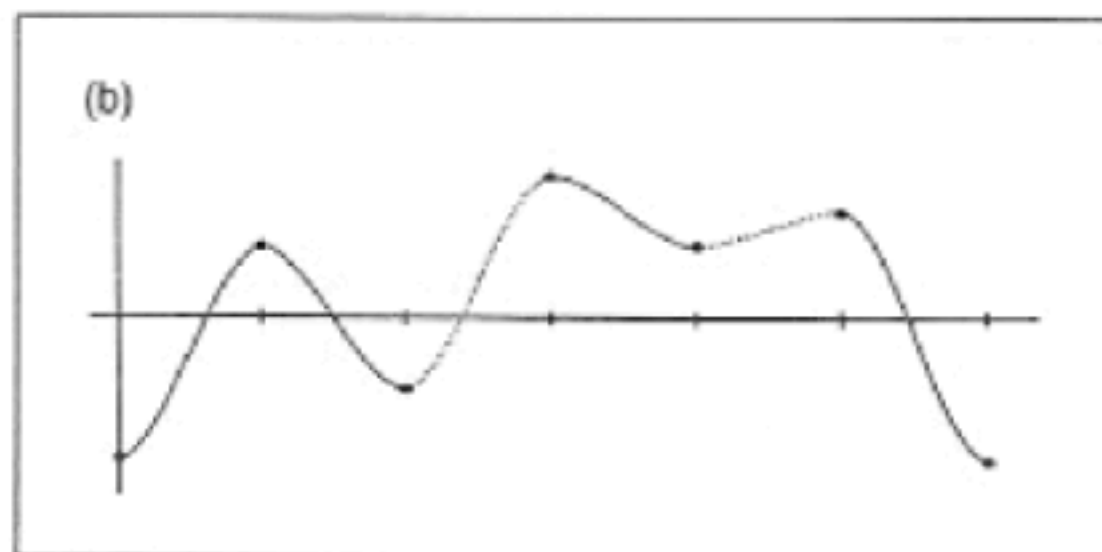i - start

end - start

(　　　　　　)
Interpolation

Half-consine
Interpolation

Waveform Interpolation
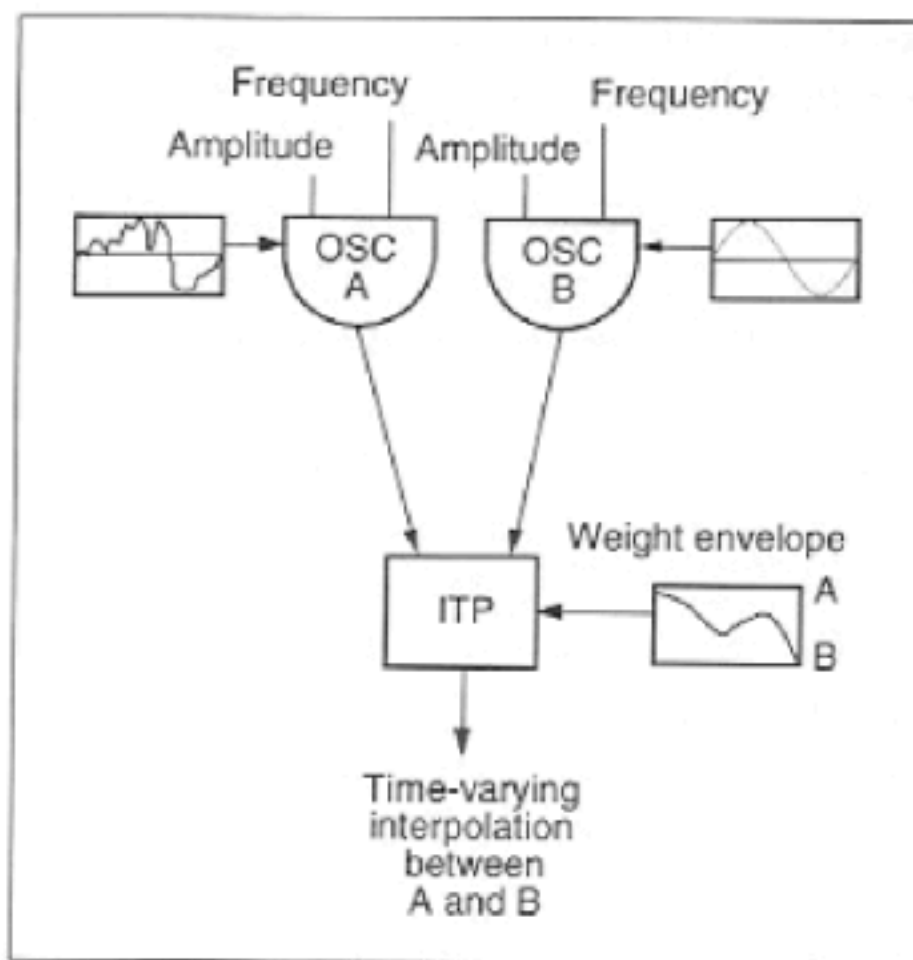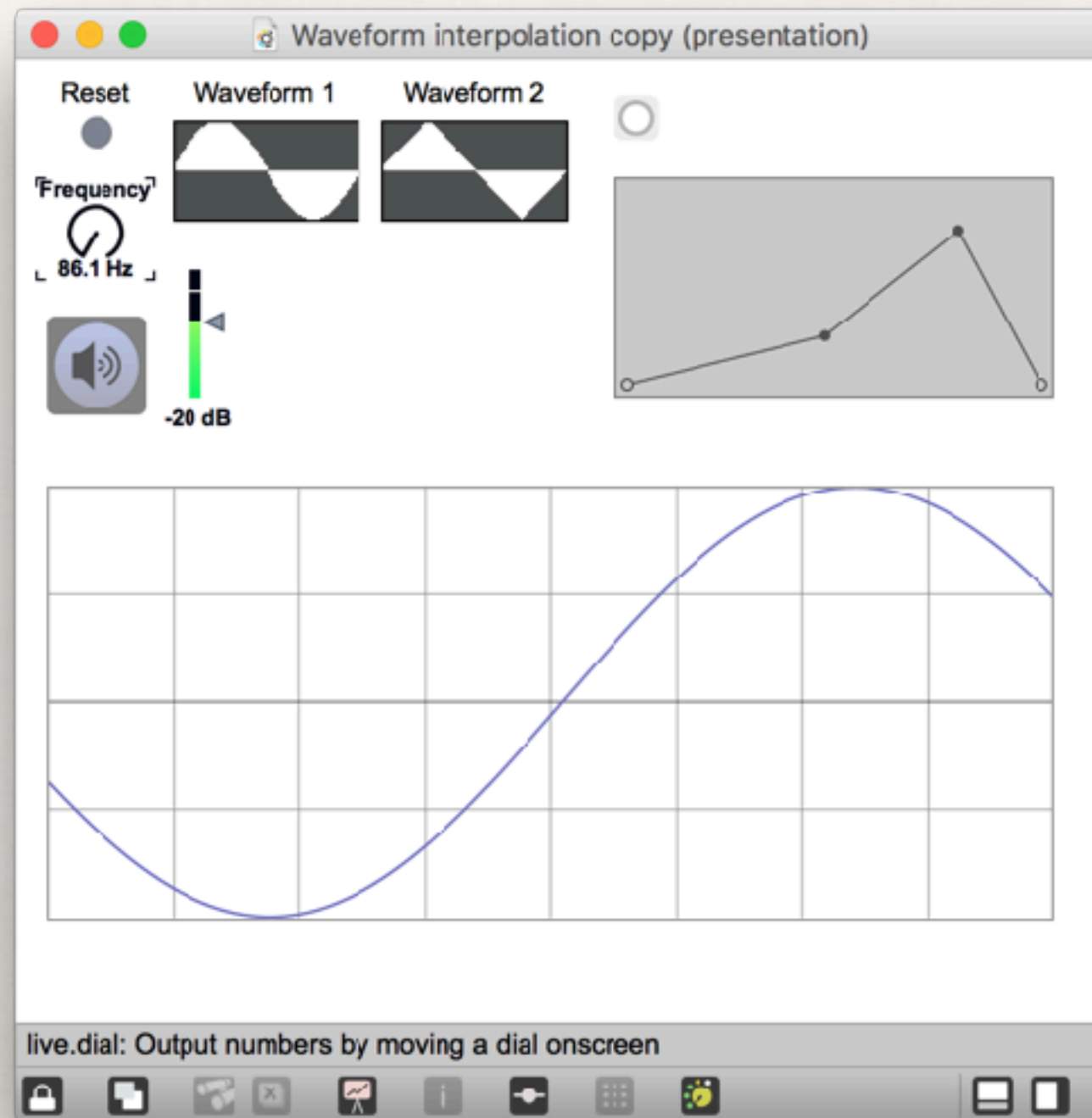
Waveform Interpolation

Figure 8.3 Instrument for waveform interpolation using the ITP unit generator found in some Music N software synthesis languages. The weight envelope specifies which waveform will predominate. When the weight envelope is 1, the left oscillator waveform is heard. When it is 0, the right oscillator plays. When it is 0.5, the waveform is the point-by-point average of the two waveforms.

Experiment mit Max

Interpolation Synthesis

Interpolation Synthesis

✤ Interpolation Syntesis? Definition?

Interpolation Synthesis
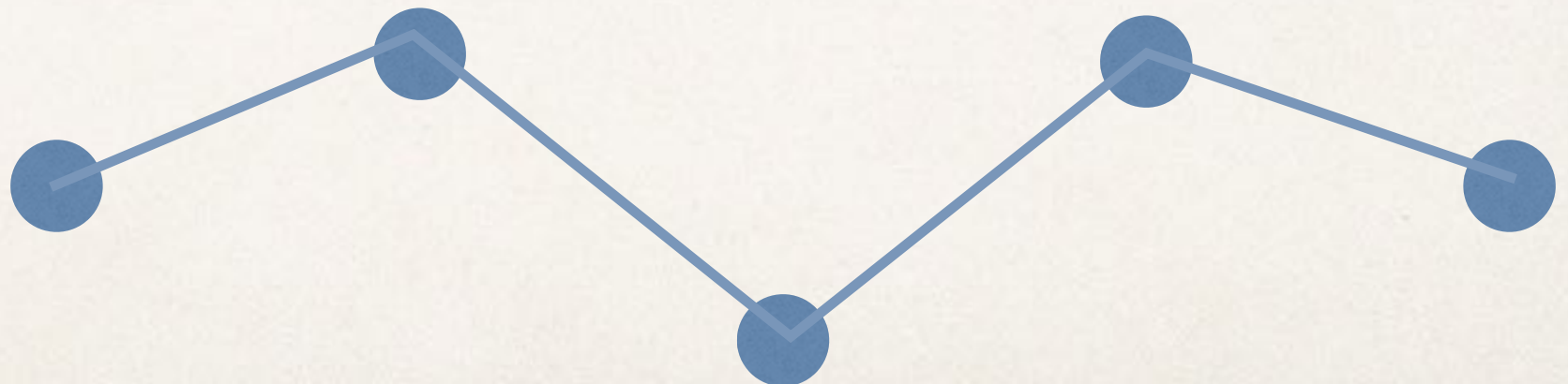
mit der linearen Interpolation

*One period of a waveform is assumed to contain n **breakpoints** spaced at equal intervals of time.*
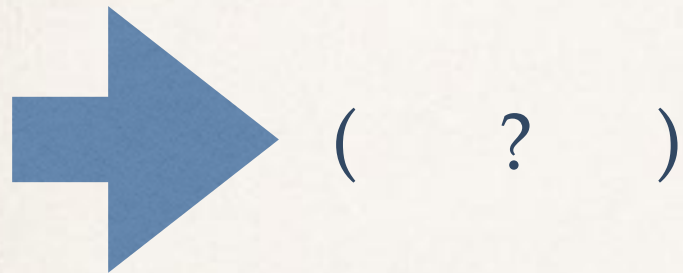
Interpolation Synthesis

Break Points

Waveform

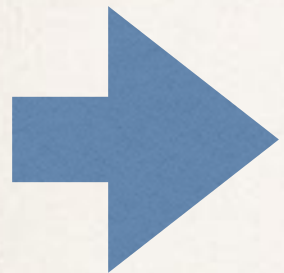# Interpolation Synthesis

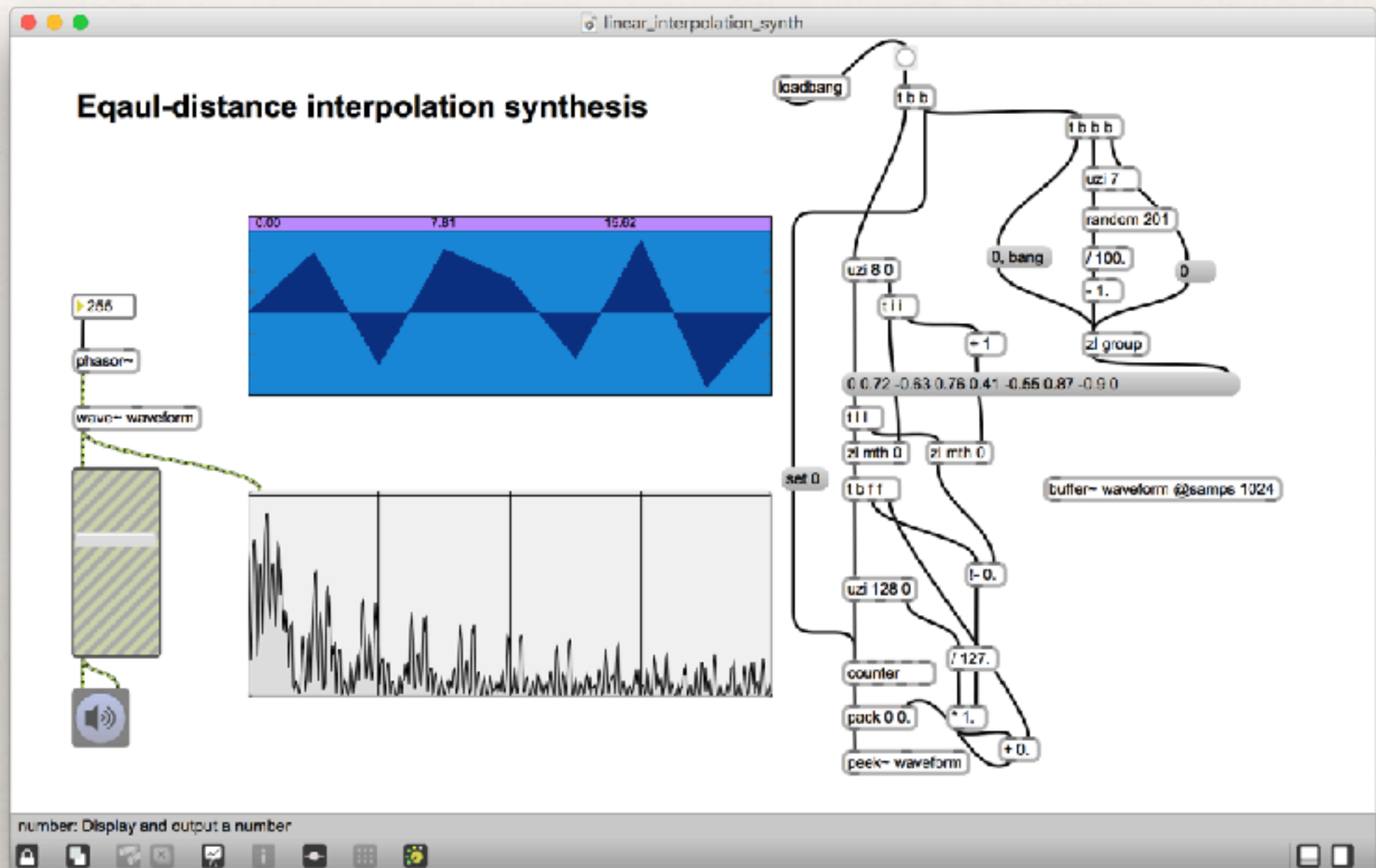✤ Problem von IS?

Interpolation Synthesis

✤ Problem von IS?

➡ (?   )

Interpolation Synthesis

✤ Problem von IS?

➡ *it generates harsh-sounding uncontrollable*
high-frequency partials

Experiment mit Max

Interpolation Synthesis

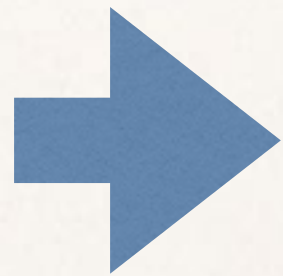✤ vier alternative Interpolationen (von Mitsuhashi)

  ✤ (   )

  ✤ (   )

  ✤ (   )

Interpolation Synthesis

✤ vier alternative Interpolationen
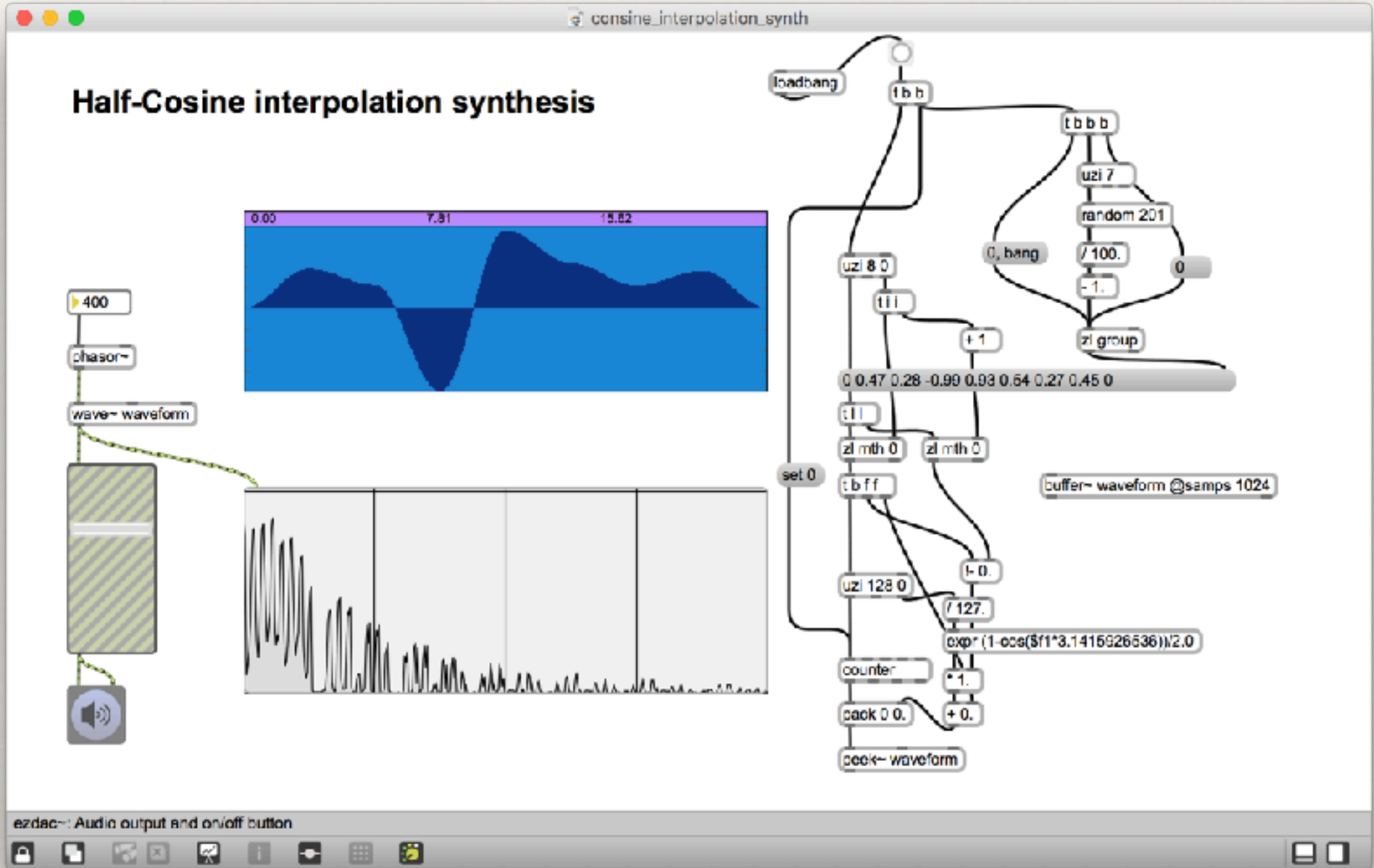
✤ Constant

✤ Half-Cosine

✤ Polynominal

Interpolation Synthesis

* Lösung für das Aliasing-Problem
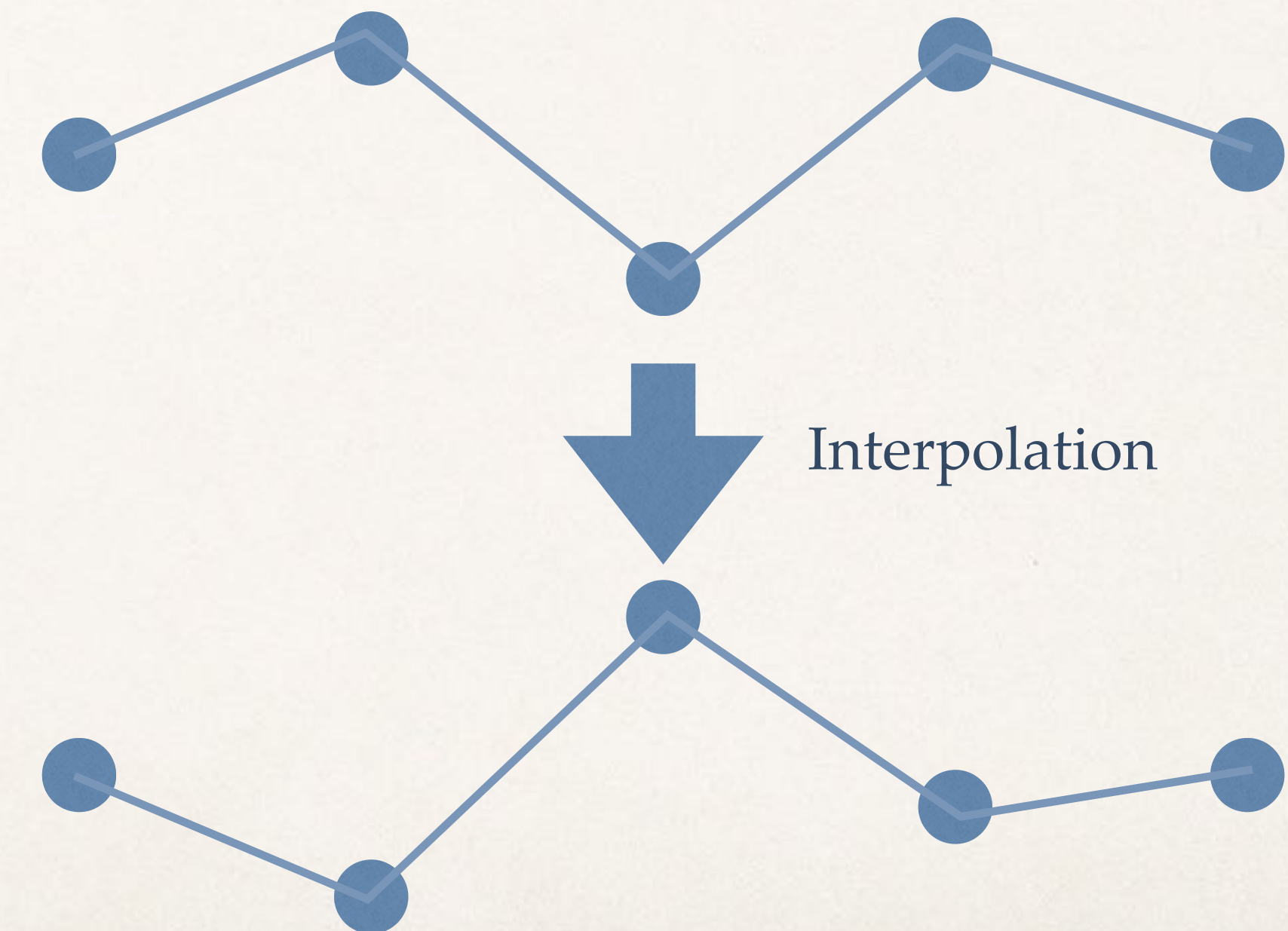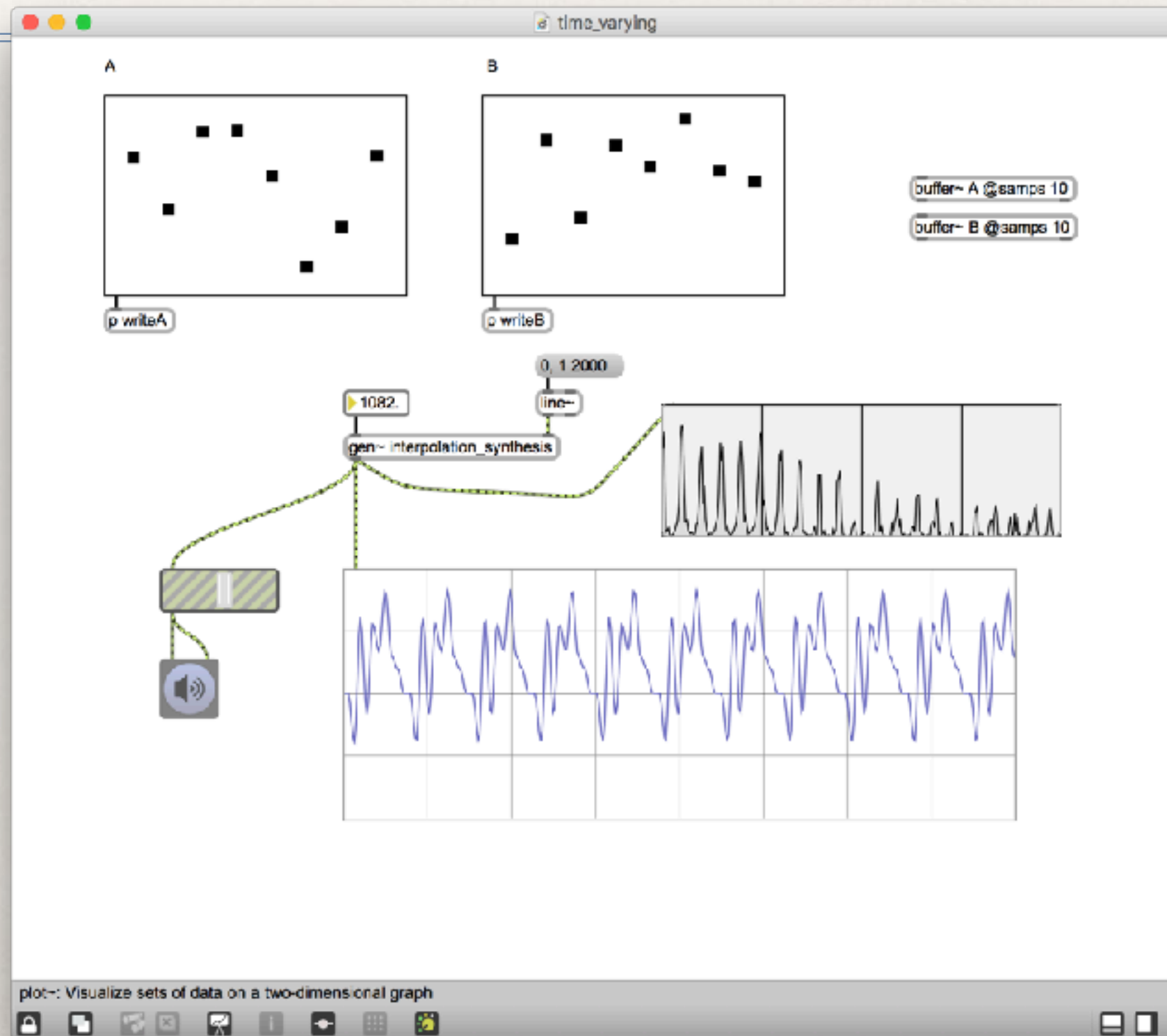
➡️ Cosine Interpolation

Experiment mit Max

Dynamic Interpolation Synthesis

It follows that time-varying spectra can be generated by changing the ordinates of the breakpoints a teach period.

Dynamic Interpolation Synthesis
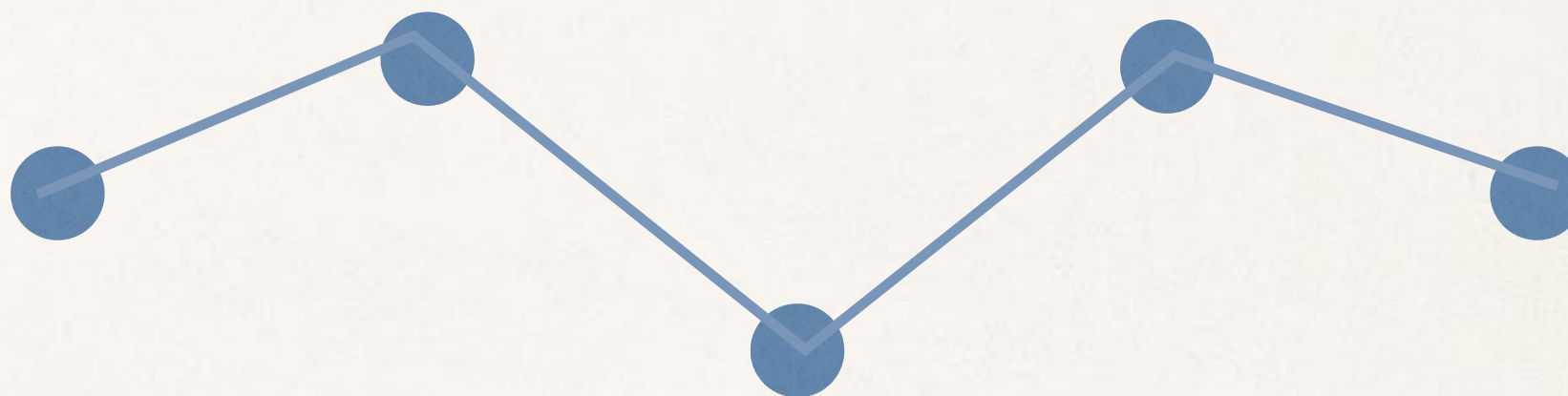

Interpolation

Experiment mit Max

Interpolation Synthesis

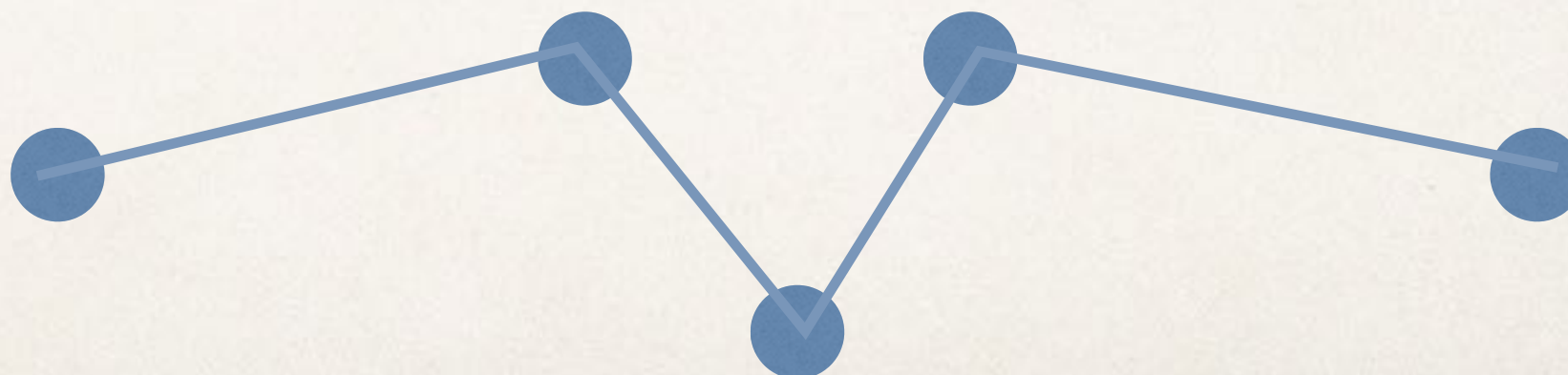✤ Was ist "Nonuniform break point intervals?"

Interpolation Synthesis

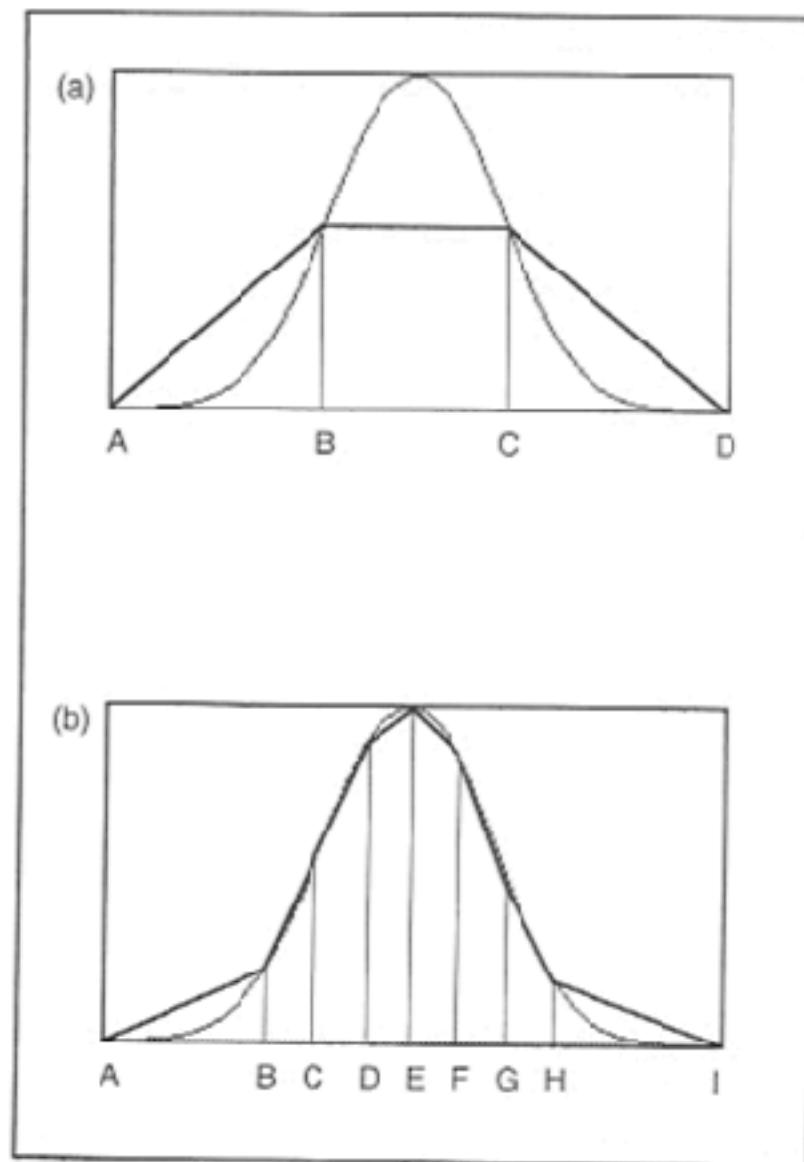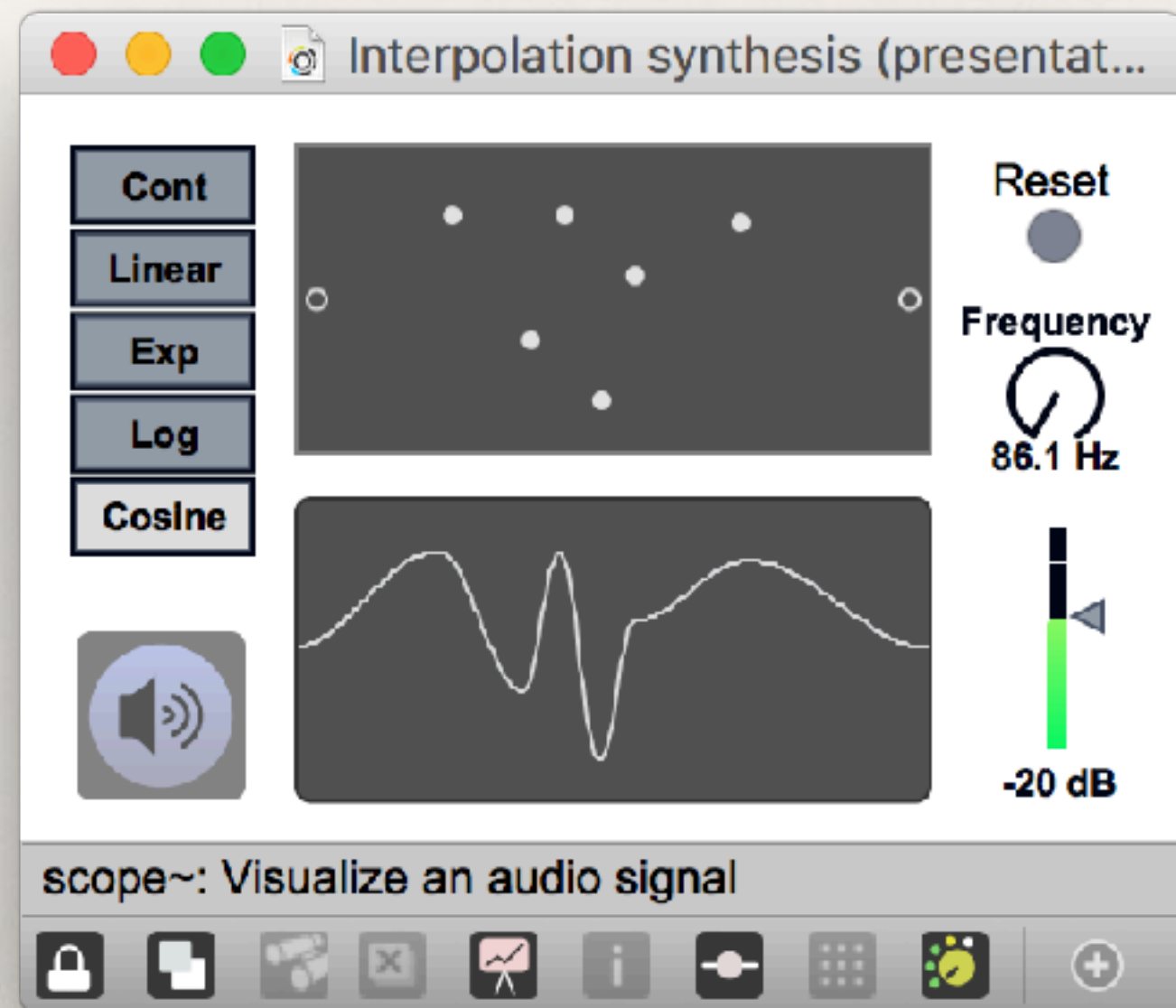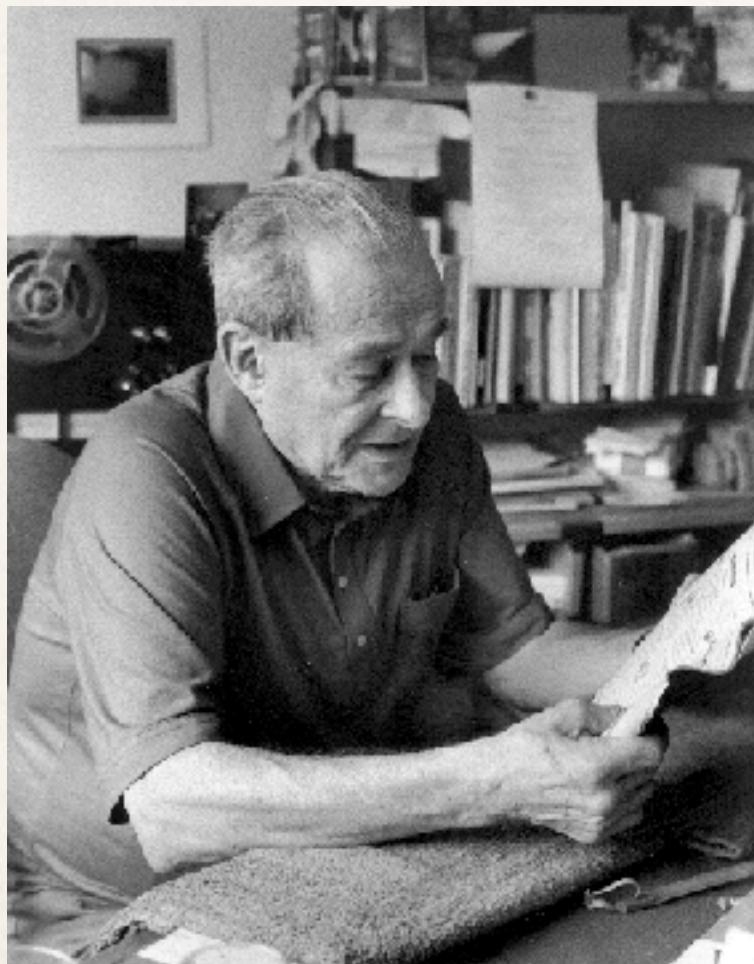uniform

non-uniform

Interpolation Synthesis

Figure 8.4 Effect of nonuniform breakpoints. (*a*) Curve drawn with uniform breakpoints. (*b*) Curve drawn with nonuniform breakpoints, yielding a better fit to the curve.

Experiment mit Max

SAWDUST

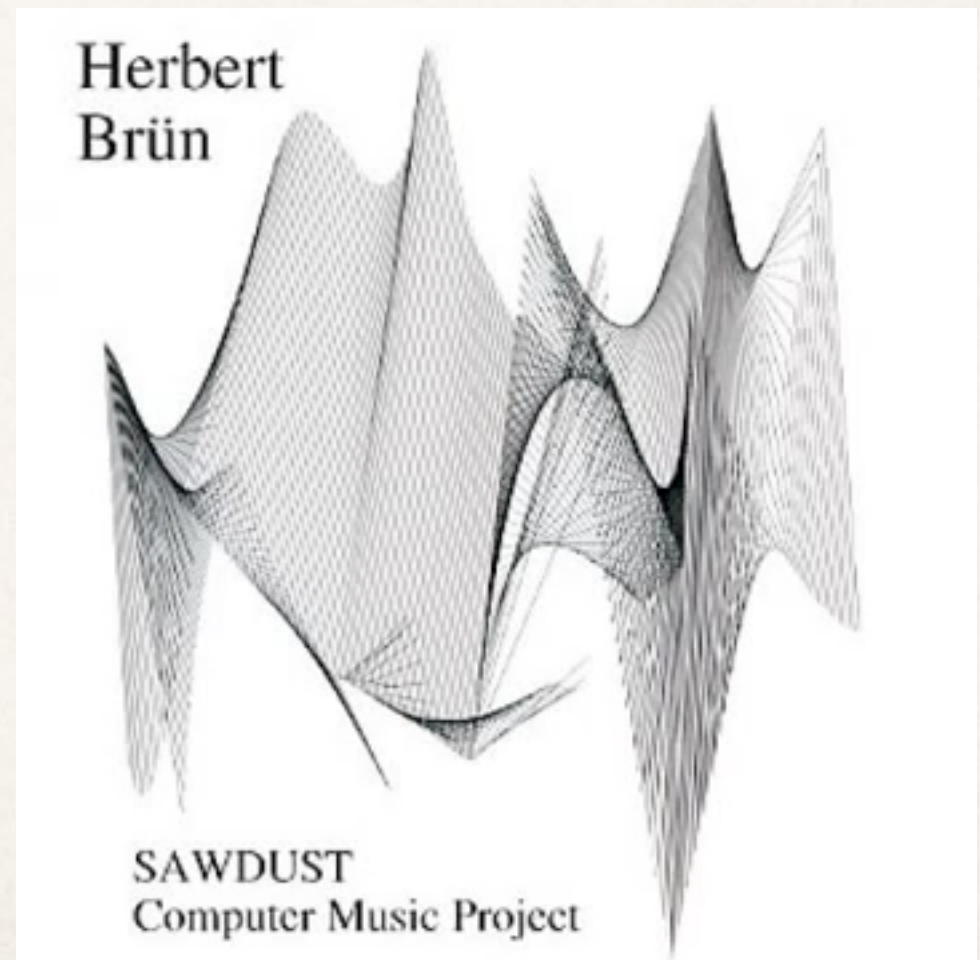http://academic.evergreen.edu/a/arunc/brun/sawdust/sawdust.htm


Herbert Brün

SAWDUST

If it can be shown that there exist significant musical ideas which require compositional thinking where not the sound but the waveform is the basic element and standard, then it can also be shown how the computer not only helps the composer to the fulfillment of up to now unfulfillable desires, but actually assists the composer in generating desires he never knew before. (Brün, H. and A. Chandra 2001)

The computer program which I called SAWDUST allows me to work with the smallest parts of waveforms, to link them and to mingle or merge them with one another. Once composed, the links and mixtures are treated, by repetition, as periods, or by various degrees of continuous change, as passing moments of orientation in a process of transformations. (Brün, H. and A. Chandra 2001)
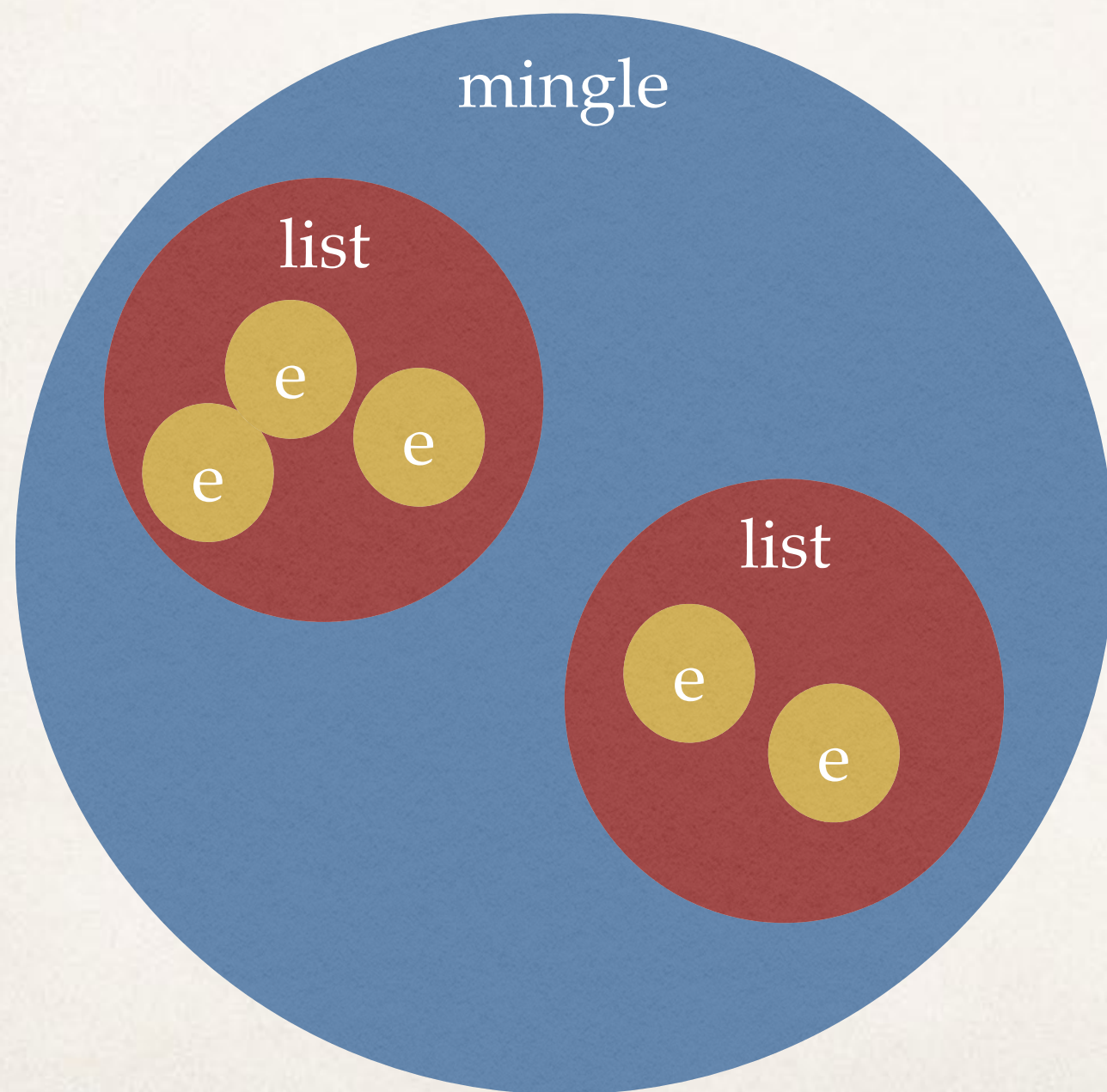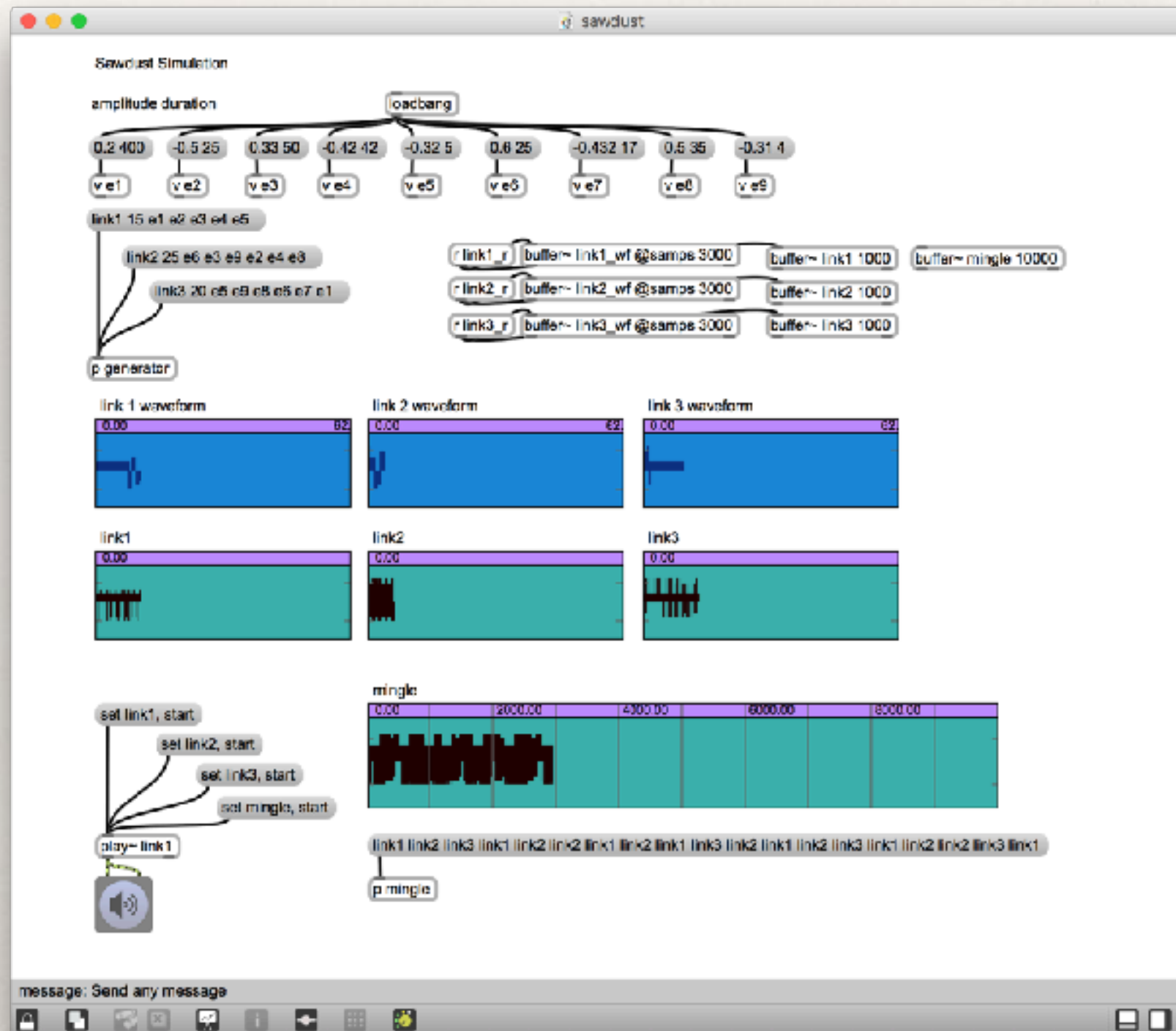
SAWDUST

```
*       element                          # command to define an element
name:          e0                        # set the identifier
amplitude=     100                       # its amplitude
samples=       433                       # its duration in samples
```

```
*       link
name:          l0                        # identifier
0:             e0                        # list of constituent elements
1:             e2
2:             e1
3:             e3
4:             e1
5:             e2
6:                                       # end input of list with blank line
statements=    840                       # number of iterations when played
```

```
*       mingle
name:          mg0                       # name of mingle
0:             l0                        # constituent links
1:             l17
2:             l2
4:
statements=        841                   # number of mingle iterations
```

SAWDUST

Experiment mit Max

SAWDUST

✤ Weitere Techniken

Merge (Link1 , Link2)
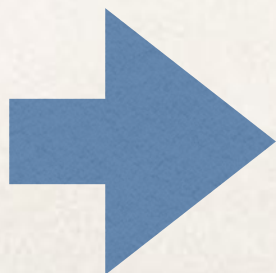
Experiment mit Max