

# Code Adam

## Realisation Score

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### Introduction

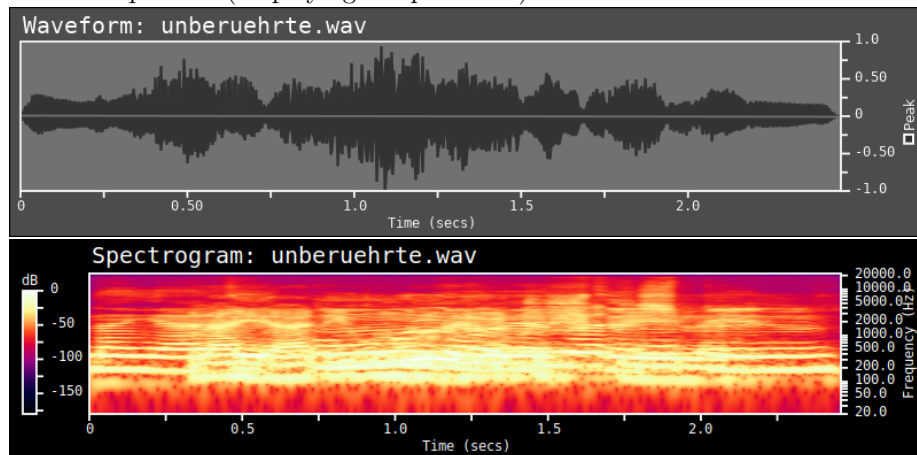
“Code Adam” (2min45, stereo) is the last of five parts of the fixed-media sound composition “Seven plus or minus two” commissioned for the theatre performance “Affair” by Christine Gaigg/2nd nature. It was premiered in Vienna November 7th 2019 in Halle G, Tanzquartier Wien.

The source material for “Code Adam” is the two sound files `unberuehrte.wav` and `milchmaedchen.wav`, which are transformed using programs from the Composer’s Desktop Project (CDP) collection as described next.

## 1 `unberuehrte.wav`

### 1.1 Overview

The source material is the mono file `unberuehrte.wav` (2.46 seconds), in which three to four male and female voices speaking the german words “... die Unberührte spielen.” (“...playing the pristine.”).



Listen to `unberuehrte.mp3` online.

### 1.2 Transformation steps

The audio file was time-stretched and had its partials sustained by accumulation before it was subjected to a bank of time-varying resonant filters. The result

was chopped up into quasi-periodic chunks which were each reversed in time. Each of these steps is described next.

### 1.2.1 Spectral time stretch and accumulation

Convert the audio file to a spectral domain file (.ana), using the default window length of 1024 samples:

```
pvoc anal 1 unberuehrte.wav unberuehrte.ana
```

Apply a spectral time stretch with factor 30, resulting in a 1 minute 14 seconds file:

```
stretch time 1 unberuehrte.ana unberuehrte-stretch30.ana 30
```

Listen to unberuehrte-stretch30.mp3 online.

Sustain the energy in each frequency bin by *spectral accumulation*:

```
focus accu unberuehrte-stretch30-gain.ana unberuehrte-stretch30-accu.ana
```

Conversion to time domain using

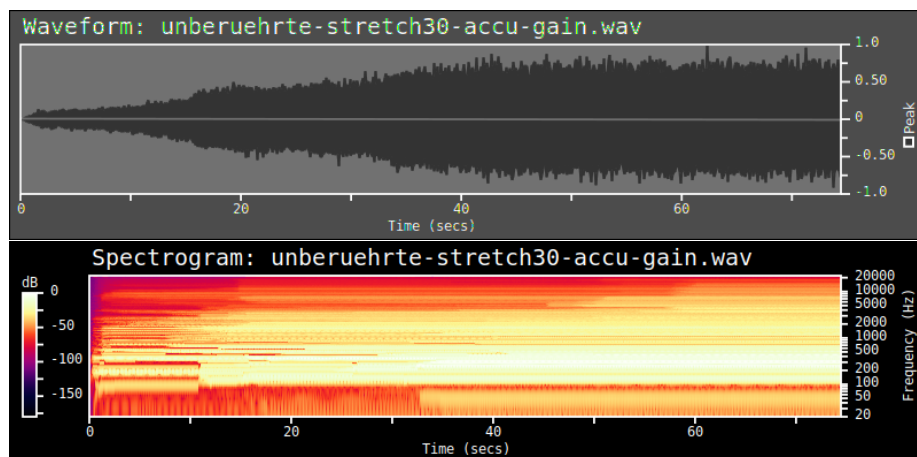
```
pvoc synth unberuehrte-stretch30-accu.ana unberuehrte-stretch30-accu.wav
```

will report a necessary gain factor of 0.388423 to prevent signal clipping.

This gain factor is applied to the spectral file before another conversion:

```
spec gain unberuehrte-stretch30.ana unberuehrte-stretch30-gain.ana  
0.388423
```

```
pvoc synth unberuehrte-stretch30-accu-gain.ana  
unberuehrte-stretch30-accu-gain.wav
```



Listen to unberuehrte-stretch30-accu-gain.mp3 online.

### 1.2.2 Time-varying resonant bandpass filters

Query the soundfile properties for the duration of the input file

```
sfprops unberuehrte-stretch30-gain-accuN.wav
```

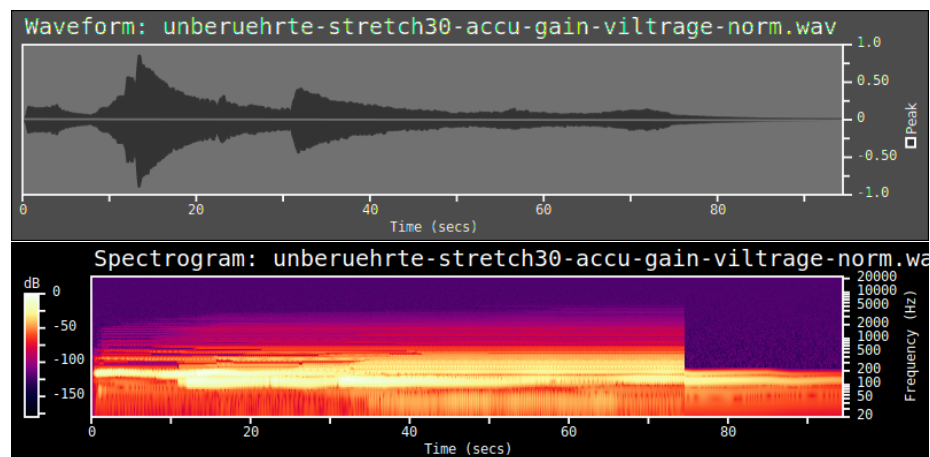
yielding 74.4461 seconds. To capture the entire decay of the resonant filters, 20 seconds are added, resulting to 94.4461 seconds used as duration value in the next step.

Generate the text file `viltrage.txt` holding four columns pairs of time and frequency values over 94.4461 seconds for 4 resonant filters having pitches from 28 to 63 linearly distributed 1, randomized 0.5, minimum amplitude 0.5, amplitudes distributed decreasing with pitch -1 every 4 seconds and times randomized 0.5. A random seed `-s123` is specified<sup>1</sup> to allow for identical random values on repeated runs of the command:

```
filtrage filtrage 2 viltrage.txt 94.4461 4 28 63 1 0.5 0.5 0 -1 4 0.5
-s123
```

Apply a bank of resonant bandpass filters controlled by `viltrage.txt` with a very steep and resonating Q of 3000, large make-up gain factor 500 and adding a tail of `-t20` seconds to the output file, followed by gain normalization:

```
filter varibank 2 unberuehrte-stretch30-accu-gain.wav
unberuehrte-stretch30-accu-gain-viltrage.wav viltrage.txt 3000 500
-t20
modify loudness 3 unberuehrte-stretch30-accu-gain-viltrage.wav
unberuehrte-stretch30-accu-gain-viltrage-norm.wav
```



Listen to `unberuehrte-stretch30-accu-gain-viltrage-norm.mp3` online.

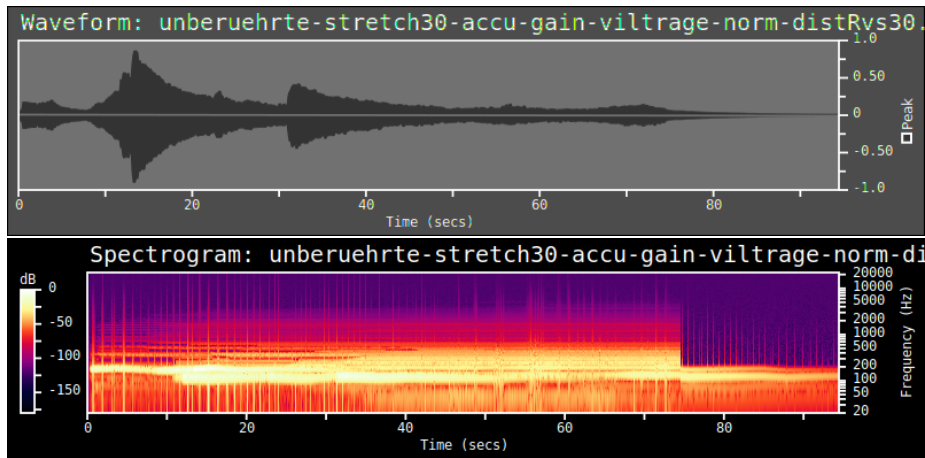
### 1.2.3 Reversal of wave-cycles

Reverse every 30 wavecycles:

```
distort reverse unberuehrte-stretch30-accu-gain-viltrage-norm.wav
unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs30.wav 30
```

The amplitude waveform for the file created does not show any significant change but the spectrogram does. It indicates the onsets of the reversed groups of wave-cycles, which are in fact discontinuities or impulses with a short broad spectrum.

<sup>1</sup>The `viltrage.txt` used for the released version of this composition was created without a seed value and can hence not be recreated here.



Listen to [unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs30.mp3](#) online.

Produce variations with slower pulsations of 50, 100, 125 and 300 wavecycles:

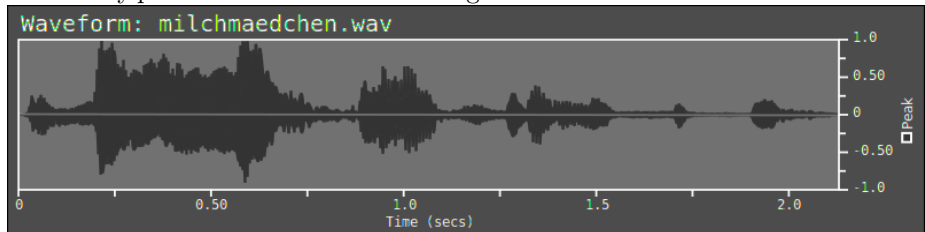
```
distort reverse unberuehrte-stretch30-accu-gain-viltrage-norm.wav
unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs50.wav 50
distort reverse unberuehrte-stretch30-accu-gain-viltrage-norm.wav
unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs100.wav 100
distort reverse unberuehrte-stretch30-accu-gain-viltrage-norm.wav
unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs125.wav 125
distort reverse unberuehrte-stretch30-accu-gain-viltrage-norm.wav
unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs200.wav 200
```

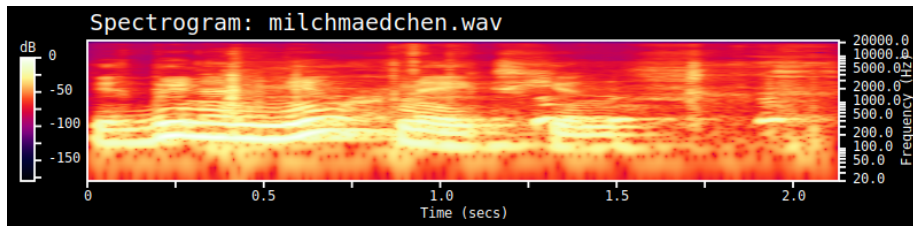
Listen to [unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs50.mp3](#) online.  
 Listen to [unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs100.mp3](#) online.  
 Listen to [unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs125.mp3](#)  
 Listen to [unberuehrte-stretch30-accu-gain-viltrage-norm-distRvs200.mp3](#) online.

## 2 milchmädchen.wav

### 2.1 Overview

The audio file `milchmaedchen.wav` (2.13 seconds) was changed to half-speed, a more noisy percussive unintended trailing sound was extracted and reverberated.





A male voice says the german phrase "Ich bin ein Milchkädchen" ("I am a milkmaid."). Listen to milchmaedchen.mp3 online.

## 2.2 Transformation steps

Slow playback to half speed (4.26s duration):

```
modify speed 1 20m07-milchmaedchen.wav 20m07-milchmaedchen-speed05.wav
0.5
```

Listen to milchmaedchen-speed05.mp3 online.

Extract the soft percussive trailing sound at the end of the file by cutting out a section from 3.104 to 3.788 seconds, followed by gain normalization:

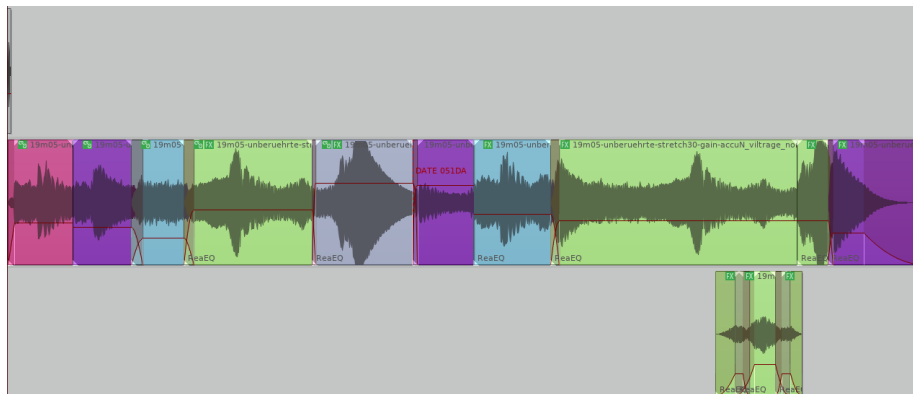
```
sfedit cut 1 milchmaedchen-speed05.wav milchmaedchen-speed05-cut.wav
3.104 3.788
modify loudness 3 milchmaedchen-speed05-cut.wav
milchmaedchen-speed05-cut-norm.wav
```

Listen to milchmaedchen-speed05-cut-norm.mp3 online.

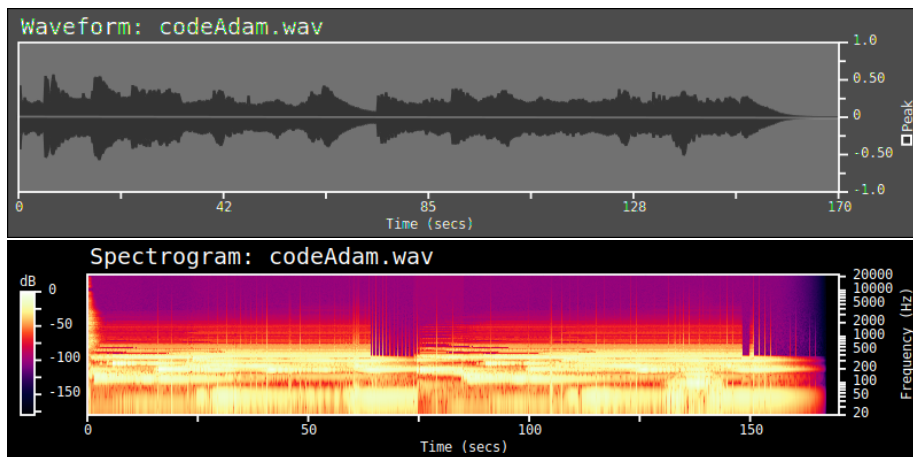
## 3 Assemblage

The files created by the transformation above were renamed for better readability, now showing only the last transformation affix. Following the **Position** in the timeline, the **Start** and **Length** values indicate the time portion that is used out of that file. All values are in seconds, while **Gain** is in dBFS.

Track	File	Position	Start	Length	FadeIn	FadeOut	Gain
1	milchmaedchen-cut.wav	0	0	0.684	0	0	-3.806
2	unberuehrte-distRvrs200.wav	0.161	10.713	11.812	1.145	0.013	1.981
2	unberuehrte-distRvrs125.wav	11.961	22.526	12.688	0.013	2.12	1.012
2	unberuehrte-distRvrs100.wav	22.53	33.033	11.48	2.12	1.88	3.257
2	unberuehrte-distRvrs50.wav	32.13	42.642	24.14	1.88	0.677	2.73
2	unberuehrte-distRvrs30.wav	55.592	66.144	19.176	0.677	0.957	3.268
2	unberuehrte-distRvrs125.wav	73.946	0	11.101	0.957	0.092	7.404
2	unberuehrte-distRvrs100.wav	84.955	11.097	15.646	0.092	1.566	3.592
2	unberuehrte-distRvrs50.wav	99.035	25.52	44.942	1.566	0.019	2.339
2	unberuehrte-distRvrs50.wav	143.959	70.444	6.58	0.014	0.95	2.339
2	unberuehrte-distRvrs125.wav	149.59	73.303	17.507	0.95	10.9	-0.429
3	unberuehrte-distRvrs50.wav	129.055	55.54	6.193	3.541	1.171	-3.417
3	unberuehrte-distRvrs50.wav	132.6	59.085	10.046	3.541	2.677	-0.392
3	unberuehrte-distRvrs50.wav	140.074	66.559	4.788	1.059	2.055	-3.417



In addition to the timeline described above, artificial reverberation with a long reverb tail was applied to `milchmaedchen-cut` on track 1. Cosmetic EQ was applied to all `unberuehrte...` files on track 2, reducing resonances at 122, 200 and 250Hz and slightly amplifying high frequency content in a wide band centered at 846Hz. The three files on track 3 were pitch-shifted by -24 semitones to create a low-frequency layer.



Listen to the production version of `codeAdam.mp3` online.