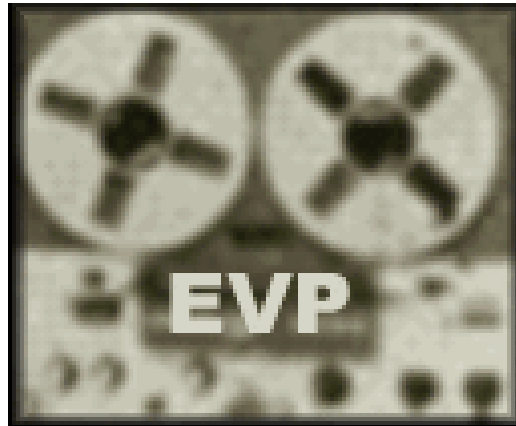Manual for

EVPmaker

Program for the generation of acoustic "raw material"
for recordings of "Electronic Voice Phenomena" (EVP)
by means of random controlled phoneme synthesis

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1. Introduction

1.1. The Electronic Voice Phenomenon (EVP)

"Electronic Voice Phenomena" (EVP) are recordings of utterances upon sound recording media (recorder tapes, cassettes, video tapes, etc.) which are physically unexplainable. These voices are often reasonable messages replying to corresponding questions, or they are referring to circumstances concerning the experimenter. The voices sometimes seem to show even precognitive or telepathically transmitted contents, i.e. the voices are referring to future events or to things concerning another person of which the experimenter has no knowledge at the time of the recording.

This phenomenon has been discovered in 1959 by the swedish artist Friedrich Jürgenson, who made them public as "voices from the hereafter". In fact, these voices often call themselves the "dead" or the "deceased". Whether or not this is the only valid explanation remains to be seen...

To carry out such experiments, no high-tech equipment is required - standard equipment and a little bit of patience are sufficient to reproduce this fascinating phenomenon. In the simplest case, this can for example be done by putting a cassette recorder into "Recording" mode and capturing some background noise (= acoustic "raw material") via the microphone. From time to time you may ask a question. The voices can be heard afterwards during the playback of the tape.

More information about this topic can be found on the Web site of VTF, the German Association For Transcommunication Research or AA-EVP, the American Association of Electronic Voice Phenomena.

1.2. The "raw material"

In order to record EVP it seems to be necessary to provide some kind of "raw material" which is used as a "carier" for the voices. Inside of soundproof rooms without any acoustic source, no voices seem to be formed at all. The frequency spectrum of this raw material - no matter if it's a direct sound event or if it's modulated onto various carriers (radio waves, light etc.) - apparently has to be within the audible range. One of the most common views is, that the voices result from paranormal *transformations* of the raw material. However, up to now this assumption could not yet be confirmed clearly in experiments. Usually the voices are already contained within the raw material. In my article Hypothesen zur Entstehung des Tonbandstimmen-Phänomens (Hypotheses about the origin of the Electronic Voice Phenomenon) I have made some reflections on this topic.

There are various methods existing to generate, transmit and record the raw material. Many experimenters use a radio set which is tuned to a foreign-language radio station, or to a mixture of several radio stations, as a raw material source. It is important that the experimenter does not understand the language of the raw material because this would be distracting. I personally don't prefer this method because it's too error-prone since it can be very delusive if you are interpreting something as a message which in fact is a usual word in the foreign language. A raw material that is "unsuspicious" but is as similar as possible to language had to be found!

Already in 1988, when most people knew computers only from science fiction movies, the former president of the German Association For Tape Voice Research (VTF e.V.), Fidelio Köberle, had the following idea:

> "[...] to provide an artificially generated raw material, like for instance the often used noise from rippling water or Struck's "rubbing method". Ideal could be a continuously produced synthetic raw material which comes as close to speech as possible. As close as possible in order to allow the interlocutors on the other side to form real speech from it using as little energy as possible. Little energy, because we know that this works best (see transformations). The raw material must of course not already be speech but sould be transformed into reasonable speech easily. It should bubble without periodicity. It should, like usual speech, contain pauses. Without the use of random generators this won't be managed. [...]". [1]

1.3. Random controlled speech synthesis

Inspired by this suggestion, different means to generate such a raw material had been developed. Electronics engineer Peter Stein (Denmark) for example used two stereo cassette players (walkmen) and switched continuously between their four audio tracks by means of an electronic switch. The switching speed could be varied. However, for me personally this method wasn't flexible enough and the generated raw material wasn't "dynamic" enough. Inspired by the psychokinesis experiments of the parapsychologist Helmut Schmidt, I wanted to use a *real* random number generator (RNG) for the focus of potential paranormal influences. Each random number should be assigned to a certain phoneme of the German language. While the RNG was running, the corresponding phonemes should be played back via a speaker. With a little "practice" the originators of the voices should be able to synthesize their messages by influencing the RNG mentally. Since it probably would have been rather expensive to realize this by electronic means, I decided to make use of a computer.

Audio-Ed

In those days (1989), PCs were still expensive, and sound cards weren't available anyway. The Amiga already had fantastic sound capabilities, but at that time I owned the C64 home computer, so I gave it a try. It is true that the C64 had a sound chip which could produce sounds artificially, but you couldn't use it to synthesize speech. Then, by chance, I found in an electronics shop a kit for a so called "Audio Interface" which could be connected to the User Port of the C64 in order to digitize audio signals, store them into the computer memory and play them back later. The Audio Interface used "Delta Modulation", an 1-bit A/D and D/A

conversion. It was very unprecise, and sounded totally noisy, but occupied very little computer memory. Nevertheless the only 48 kilobytes of memory were already full after 13 seconds of recording time. But this was sufficient for my purposes; after all it was possible to store about 100 phonemes (if you base on an average phoneme duration of 0.1 to 0.2 seconds), and that was absolutely sufficient to synthesize artificial speech.

To operate the Audio Interface, a little BASIC program was enclosed (of course as a listing for typing in) which POKEd some Assembler routines from DATA lines into the main memory. I used a "Machine Language Monitor" (something similar to DEBUG under MS-DOS) to disassemble the program and to add some further functions to edit, save and load the audio signal. I called the resulting program simply *Audio-Ed*. The part *"Ed"* indicates, that this program was able to edit an audio signal: You could cut out short sound sequences by ear and store them as individual segments onto "Floppy-Disk". If you had collected enough phonemes, you could make a phoneme file from them. These phonemes could be used to generate "random speech" which sounded like "gibberish". Additionally, there was a function to control the choice of the phonemes via the Game Port, so that an external random generator could be connected to the C64.

But regarding the quantity and quality of the obtained EVP, it turned out in practice that it is irrelevant if "real" phonemes are used, or if simply small pieces (segments) of equal duration are cut out automatically from the audio signal. Also if "real" random numbers or only "pseudo" random numbers are used to select the phonemes/segments turned out to be insignificant. In this connection, here a little anecdote:

Once during an EVP session using female speech as a raw material, I received the quite distinct and striking voice "Computer ist kaputt!" (German for: "Computer is kaput!"). I didn't know what to do with it, because apparently my device worked very well. On the next day I used the same raw material again for an EVP recording (I had stored the sample on a diskette). I was very surprised when I suddenly heard exactly the same voice "Computer ist kaputt" again! What has happened?

Since the C64 had no built-in real time clock, the RNG had been initialized with the same starting values each time it was switched on - until then I hadn't been aware of this fact. But how could this be? Such a distinct voice from pseudo random numbers? Moreover, through this incidence the voice obtained a certain meaning by giving me to understand in a coded form (which is often the case with EVP) that the RNG did not work the way I assumed. Since the literature always mentioned a "random" number generator, I wrongly assumed that it would produce "real" random numbers. Therefore my hypothesis was that this RNG could be influenced paranormally. But obviously this did not happen, since otherwise this voice would not have been produced once more.

The conclusions from this incident were far-reaching: Apparently it was **not** necessary for the generation of distinct and meaningful EVP to influence the devices in some paranormal way! (Meanwhile my theory is that the EVP phenomenon as well as other paranormal phenomena is based on some kind of "synchronicity".)

In 1990, *Audio-Ed* had been rewritten for a PC (80286 CPU) under MS-DOS and extended by a "logging" feature. With it, the generated sequence of random numbers could be logged into a logfile during the (pseudo) random controlled playback of the segments. Later exactly the same "raw material" could be played back again in order to "repeat" an EVP session. By this means it was possible to examine if the same voices were obtained again. (In my own experiments, this was always the case - thus no "transformations"!)

Audigit

Since editing each individual phoneme and compiling a complete phoneme set was always a very time consuming task, and because randomly cut segments work as well as phonemes, the next program version got no more editing function at all, thus it was given the name *"Audigit"*. This version - now written in C - worked with 8-bit D/A and A/D conversion. Sound cards were still nearly unaffordable, therefore I used a self-made "Sound Digitizer" which I built from a construction manual which was printed in the October 1990 issue of the German computer magazine "DOS International" (now "PC Magazin"). Sound card support was added later. Since *Audigit* was a DOS program, the usable memory was still limited to 640 KB which allowed only a short recording time (about 25 seconds at a sample frequency of 20 kHz and a resolution of 8 bit). Moreover it only worked with 100% Soundblaster compatible sound cards. Therefore in May/June 2000 I wrote a "successor", the program *EVPmaker*, which runs under Windows 9x and Windows NT, works with any sound card and has no memory limitations.
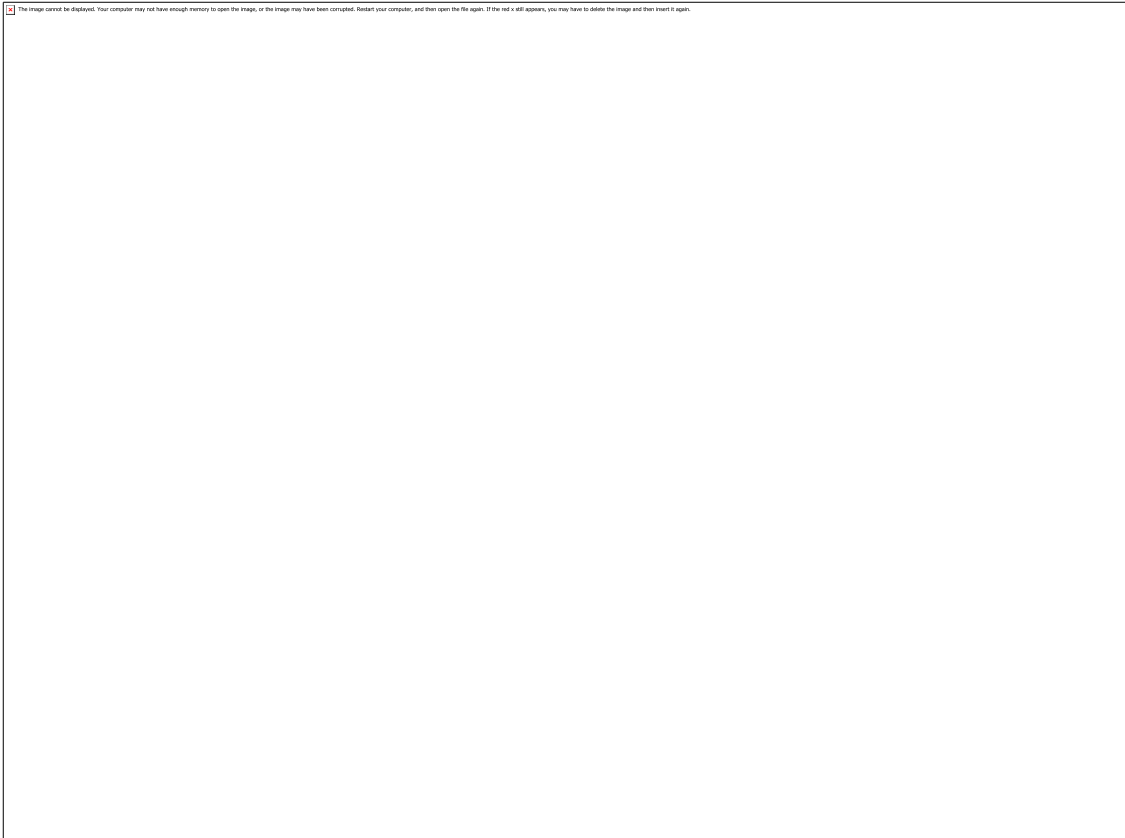
EVPmaker

EVPmaker is far more than just a program for generating synthetic raw material. Of course it can be used for that purpose now as ever, and who intends to use it merely as an "raw material source" will have no problems to operate the program. But the actual innovation is the

possibility to record whole "EVP Sessions". An EVP session can consist of any number of individual EVP. Each EVP is automatically provided with the current date and time. For each EVP a question and an interpretation can be entered. EVP sessions can be saved to disk and loaded again later. The raw material sequence of each EVP can be repeated as often as you wish, it can be saved as a WAV file, or it can be loaded into an sound editor where it can be processed or examined in any way. Every single raw material segment, from which the randomly generated sequence has been composed of, is stored in a "cue list". If the sound editor is able to display such a cue list, then these segments can be addressed and played back directly. In this way you can examine exactly, from which fragments a voice has been composed of.

Another feature is the possibility to use "real" phonemes for the generation of the raw material for EVP recordings. With sound editors such as *CoolEdit*, the phonemes can be cut out from an audio signal and saved to disk together with their label (phonetic transcription). These phonemes are then read by *EVPmaker*. While the phonemes are being played back in random order, their labels (thus the phonetic transcription symbols of the phonemes) are being logged. Later these symbols are being displayed together with the corresponding EVP sequence. So if you hear an EVP, you can additionally read it in phonetic transcription.

1.4. The functional principle of EVPmaker

You can imagine yourself EVPmaker as a meat grinder - or better, as a "sound grinder": Like a meat grinder grinds meat, EVPmaker "grinds" sound. It takes a source audio file (WAV audio format), "chops" it into small segments, and then plays the chopped sound back via the speakers connected to the sound card of your PC. Like a meat grinder has different grinding plates to vary the fineness of the ground meat, EVPmaker allows you to vary the segment size between 0.001 seconds and 10 seconds. If you're lucky and listen carefully to this "ground sound", you'll hear hidden personal messages within this "gibberish"...

Actually, there exist other programs called "sound granulators", like for instance GranuLab, which is used by musicians to produce interesting sound effects. Compared to this, EVPmaker is only a very simple sound granulator. But EVPmaker has some special features especially for EVP research. One of these features is the ability to log the sequence of the segments from the source WAV file, together with some other information (date, time, sequence number, question, heard answer), into an "EVP session" file. Additionally, the information in this session file can be used by EVPmaker to reproduce an previously generated EVP at any time, or to export an EVP to a new WAV file (output WAV file). An EVP session can contain several individual EVPs.

As I mentioned, the EVP session feature is optional - you can use it, but you don't have to. If you don't use it, you must record the chopped sound by any other method - for instance by a usual cassette recorder, or by the computer itself (while playing back simultaneously).

2. Technical and legal notes

2.1. Download, Installation

The current release of *EVPmaker* can be downloaded from the following WWW address:

- http://www.StefanBion.de/evpmaker/evpminst.exe [size about 1.6 MB]

To start the installation, please double-click the .exe file after the download has succeeded. The queries of the installation dialog may be simply confirmed by clicking on the "Next" buttons. Of course, the default values for the "Installation path" and the "Start menu group" can be changed as needed. Finally a click on "Install" will start the installation...

If you should want to uninstalled the program later, double-click the "EVPmaker" entry in the Windows standard software install/uninstall dialog ("Start > Settings > Control panel > Software").

Here is technical info for concerned users: No .dll or other files will be copied into the Windows system folder. Only the program and manual files will be copied into the application folder, and a Start menu group and a shortcut on the desktop will be created. Below the application folder an empty folder with the name "user" will be created which is intended to contain the source WAV files for the generation of the raw material, the session files, and the WAV files from exported EVP sequences. If you would like to use a different standard folder for this purpose, then you must enter this path as "Working directory" in the "Properties" dialog of the shortcut(s) to the program. Finally the file type EVP will be registered and associated to the program.

2.2. Copyright

EVPmaker has not been written in commercial interests, but for fun of programming and for scientific curiosity. Therefore, I don't want any money or other material returns for *EVPmaker*; thus the software is distributed as "Freeware". Nevertheless, I reserve all rights for this program, *EVPmaker* is Copyright © by Stefan Bion.

The idea on which the program is based - the generation of raw material for EVP recordings by random controlled assembling and playback of individual segments of an audio signal - is common knowledge and as such not subject to copyright.

2.3. Disclaimer

EVPmaker is supplied on an as-is basis. The author offers no warranty of its fitness for any purpose whatsoever, and accepts no liability whatsoever for any loss or damage incurred by its use. *EVPmaker* is not a supported product. The author accepts no commitment or liability to address any problems that may be encountered in using it; however, *EVPmaker* is continually being developed and improved, so he is always interested to hear about any bugs or deficiencies.

2.4. Distribution

The program may be distributed or made accessible to the public in its complete and unchanged form, along with the manual. Concretely this means that only the unchanged installation file evpminst.exe may be passed on.

2.5. Feedback

Your feedback regarding bugs or results in your work with *EVPmaker* is greatly appreciated; my current e-mail addres can be found here.

2.6. Updates, version history

EVPmaker is continuously being developed; always the latest version is available for downloaded. Major changes and improvements are marked by an increased version number. For minor bugfixes or for "cosmetic" corrections only an internal version number will be increased, which is displayed under the "Version" tab in the "Properties" window (available through right-click on the program icon).

Here now follows a survey of updates, sorted by the "major" version number:

Version 1.0 (06/13/2000)

- First release.

Version 1.1 (06/22/2000)

- Added option "Z-Cross" (Zero Cross Adjust) to eliminate the "clicks" between the playback of segments
- Display cue labels without blanks between them.
- Font can be set for the display of the cue labels (by right-click).

Version 1.2 (07/22/2000)

- Bugfix: Editing of question and EVP interpretation didn't work - now it does.

Version 1.3 (04/01/2001)

- For the segment length you can now enter a "From" and a "To" value so that the actual segment length used by the program will vary randomly between a minimum and a maximum value.
- The program now supports 'Drag & Drop', i.e. WAV and EVP files can be opened by dragging files from the Windows explorer into the program.
- If you double-click on an EVP file, *EVPmaker* will be opened and the EVP session will be loaded. Besides EVP files also WAV files can be opened via the command line.
- The position of the *EVPmaker* window will be saved on Exit and restored when the program is started the next time. This Option can be deactivated.

Version 1.4 (04/08/2001)

- The source for the generation of random numbers can now be chosen between pseudo random numbers (like previously), input of the sound card, and a file.
- 'Drag & Drop' now also works for PCM files as a random source.
- Bugfix concerning the "Z-Cross" (Zero Cross Adjust) function.

Version 1.5 (04/16/2001)

- New random source added: Fractal formula (Logistic Equation).
- Option "Best Sample Rate" added: You can choose now whether the sample rate of the loaded WAV file or 44100 Hz is used for the recording with "Random source = Soundcard".
- Option "Use absolute values" added: Specifies whether for "Random source = Fractal formula, Soundcard or File" the absolute values are taken as random numbers, or if 32-bit numbers are computed from them.

- Two new functions to write and log the random numbers into a text file (for statistical analysis).

Version 2.0 (05/20/2003)

- An introducing Step-By-Step Guide with practical examples is now available via **Help > Quickstart Guide** in the menu.
- New "Cross Fade" option to make the output sound "softer".
- New option to use separate folders for each file type (source WAV files, output WAV files, EVP session files, random number source files, random number files).
- *EVPmaker* can now add effects to the source WAV file such as echo or reversing.
- "Visual Feedback" to possibly enhance the assumed communications.
- Speed control (50...200%) for playback.
- Recording function - you don't need another program anymore to record source WAV files.
- Recorded/changed source WAV files can now be saved.
- If there is more than one sound card inside the computer, you can select now which one is used for playback, for record, and as random number source.
- No more limitation of the number of Cues in WAV files to 1000.
- If the WAV file being part of the EVP session file cannot be found any more because e.g. it was moved or renamed, a dialog appears now to search for the file.
- The smallest segment length is now 1 ms (instead of 10 ms).
- The font of the cue labels will now be saved in the INI file.
- The option "Z-Cross" (Zero Cross Adjust) is now available also if "Use Cue List" is activated.
- ... and 5 further minor changes.

  Finally also 3 bug fixes:

- Under certain conditions there was an error message saying "Access violation" if you answered "No" to the question if a changed session file should be saved. This bug also caused "endless saving" if a session was saved repeatedly.
- An error message saying "Division by zero" appeared when a WAV file was tried to open which was no standard PCM file but an "ACM Waveform" file.

- If short segments (< 31 ms) were used, there was a small audible gap at the beginning of the random controlled playback and of the playback of EVP session files.

Version 2.1 (07/05/2003)

- New option "Normalize to achieve optimal recording level" for the automatical adjustment of the recording level.
- New function "Normalize signal" in the "Effects" menu to adjust the level of a loaded source WAV file to an optimal value.
- 2 bugfixes in the recording function and 1 bugfix in the "Open WAV file" function.

2.7. Known bugs and restrictions

- Only Cue Lists will be considered. Other kinds of information in WAV files such as for instance the Play List will be ignored and are lost after saving the source WAV file!
- For some WAV files that don't keep to the standard (e.g. a missing pad byte with an odd chunk size) it's possible that the Cue List will not be found.
- If Windows is configured to use "Large Fonts" (120 instead of dpi), occasional display errors may occur in the program window (e.g. labels will be cut off).

3. Program description

3.1. Start

After this survey I will now describe the functions of the program. But first of all, I'd like to invite newcomers to open the introducing Step-By-Step Guide via **Help > Quickstart Guide** in the menu and to replicate the given practical examples.

After *EVPmaker* has been installed, it can be started either by double-clicking the "EVPmaker" icon on the desktop or by choosing "EVPmaker" from the Start menu.

EVPmaker

After the start, the main window of the program appears:
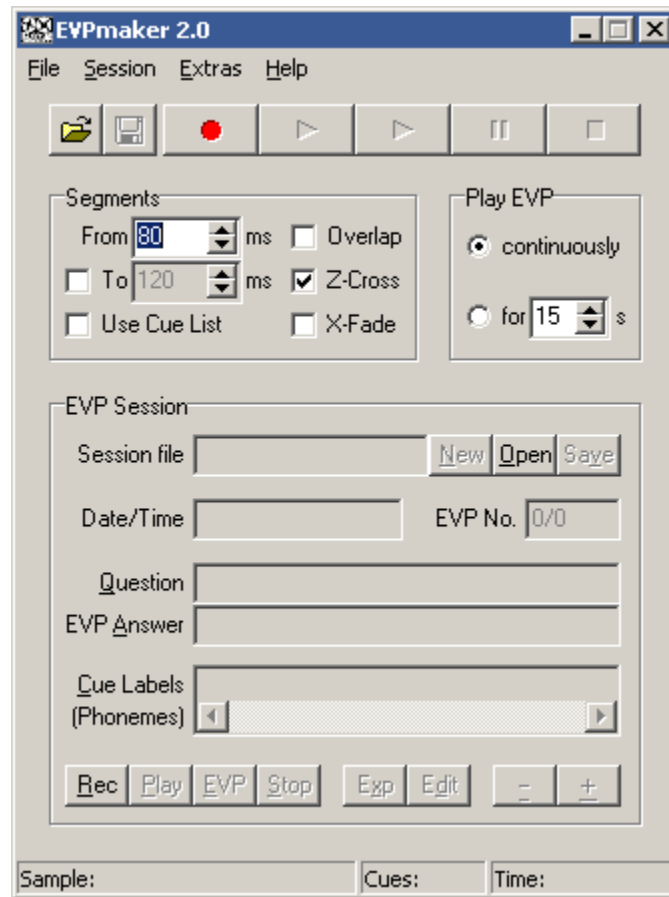
Overview

First of all, here follows an overview of the individual areas of the program window:

At the top there is the menu bar (**File Session Extras Help**). All functions of the program except of those in the menus **Extras** and **Help** can be reached by buttons as well as via the menu. In the menu, there are shortcuts displayed for most of the functions. These shortcuts usually consist of letters which must be pressed together with the Ctrl key in order to activate the corresponding functions.

Below the menu bar there are the buttos ☞ (Open), 🖫 (Save), ● (Record), ▶ (Play), ▷ (Make EVP), ‖ (Pause) and ■ (Stop). These buttons serve to load a source WAV file, save it, record sound, play it back, start the random controlled playback, pause and continue the playback, and to terminate the playback. How this works exactly will be explained in detail in section 3.2. ("Generating raw material").

Depending on which functions of the program are available at the moment and which aren't, the buttons as well as other elements will appear either activated (colored) or deactivated (grey).

For the buttons there exist shortcuts as well, so that every function can be executed without using the mouse. For the upper buttons these are the function keys F2 to F8, and for the remaining buttons these are the underlined letter which has to be pressed simultaneously with the Alt key. The shortcut letters of the menu functions (Ctrl-...) correspond with the shortcut letters of the buttons (Alt-...).

Below the buttons the two areas **Segments** and **Play EVP** are following. Under **Segments**, the length of the individual segments which are played back randomly can be entered. Furthermore you can select here, whether*EVPmaker* itself shall determine the segments for the random controlled playback, or whether the sections defined in the Cue List shall be used instead (**Use Cue List**). The first option is very easy to use, because any WAV file is suitable. For the second option, first of all a cue list has to be created and stored into the WAV file using a sound editor. In the area **Play EVP** you can choose whether the random controlled playback shall happen**continuously** until the ■ (Stop) button is clicked, or whether it shall stop automatically after a certain number of seconds.

Below the two function groups **Segments** and **Play EVP** there is the area **EVP Session** which takes up the largest area of the program window. Here a new session can be started, sessions can be stored in session files, or previously recorded sessions can be loaded. For each EVP a question and the heard interpretation of this EVP can be entered. For each session, as many EVP as you like can be recorded. While skipping forward and backward between the individual EVP, the corresponding questions and interpretations are being displayed. If the cue list of the source WAV file has been used to generate the raw material for the EVP, additionally the cue labels (phonetic transcription) will be displayed in this area. Later in this manual an example will be given which shows how to work with "EVP sessions".

At the bottom of the program window the status line is located which is subdivided into three parts. Here some parameters of the loaded source WAV file are being displayed: The sample frequency (e.g. 44100 Hz), the sample resolution (8 or 16 bit), channels (stereo or mono), number of cues, duration of the signal in seconds.

3.2. Generating raw material

This section will describe how *EVPmaker* is used to generate acoustic raw material for EVP recordings. If you just want to make some EVP recordings, this is all you have to know. First of all, a source WAV file has to be loaded (option 1) or recorded (option 2). If possible, it should be a recording of speech. For example, you could record something from the radio, or you could speak into the microphone.
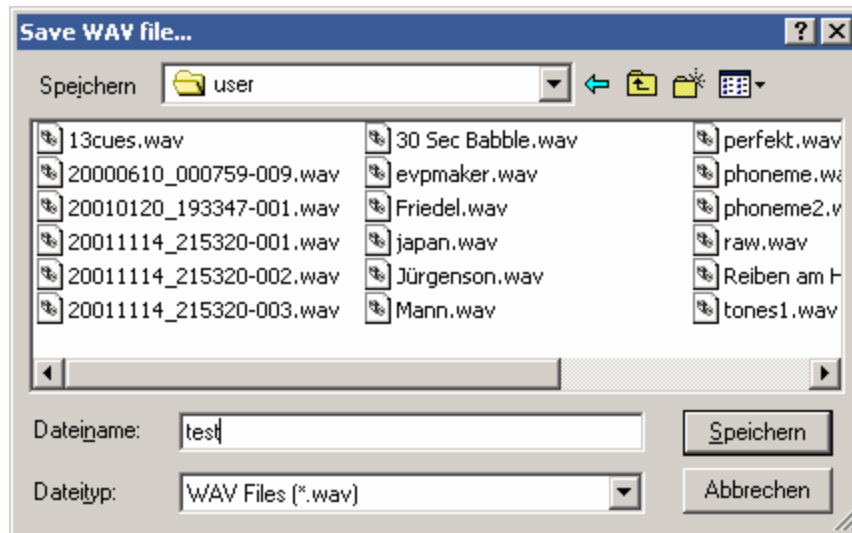
Option 1

In order to record a WAV file, the radio must be connected to the "Line in" input resp. the microphone must be connected to the "Mic" input of the sound card via a cable. At the mixer (this is the program which is used to adjust the various inputs of the sound card; it can be accessed by double-clicking the little speaker symbol besides the windows clock on the lower right), the corresponding input ("Line In" or "Mic") must be activated, and the controls should be in middle position. Next, click on ●
 (Record), and a window will open which lets you choose the suitable recording parameters:
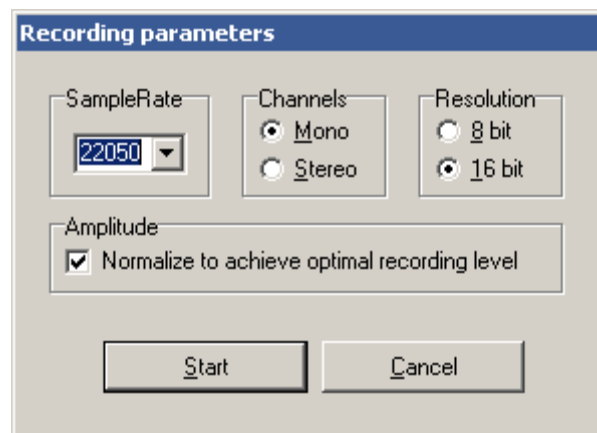
For the sample values, 11025 or 22050 Hz, 8 bit resolution and one channel (mono) should be sufficient for this purpose. If the option **Normalize to achieve optimal recording level** is activated, the level of the recorded signal will automatically be adjusted to the greatest amount of amplification that will not result in clipping. A click on the **Start** button will begin the recording immediately. While the recording is running, the time display in the status bar will be incremented. After you have recorded for some minutes or seconds, click on ■ (Stop) to end the recording.

To save the recording for later use, click on 💾 (Save), browse to the destination folder and enter a filename for the WAV file:

Of course, saving the file isn't necessary for the generation of raw material; if you prefer to generate "fresh" basic material for each EVP recording, you don't need to save the recording.

Option 2

To open an existing WAV file, click on 📂 (Open), and an "Open" dialog window will appear, which lets you select the file.
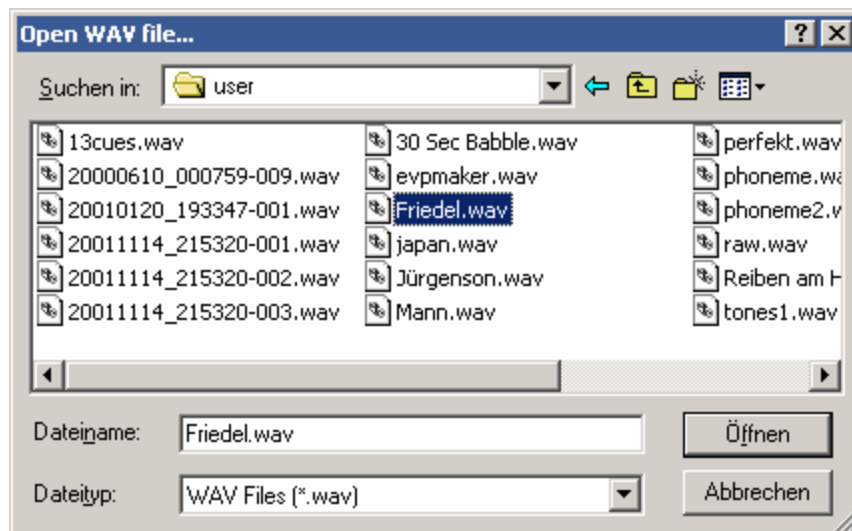
Alternatively, a WAV file can also be opened simply by dragging the file with the mouse button pressed from the Windows Explorer into the *EVPmaker* window and drop it there ("Drag and Drop" method). By

the way, the same works also for the EVP files which will be discussed later.

The name of the loaded WAV file appears now in the title line of the program, and in the status line further information is given (sample frequency: 9395 Hz, resolution: 8 Bit, channels: mono, Cues: 0, Duration of the sample: 51.92 seconds).
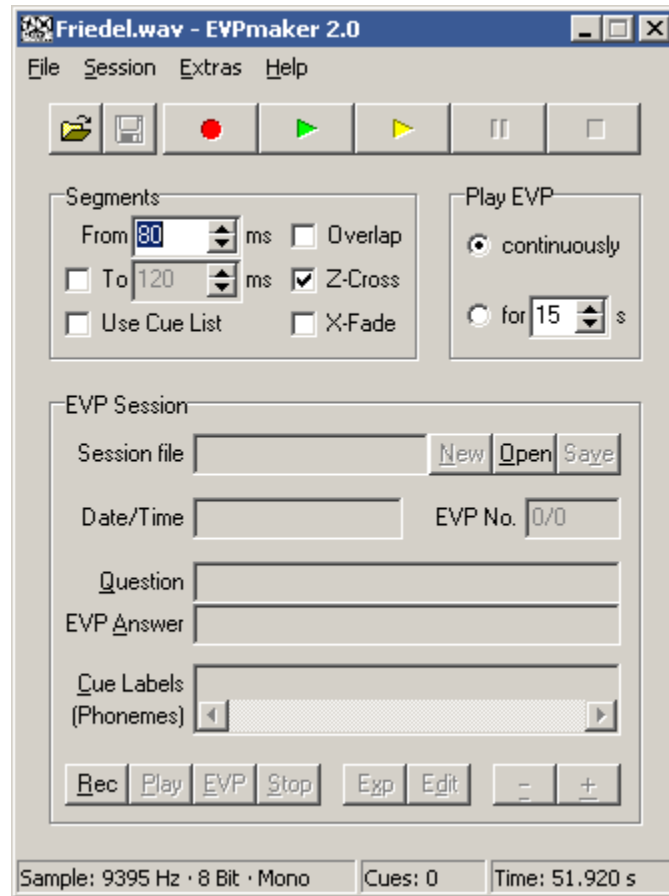
Playing the entire recording

By clicking on the button ▶ (Play) you can listen to the whole WAV file. The playback can be paused by clicking on ‖ (Pause). By another click on ‖ the playback is continued. The playback either runs until the end and will then be stopped automatically, or it can be stopped prematurely by clicking on the ■ (Stop) button.

Random-controlled playback

The random controlled playback can be started by clicking on the ▶ (Make EVP) button. Here the buttons ‖ (Pause) and ■ (Stop) are effective as well. While the random controlled playback is running, an

EVP recording can be performed as usual. It turned out to be practical to send out the computer generated random speech signal into the room via speakers and to receive it by a microphone which is connected to a cassette recorder. The questions of the experimenter are being recorded along with the acoustic raw material. As a microphone, an amplifier microphone like for instance the "Hannover-Mikrofon" which is offered by the VTF or which can be built by yourself is suitable excellently.

Recording directly into the computer

It's also possible to record directly into the computer, so that the use of a cassette recorder is unnecessary. Required is a sound card which supports "full duplex", i.e. it must be capable of recording and playing back simultaneously. Most sound cards today meet this requirement. The microphone must be connected to the "Mic" input of the sound card instead of the cassette recorder. While the raw material is played back via the speakers, a sound recorder like for instance *CoolEdit* is turned to "recording" mode at the same time. Some sound cards require the same values for sample frequency, resolution and channels: If for example the source WAV file which is used for *EVPmaker* has the values "22050 Hz, 16 bit, mono", then exactly these values must be used for the microphone recording in *CoolEdit*. Afterwards, the EVP recording can be listened to at the computer. Some sound editors offer the valuable feature to mark selected segments within the wave form by written notes. In *CoolEdit*, this can be done with the "Cue List" which can be accessed from the "View" menu. In this way, EVP interpretations can be entered directly, and the voices can be accessed later very quickly.

Altering the segment durations

But now back to *EVPmaker*: By changing the settings within the framed areas **Segments** and **Play EVP**, the random controlled playback of the segments can be varied further. First the segments: Here are two edit fields for the duration of the segments in milliseconds (ms), i.e. 1/1000 seconds. By default, only the upper edit field labelled with **From** is active, while the other one, which is labelled with **To**, is greyed (= inactive). If the box on the left side of the lower edit field is checked, this field becomes active, too. The values in these fields control how much the signal is being chopped during the random controlled playback. If only the upper "From" value is active, all segments are equally long. If

also the lower "To" value is activated, then the segment length varies random controlled between these two values, which results in a more dynamic raw material. The segment duration can be increased or decreased by clicking on the little up/down arrows besides the input field. The valid range covers values from 1 ms to 10000 ms, which is equivalent to one thousandth to 10 seconds. Values around 100 milliseconds (= 0.1 seconds) have turned out to be convenient. If the values are too big, parts of words or even whole words may become audible. If the values are too small, the signal is being distorted very much, which however can lead to interesting results.

Right beside the input field for the segment duration there are the three checkboxes **Overlap**, **Z-Cross** ("Zero Cross") and **X-Fade** ("Cross Fade"), which will be explained now.

Overlapped segment positions

Overlap has the following meaning: Normally all segments are located seamlessly one after another on exactly defined positions. With a signal of 10 seconds and 100 ms segments there are for example exactly 100 different possible positions where segments can be located (a).
If **Overlap** is checked, any segment can start at any position within the audio signal, thus segments can overlap each other (b). This results in a higher variation of the generated raw material:
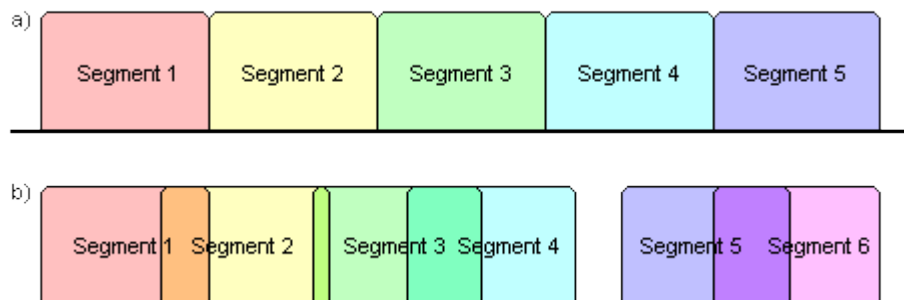
Positions of the segments within the source WAV file a) without and b) with "Overlap"

Avoiding Clicks

If **Z-Cross** is checked, segments will be cut out from the audio signal only at positions where the wave form crosses the center line (zero amplitude). By this, audible pops or clicks during the random controlled playback of the segments are being eliminated. However, a side effect of this function is that the segment duration no more matches the preset

value, but usually is a bit greater (for example 102 ms instead of 100 ms - it depends on how far the next zero crossing point is apart). In very unfavorable cases, it might even occur that the next zero crossing point will be found much later, or that it won't be found at all, so that single segments may last several seconds. This can for example occur when the signal has an DC Bias, i.e. when the zero amplitude of the signal has an offset towards the center line of the wave window, so that the wave form crosses the "actual" zero line only now and then. In such a case it might help to load the WAV file into a WAV editor and to "adjust" the signal (in *CoolEdit*, choose "Transform > Amplitude > Normalize", check the option "DC Bias Adjust", and normalize the signal to 90%).

A softer sound

With activated option **X-Fade**, consecutive segments will be gradually cross faded:
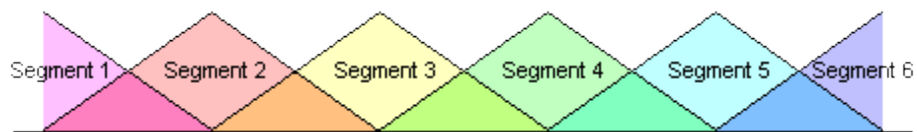
While the volume of the new segment (Segment 2) gradually increases, the volume of the previous segment (Segment 1) decreases simultaneously. After reaching the maximum level, the current segment (Segment 2) slowly fades out while at the same time the next segment (Segment 3) slowly fades in, etc. This fading yields a "softer" sound since the cuts between the segments are no longer audible. However, with the same cutting frequency the length of each segment will double.

Using a Cue List instead of arbitrary segments

As mentioned, besides the option to use segments of fixed duration, the program can also be instructed to use the "cues" which have been stored in the WAV file to generate random speech. To achieve this, the option **Use Cue list** inside the area **Segments** must be selected. However, the just mentioned options **Overlap** and **X-Fade** take no effect if the cue list is used. But using cues instead of fixed-length segments will be explained in detail later.

Automatic playback stop

For EVP recordings, it is sometimes quite practical if after each asked question the raw material is being played back only for a certain time and then stops automatically, so that the next question can be asked. For this purpose,*EVPmaker* offers the option to preset a duration in seconds, after which the random controlled playback stops automatically. Normally, the playback runs until the ■ (Stop) button is clicked. This is the case if in the area **Play EVP** the option **continuously** is selected. To activate the automatic stop of the playback, **for *x* s** must be selected. In the corresponding input field of this option, a number of seconds can be entered, after which the playback of the raw material is being stopped. By clicking in the little up/down arrows, this value can be varied from 1 to 99 seconds.

This is all you have to know in order to generate raw material for EVP recordings. Any further description is only interesting if you intend to use *EVPmaker*'s **EVP Session** feature in order to document and examine the obtained EVP scientifically.

3.3. Recording a session

The **EVP Session** feature is primarily meant to take down the generated raw material into a log file in order to be able to examine and to analyze it later. Thus it serves mainly scientific purposes and is less intended for all-day use, particularly since experience shows that most EVPs are audible only in the acoustic recording of the raw material and not already in the original raw material itself. By the unadulterated recording of the original raw material with the help of the function **EVP Session** one has, however, the possibility of comparing both with each other and that way documenting possible "transformations".

In the session file (EVP file) not the result in form of a new WAV file is saved, but merely all parameters which have led to the generation of this raw material are recorded. This includes the name and the location (folder) of the used source WAV file as well as for each segment its position and length within the source WAV file. With the help of these details *EVPmaker* then is able to reproduce the raw material exactly. However, an "export" function allows also to store the acoustic final result as WAV file in addition (more on this later in this manual).

In order to record a session, the recording mode must be activated by clicking the button **Rec** in the area **EVP Session**. While the recording mode is active, the label **Recording** appears in red letters on the right side of the upper border of the frame of this area:
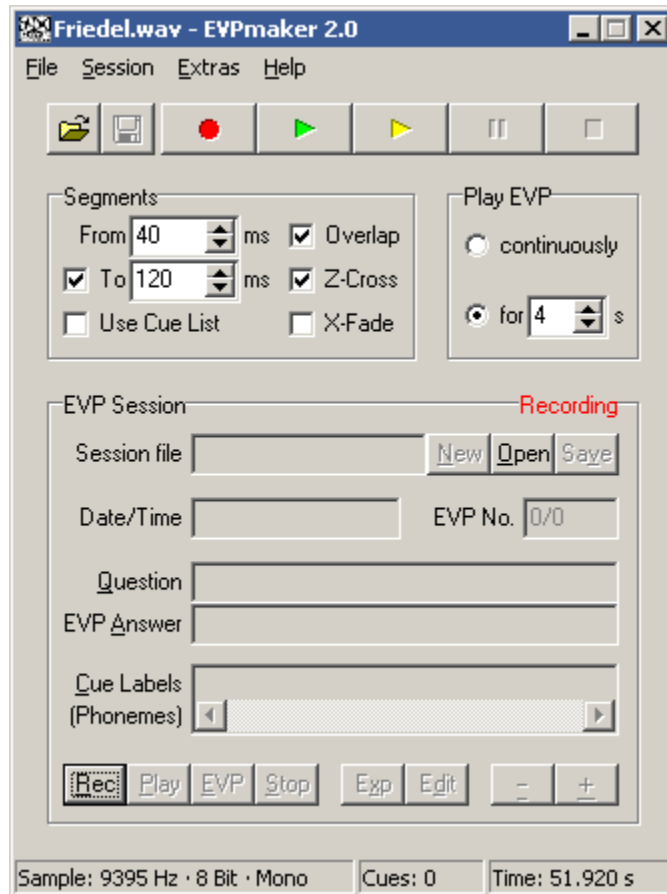
The recording mode can only be activated if either a WAV file has been opened, or a previously made recording has been saved as a WAV file.

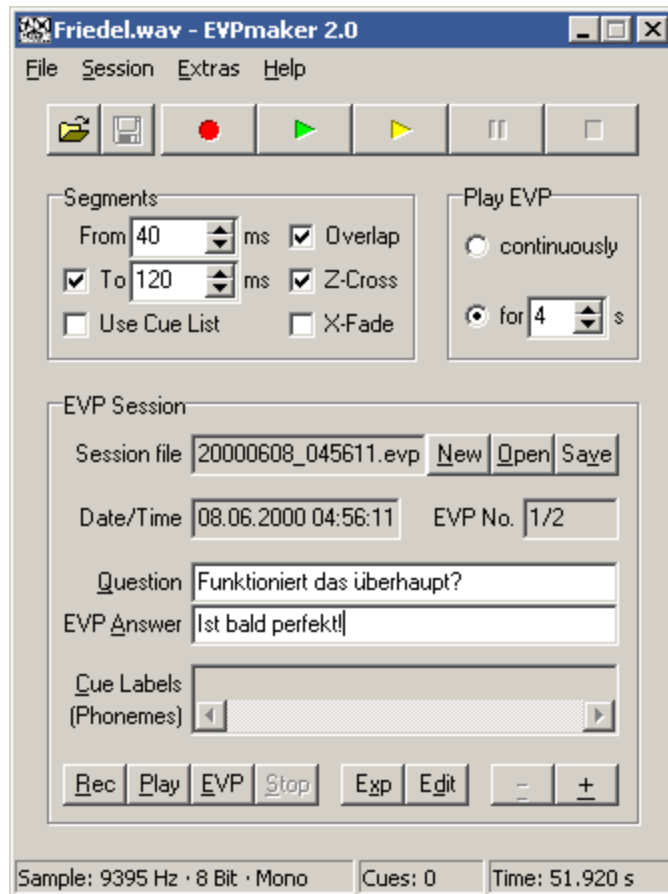If a session file is already open, new EVP will be appended to the session.

If during activated recording mode the random controlled playback is being started via the button ▷ (Make EVP), at first a dialog box will be opened which allows you to enter an question:
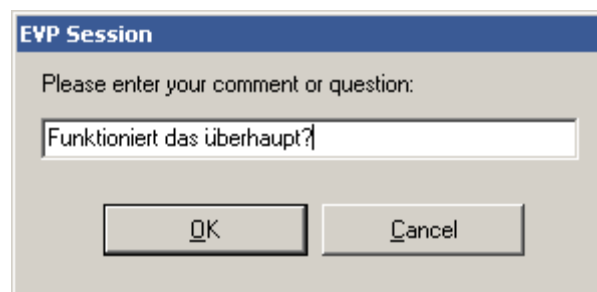
The question or the comment which may be entered here has only documentation purposes and doesn't have any effect on the generation of the raw material. However, with regard to the documentation of possible references of the EVP to a previously asked question it would be important to note the (mental or verbal) asked question. After closing the dialog box by clicking either **OK** or **Cancel** (**OK** will store the entered text into the session, **Cancel**will discard it), the playback of the raw material begins. Simultaneously, the numbers of the randomly played back segments resp. of the cues are being logged. After playback has been stopped (either by clicking the upper ■(Stop) button, or automatically after a certain number of seconds), the next EVP can be recorded immediately by clicking on ▷ (Make EVP) once more and entering a new question. At any time you can listen to any EVP which has been recorded so far, or to the entire session, by clicking on the lower **Play** resp. **EVP** button (explained below). To finish a session, the recording mode has to be terminated by clicking on **Rec** again. The red label**Recording** will then disappear. The recording can be continued at any time later, but it is recommended to create a new session file for each EVP session. To start a new session while a previous session is still opened, click on the **New** button. If the previous session had not yet been saved, you will be asked to do so. The current session can be saved at any time by clicking on **Save** (explained below).

3.4. Playing back a session

Every single EVP that has been recorded in the session file is automatically being provided with the current date and time (**Date/Time**) and a consecutive number (**EVP No.**). The number before the slash is the number of the currently displayed EVP (sequence number), and the number after the slash is the total number of recorded EVP in this session. You can skip between the individual EVP by clicking on the buttons labelled **-** and **+**. Instead of clicking these buttons, you can alternatively use **-** and **+** on your keyboard. The previously entered question now appears in the field labelled **Question**:

Friedel.wav - EVPmaker 2.0

File Session Extras Help

Segments
From 40 ms ☑ Overlap
☑ To 120 ms ☑ Z-Cross
☐ Use Cue List ☐ X-Fade

Play EVP
○ continuously
◉ for 4 s

EVP Session
Session file 20000608_045611.evp New Open Save
Date/Time 08.06.2000 04:56:11 EVP No. 1/2
Question Funktioniert das überhaupt?
EVP Answer Ist bald perfekt!
Cue Labels (Phonemes)

Rec Play EVP Stop Exp Edit - +

Sample: 9395 Hz · 8 Bit · Mono Cues: 0 Time: 51.920 s

By clicking on the button **Play**, the entire session including all EVP will be played back completely, whereas the button **EVP** playes back only the currently displayed EVP. **Stop** terminates the playback prematurely. You can enter your interpretation of an EVP into the field **EVP Answer**. This also is important with regard to a documantation of references of the EVP to a previously asked question.

### 3.5. Saving and loading a session

After a session has been recorded, it should be saved into a session file. Any saved session can later be loaded into *EVPmaker* again in order to process it (for example to edit the interpretation text) or to listen to it. To save a session, click on the button **Save**. A dialog window will be opened to save the session file:
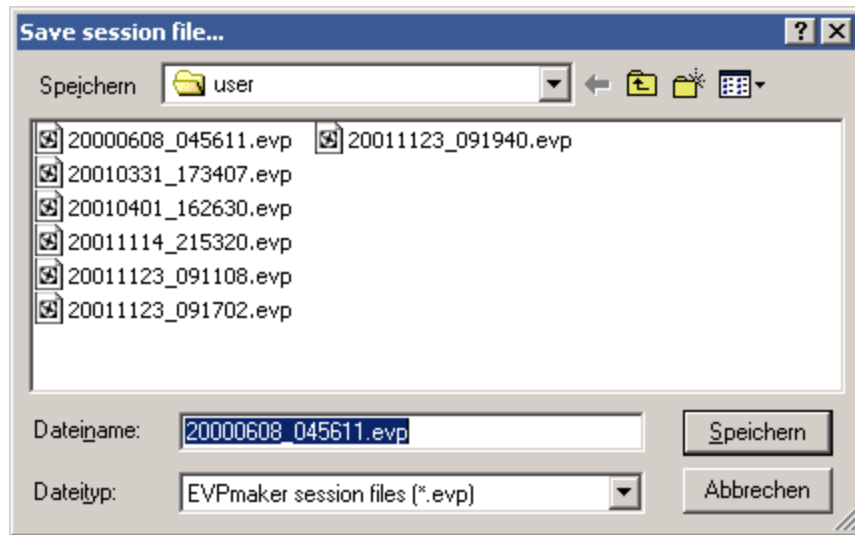
The suggested filename is a combination of date and time of the first EVP which has been recorded in this session file. In the above example this is the session of 12 June 2000, 19:43:10 h. Of course the filename can be changed if it appears too "illegible" to you. The file extension is normally ".evp".

Saved sessions can be opened by a click on **Open** or by using the "Drag and Drop" method. At the same time also the corresponding source WAV file which has been used to generate the raw material will be loaded automatically. Thus the used WAV file should be preserved well; without it, the session cannot be opened later!

If the source WAV file can't be found anymore when opening a session file because it has been renamed or moved to another folder, EVPmaker complains and asks if you would like to search for the matching file:
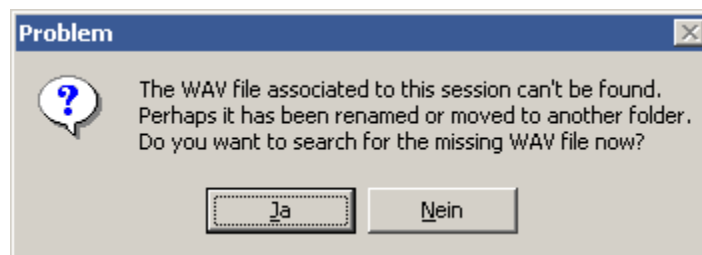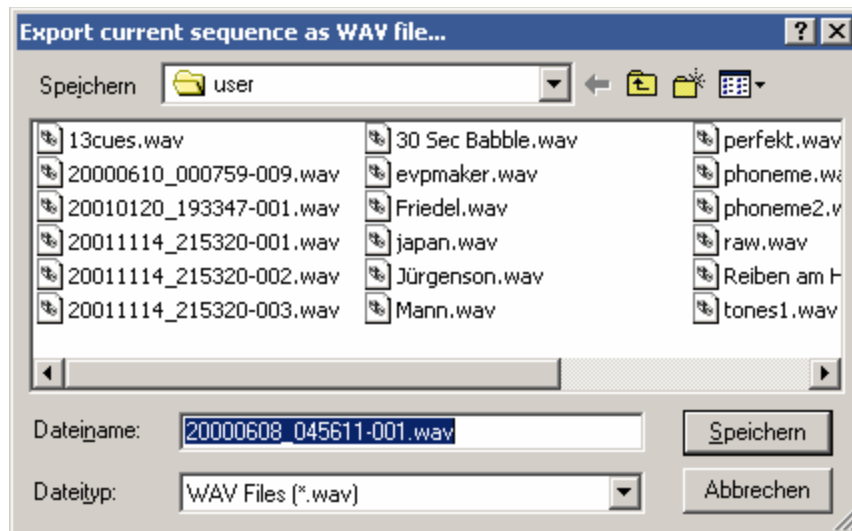

If you answer **Yes**, an "Open" dialog will appear which lets you browse to and open the missing WAV file.

After a session has been saved or an existing session has been opened, its filename will be displayed in the field labelled **Session file**.

3.6. Saving an individual EVP as WAV file

Perhaps you would like to save individual sequences of EVP raw material in order to archive them or to send them by e-mail. For this purpose, *EVPmaker* offers the export function which allows you to export the currently displayed EVP as a WAV file. After clicking on the button **Exp**, an dialog window is opened to save the file:

Export current sequence as WAV file...

Speichern: user

13cues.wav	30 Sec Babble.wav	perfekt.wav
20000610_000759-009.wav	evpmaker.wav	phoneme.wa
20010120_193347-001.wav	Friedel.wav	phoneme2.v
20011114_215320-001.wav	japan.wav	raw.wav
20011114_215320-002.wav	Jürgenson.wav	Reiben am H
20011114_215320-003.wav	Mann.wav	tones1.wav

Dateiname: 20000608_045611-001.wav   Speichern

Dateityp: WAV Files (*.wav)   Abbrechen

The suggested filename is composed of the session file name, followed by a dash (-), followed by a three-digit number. This number is the consecutive number of the current EVP which is displayed behind **EVP No.**

3.7. Loading an EVP into a Wave file editor

In order to examine an EVP more exactly, it's recomended to open it in a suitable sound editor. My favorite one is *CoolEdit* which can be downloaded at http://www.syntrillium.com/ as a 30 day evaluation version. To load an EVP directly from *EVPmaker* into a sound editor, Windows must be configured so that WAV files will automatically be opened in this sound editor by a double-click. If this is not yet the case, this can be changed manually: In Windows Explorer, choose "Extras > Folder options > File types", and under "Registered file types" choose the type for WAV files, click on "Change", and in the window "Open with" choose your sound editor. (Note: Some terms may be different on your computer since I only have a German Windows version.)

If these preparations are done, you can load the currently displayed EVP into the editor by clicking *EVPmaker*'s **Edit** button. This might look like this (here still the old version "CoolEdit 96"):

The blue triangles above and below the wave window are the markers of the individual segments of which *EVPmaker* has composed the EVP sequence. These markers have been stored as "cues" in the WAV file and are now being displayed by *CoolEdit*. To show the cue list, choose "View > Cue List" from *CoolEdit*'s menu. The list of the individual segments might for example look as follows:
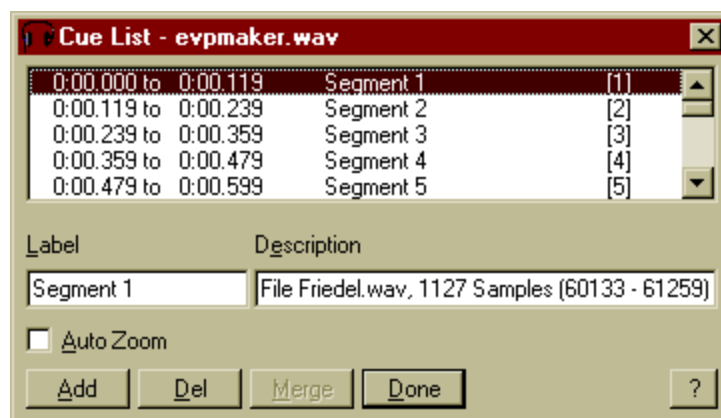
The individual segments are being displayed one below the other. By using the scrollbar on the right margin, you can scroll through all of the segments. Double-clicking a segment selects that segment in the waveform. In the first column of the cue list you see the exact positions

of the segments within the loaded WAV file in seconds. The next column shows the labels of the segments. All segments are numbered consecutively, starting with 1. The label is also being displayed in the field "Label", if you click one of the cue list entries. Right beside the label there is a "Description" field which displays for each segment the name of the original WAV file (that one which*EVPmaker* used to generate the EVP sequence), the number of samples, and the first and the last sample within the original WAV file.

An EVP which was previously discovered in *EVPmaker* can now be examined much more precisely. For example you can zoom into the signal or switch to spectral view in order to analyze the frequency components of the signal:


BTW: Not only those EVP which are loaded in the WAV editor are provided with a cue list, but also those EVP which have been exported as WAV files.

3.8. Creating and using a phoneme set

As mentioned above, *EVPmaker* can not only use arbitrarily choosed segments for the random controlled playback, but also individually selected parts which have been stored in the cue list of the source WAV file. By means of the cue list, a set of phonemes can be created which

can be used to synthesize random speech. Phonemes are the smallest sound elements speech is being composed of; this comprises all consonants and vowels. To learn which phonemes are existing, look into a dictionary where the pronunciation of the language is explained. Now record a suitable text - either spoken by yourself, or an existing one -, select every single phoneme and add it to the cue list. For a label, you should use a short name. Since you can't use phonetic transcription symbols in the cue list, you have to manage with a kind of "pseudo phonetic transcription". In the Appendix I have listed the phonemes which I have used, along with their names and some pronunciation examples. [2]

Next, zoom into the signal and select the phonemes by ear and by sight:
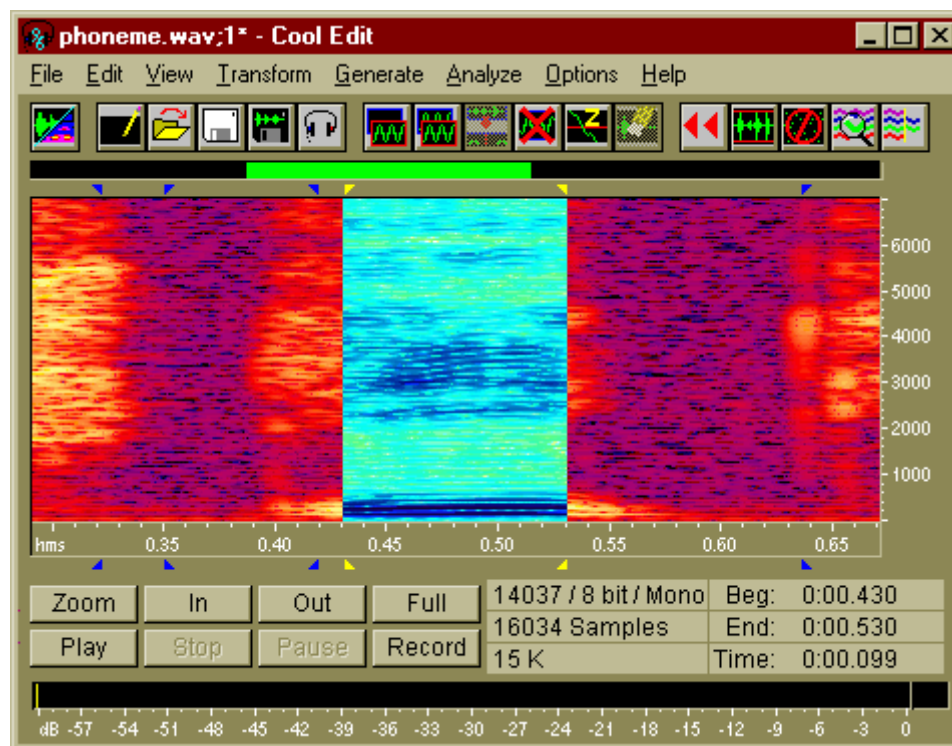

Before you add a phoneme to the cue list, choose "Edit > Zero Crossings > Adjust Selection Inward" from the *CoolEdit* menu to align the selection to the nearest places where the waveform crosses the center line in order to eliminate clicks and pops. Then click on the "Add" button of the cue list window and enter a name for this phoneme into the field named "Label":
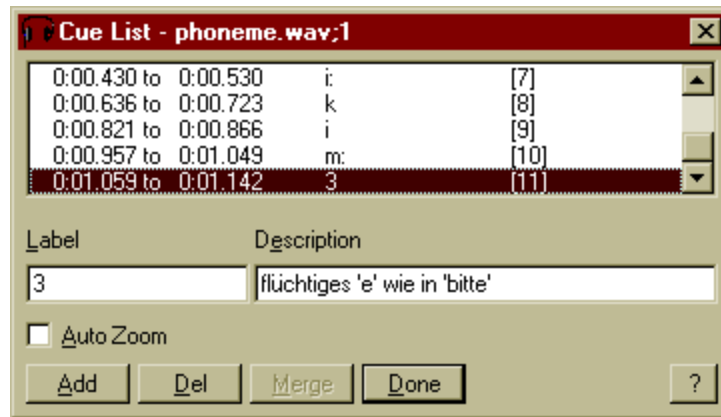
Optionally you can enter a description. By the way, the labels can be used multiple, i.e. they needn't be unique, so phonemes can be stored in different variations (durations, pitches etc.) using the same name for it. To simulate a natural flow of speech, you could additionally include a few pauses.

To save memory, you could open a second *CoolEdit* window and copy each phoneme you have selected in the first window into this second window so that all phonemes follow one after the other without gaps.

When saving the phoneme set to disk, pay attention that the option "Save extra non-audio information" in the Save dialog is checked! If you forget this by mistake and overwrite an already existing phoneme file and then close Cool Edit, your complete cue list will from now on reside in Nirvana... ;-)
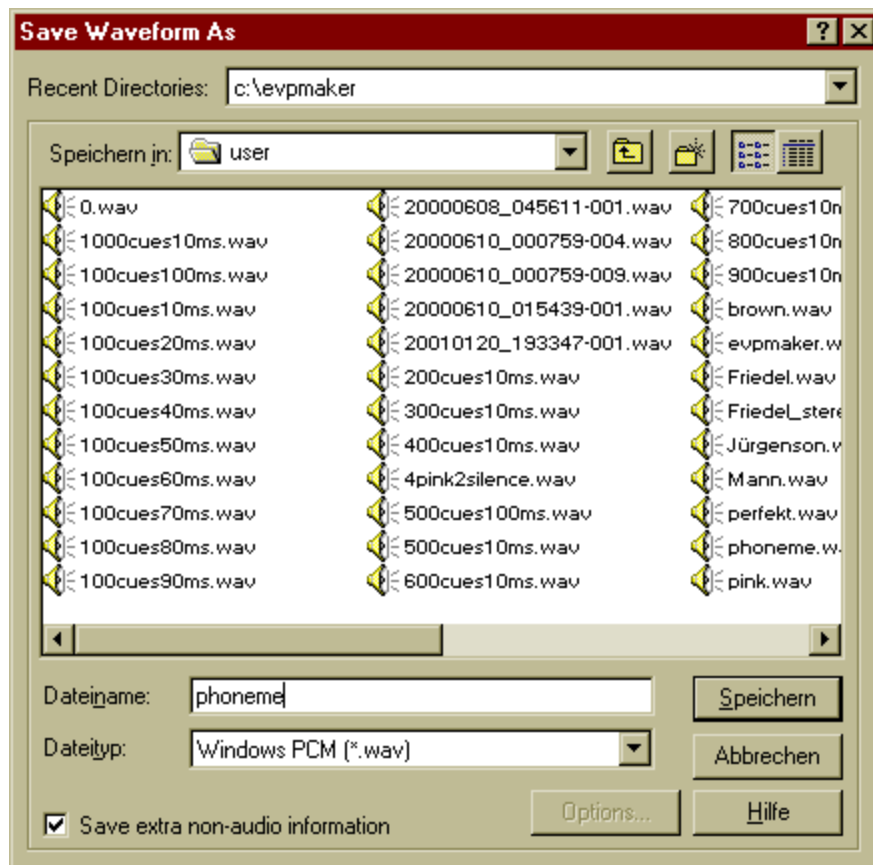
The phoneme file can now be opened in *EVPmaker*. Below in the status line, after **Cues**, the number of the loaded phonemes are now being displayed. In order to use these phonemes instead of arbitrarily segments for the generation of the raw material, the option **Use Cue list** must be selected:
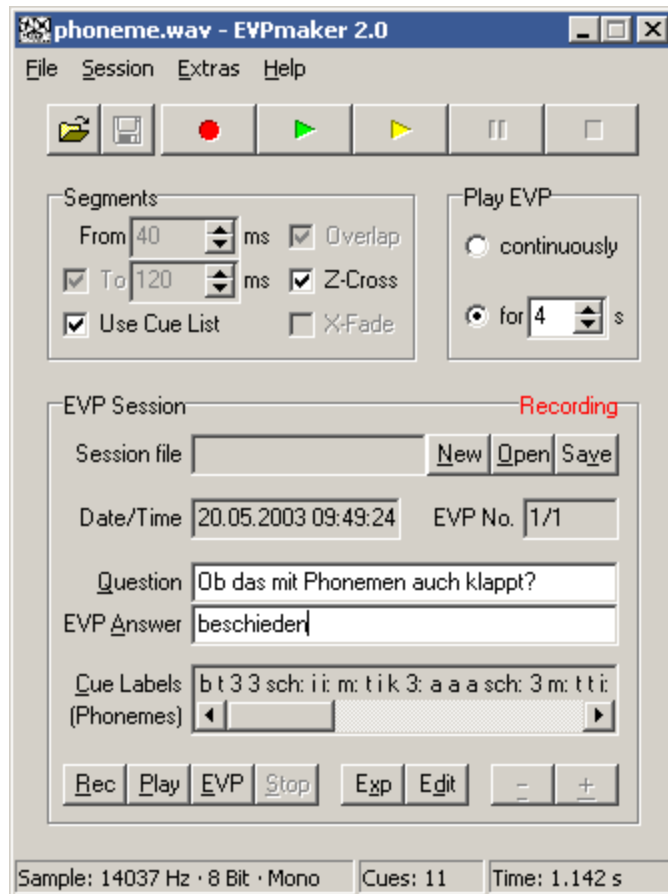
The further procedure is the same as described in section 3.3. ("Recording a session").

In addition to the heard interpretation of an EVP, you can now read the phonetic transcription which is displayed in the field **Cue Labels**. To change the font which is used to display the phonetic transcription, right-click into this field and choose another font from the Font dialog. Individual sections or the complete line of phonetic transcription can be copied to the clipboard and pasted for instance to a text editor. Use the mouse to select a portion or the entire line and press the keys "Ctrl" and "C" simultaneously to copy the selected part to the clipboard. In your text processing program, press "Ctrl"+"V" to insert the text from the clipboard.

In the example which is displayed above, for example the word *"beschieden"* (German for: *"notified"*) was heard. In phonetic transcription this corresponds to the sequence "b t 3 3 sch: i i: m". At first sight this sequence has no big similarity to the word "beschieden", but as everybody knows the human hearing is pretty flexible...

To examine this sequence further, the EVP is being loaded into a wave editor by clicking on **Edit**:

Here the section which includes the heard phonetic sequence *"beschieden"* has been zoomed. In the spectral view you can clearly recognize the various phonemes: From 2.13 to 2.20 the plosive "b" with a preceding pause before suddenly the air deflates between the lips, then from 2.20 to 2.25 the inappropriate "t" - also a plosive with preceding pause -, followed by two "3" vowels (called "schwa" vowels), followed by a "sch" which can be recognized in the spectral view as hissing. Next the two "i" which result in a long "i:", then the "m" which sounds like am "n" with a preceeding plosive because of its suddenly (in fact unnaturally) beginning.

In the cue list, the individual phonemes are listed in detail:
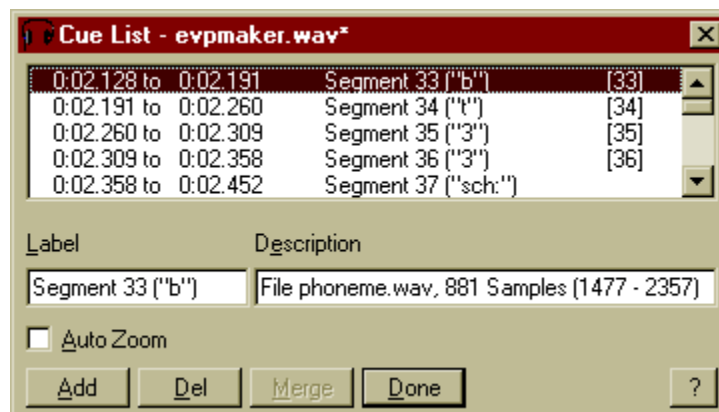
The labels of the phonemes (= the "pseudo phonetic transcription") were added in brackets and between quotes after the segment labels.

Well, this was only a little insight into the possibilities of how *EVPmaker* can help to objectify EVP interpretations.

3.9. Effects

By using effects, the source WAV file which is used for the generation of the raw material can be defamiliarized further. In the **Extras** menu you can find the following entries:

Reverse Signal

This function will turn over the entire audio signal so that it will play backwards. This could be used for EVP recordings to make a recording of speech in a language you understand more unintelligible, if you want to use very long segments, in which otherwise you would hear individual words.

Add echo to signal

With this function reverberation and echo effects can be produced. By this the audio signal will get more "volume". Two parameters will influence this effect: Delay in milliseconds and Decay in percent:
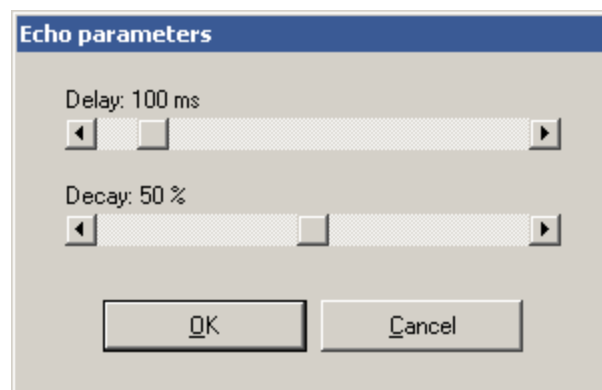

Short delay times (less than 100 ms) will yield a reverberation effect, long delay times will yield echo. The duration of the reverberation or the number of echoes is determined by the decay: A small value will let the reverberation or the echo cease faster than a large value.

Normalize signal

This function will amplify the amplitude (i.e. the recording level) of the audio signal to the greatest possible amount that will not result in clipping. By this means, recordings which are too faint can be adjusted to an optimal level subsequently.

* * *

All three effects, **Reverse Signal**, **Add echo to signal**, and **Normalize signal**, will change the loaded WAV signal. Therefore if a new source WAV file is opened, or if *EVPmaker* is exited, you will be asked if you would like to save these changes:
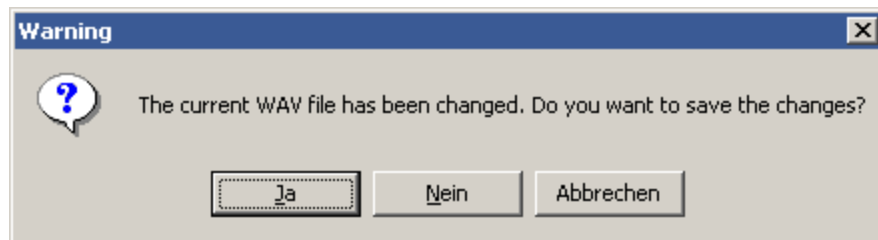

If the answer is **Yes**, the changes will be saved; if you want to keep the original WAV file, you should enter a new filename. You should do so if this WAV file has already been used for other EVP sessions!

By clicking on 💾 (Save), the WAV file can also be saved before.

Speed control

Opens a slider which lets you adjust the playback speed. It can be adjusted to values between 50% und 200%, which is bisection or doubling:
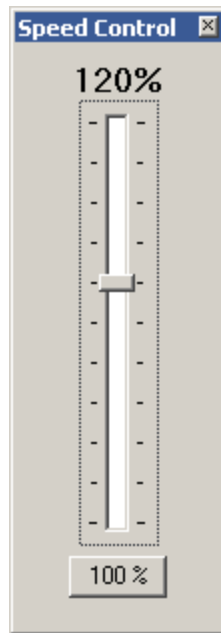
Since this is yielded by changing the sampling rate of the WAV signal, it depends on the sound card it the variation of the speed is possible or not. If the resulting sampling rate lies beyond the capabilities of the used sound card, an corresponding error message will appear upon playback. It also depends on the capabilities of the sound card whether or not a change of the speed affects the playback immediately or only after an interruption and continuation of the playback.

By the **100%** button the playback speed can be reset to the original value by a single click.

3.10. Visual Feedback

This function is based on an idea someone suggested to me by e-mail. Here is an excerpt from it:

Assuming that communication can be obtained through the random generation of information, what if, in addition to sound you also added visual images to enhance and clarify the verbal communications? This would not only make communication clearer (assuming we are communicating with other dimensional entities), it would make verification of this communication much more palpable if the images correlated or complemented the words.

Let's say you had about five hundred or so images or symbols or colors. Here's a few ideas: a ufo, a cross, a dragon, a smiley face, a pentagram, a peace sign. These images of course would be randomly chosen in the same way the sound is on your program. Going by one theory, if these other dimensional intelligences actually can "see" the screen, there might be a way to program the software in which they have a real time interaction with it to see their "work in progress" so to speak.

This idea sounds interesting. In order to be able to check it, *EVPmaker* has a so-called "Visual Feedback Window". It can be activated by choosing **Visual feedback window** from the **Extras** menu:
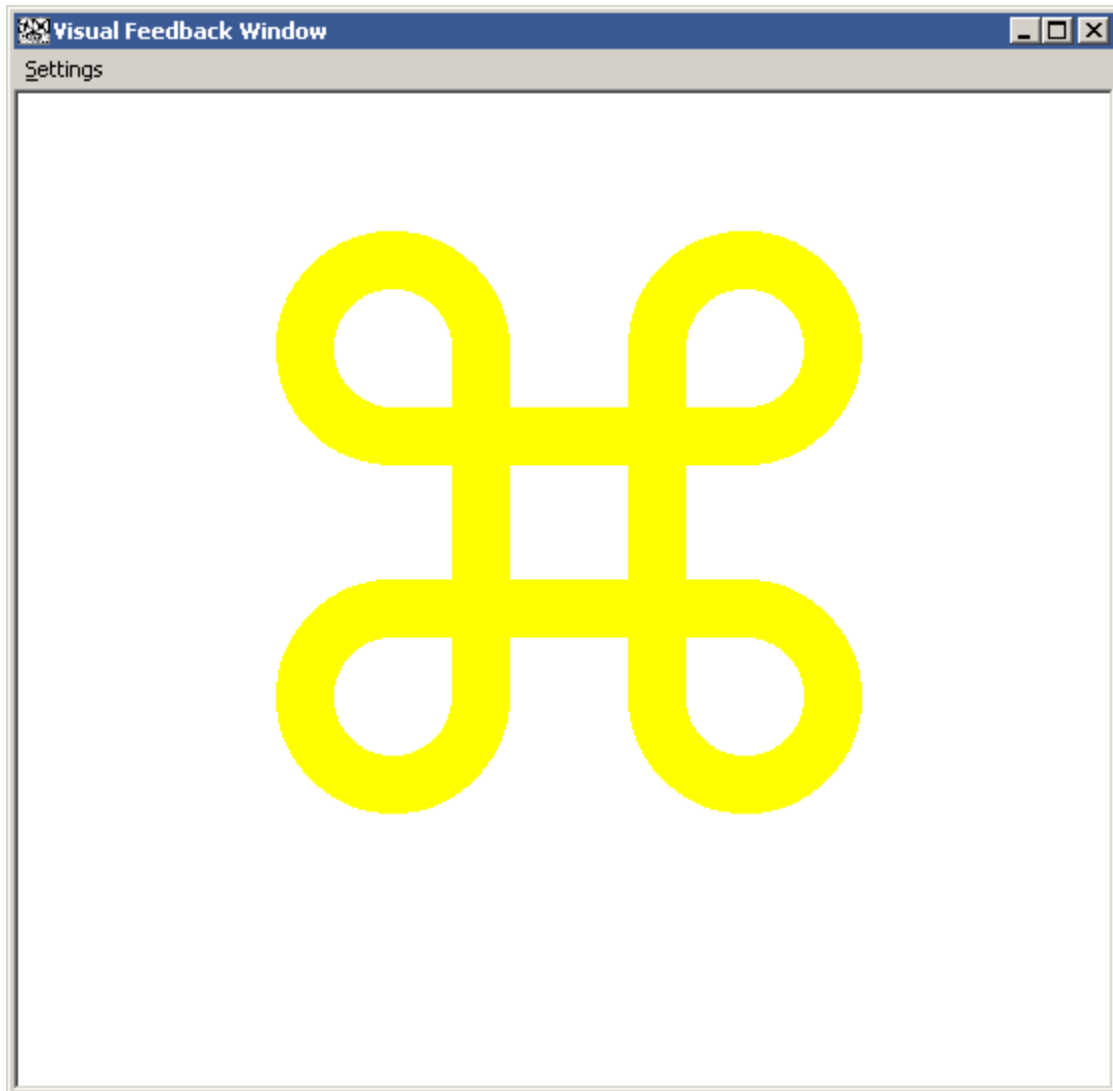

If now the random-controlled playback is started by clicking on ▷ (Make EVP), a certain symbol with a certain color for each segment will appear in this window during the generation of the raw material.

As symbols, the 223 characters of the Windows font "Wingdings" are used by default:
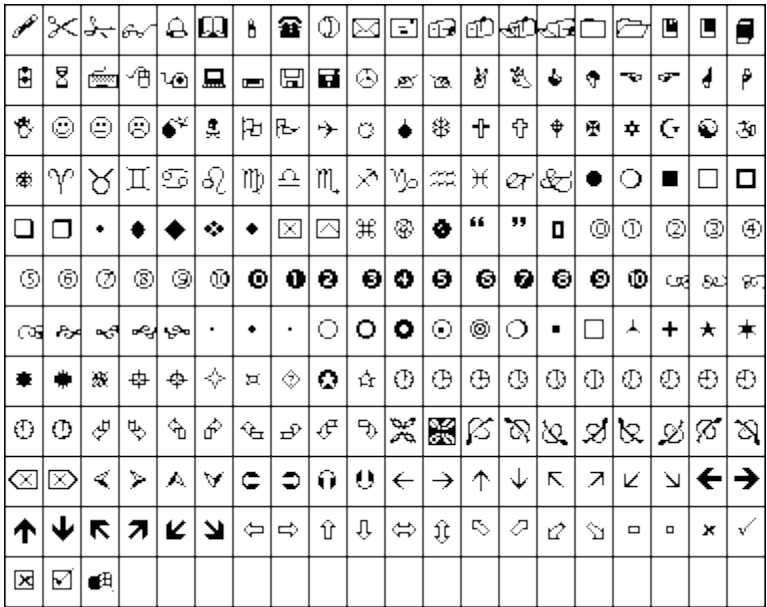
Combined with the 15
colors **Black** , **Maroon** , **Green** , **Olive** , **Navy** , **Purple** , **Teal** , **Silver** , **Gray** , **Red** , **Lime** , **Yellow** , **Blue** , **Fuchsia** and **Aqua** these are 223 x 15 = 3345 possible different symbol/color combinations. This means of course that with more than 3345 segments a clear assignment of segments to such a symbol/color combination is no more possible. This is for instance the case if a WAV file of 8 minutes is subdivided into segments of 100 milliseconds: In this case there are 480 seconds / 0,1 seconds = 4800 segments, thus more than existing symbol/color combinations. For this reason a corresponding note will be written at the bottom of the "Visual Feedback Window" if such a case occurs. Also it doesn't make sense to use variable segment durations or overlapping segments, since this can theoretically result in an "infinte" number of different segments. Therefore a corresponding note will appear here as well, if during random-controlled playback one of the options **Overlap** or **Segments To** is activated.

By choosing **Settings > Font** in the menu of the "Visual Feedback Window", another font than the default "Wingdings" or a font size different from the default of 300 can be chosen:
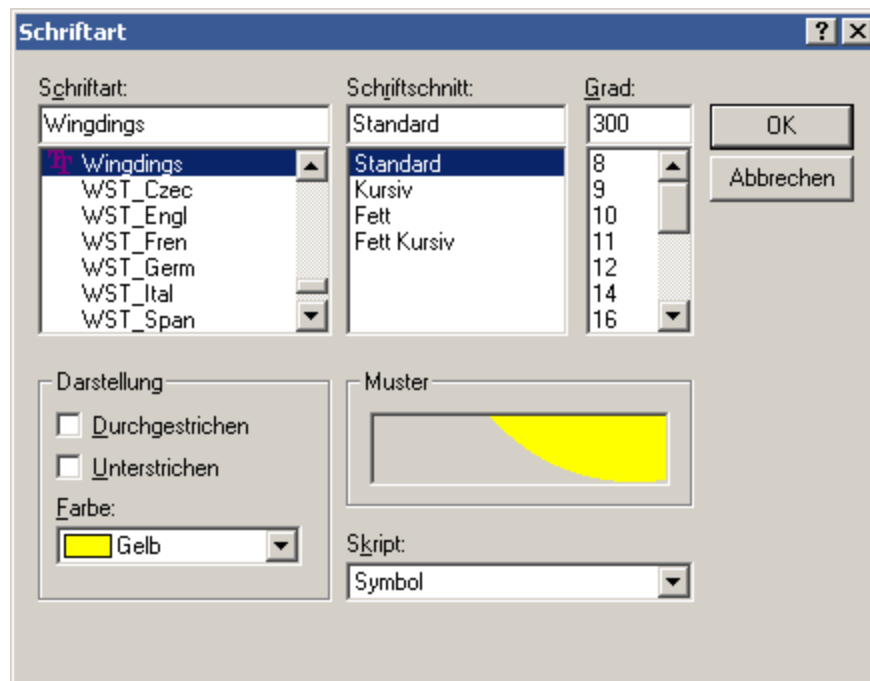
There are many Web pages where symbol fonts can be downloaded. Just pay attention that actually all 223 characters are used, since otherwise invisible "blanks" will be desplayed. "Webdings" for instance is another suitable font.

A different font size is appropriate if the size of the feedback window is changed to fit to one's own screen resolution. The characters being displayed should fill the window as well as possible.

3.11. Selecting the random number source

As mentioned in the Introduction, the original idea behind the means of random controlled phoneme synthesis was a supposed paranormal influence on random number generators (RNG). Experiments have shown however, that meaningful EVP also occur by using program generated pseudo random numbers which can in no way be influenced. Similar observations have been made during psychokinesis (PK) experiments in parapsychology labs: PK influences of a display by test persons occured not only by use of "real" RNGs on the basis of radioactive decomposition, but also by use of computer generated pseudo random numbers. Even by use of so called "pre-recorded targets" (PRT), i.e. series of random numbers which have been recorded some time before the actual beginning of the experiment, this PK effect did occur, which by common sense should not be...

In order to be able to conduct experiments with these different possibilities for the random controlled phoneme synthesis in *EVPmaker*, you can choose between several ways of random number generation:

- **Pseudo random numbers:** Uses program generated pseudo random numbers
- **Fractal equation:** Uses the chaotic iteration result of the Logistic Growth Equation by *Verhulst*
- **Sound card:** Allows to use "real" random numbers (e.g. by connecting a noise source to the input of the sound card)
- **File:** Uses any binary file containing 16 bit integer numbers to simulates "pre-recorded targets"

These three kinds of random sources can be selected in the **Random source** submenu which can be found in the **Extras** menu:
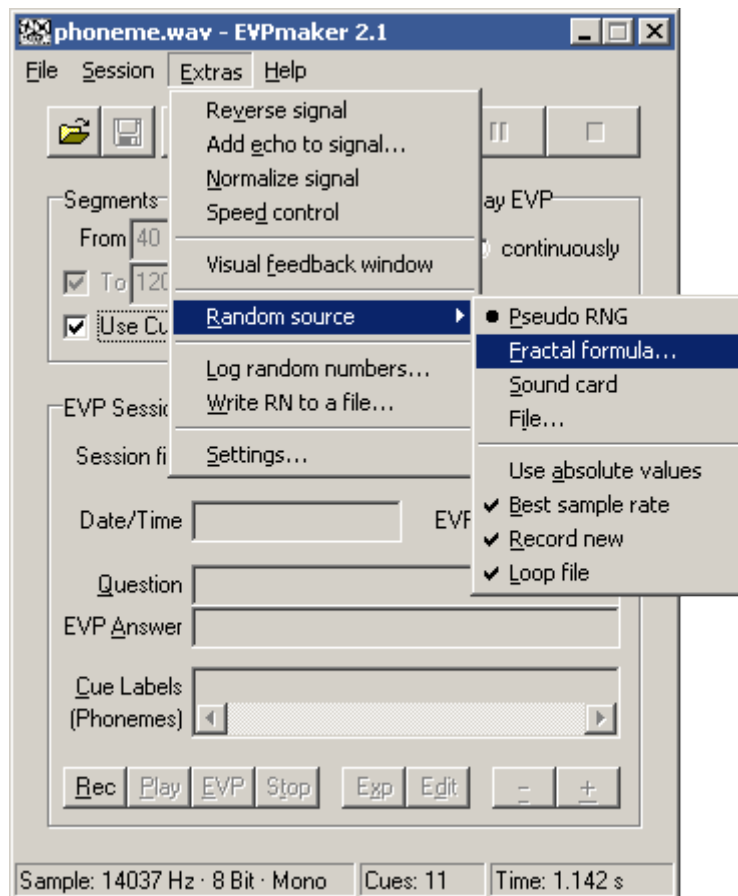
In the following section, all of these options will be explained in detail:

Pseudo RNG (Pseudo Random Numbers)

This is the program-internal generation of pseudo random numbers, or more exaxtly, the "random()" function from the program library of the *Borland C++ Builder 4.0* compiler which I have used. According to the documentation, this is a multiplicative, congruential random-number generator with a cycle length of 2^{32}.

Fractal formula

With this setting, the random numbers are generated by means of a nonlinear equation which delivers nonpredictable results (deterministic chaos). At present only the the Growth Equation by *Verhulst* has been implemented:

f(x) = r * x * (1 - x)

This formula is for example used in biology to describe the growth of a population inside a closed system. This equation is non-linear and produces chaotic results when r is above 3.57. For more information about Verhulst Dynamics, see for instance here.

Experiments by Prof. Dr. Johannes Hagel and Margot Tschapke [3] have shown, that the chaotic results of the iteration seem to support the EVP. Voices occur both within the noise which becomes audible when the x values are interpreted as sound samples, and when these values are used for the selection of phonemes or speech segments.

If you select **Fractal formula** from the *EVPmaker* menu, the following mask will appear:
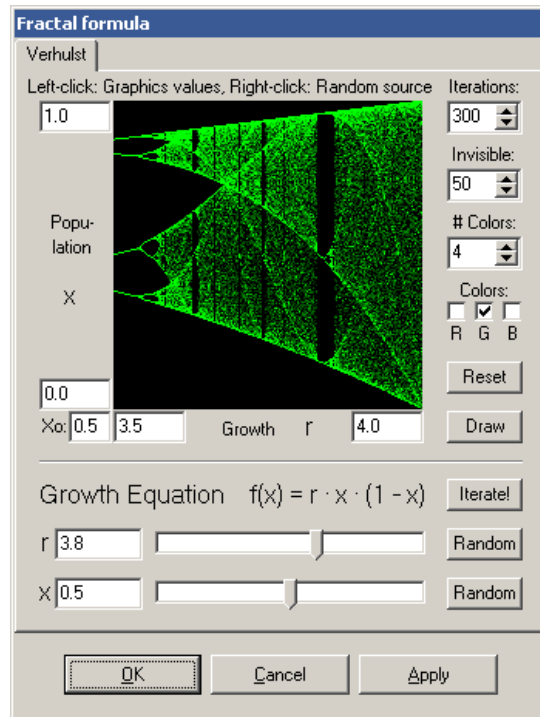
In the upper area (above the separation line) a *Feigenbaum* diagram is shown. Here you can experiment with various x and r values in order to explore the chaotic areas. By clicking on the **Draw** button the diagram will be drawn using the current values. A **left-click** into the diagram sets the graphics values: To enlarge an interesting area, first click to the upper left, then to the lower right edge of this area, and then click the **Draw** button. With **Reset**, the graphics values are set to default.

In the lower part of the mask, the settings of the parameters r and x can be done, which are used for the generation of the random numbers. You can either enter these values directly into the two input fields on the left, or you can increase/decrease them by moving the sliders, or you choose a random value by clicking on the **Random** buttons, or you can simply **right-click** into the above displayed *Feigenbaum* diagram. With the **Iterate!** button, you can simulate some iterations to observe the behavior of the x parameter. If this mask had been opened during the random controlled playback (using Random source = Fractal formula), you can make these settings immediately audible by clicking the **Apply** button. The **OK** button does the same but additionally closes the mask. **Cancel** closes the mask without changing the r and x values for the program.

Sound card

To generate 32-bit random numbers, sample values are being read continually from the sound card. In most cases the background noise from the sound card itself will be sufficient, but if the sound card is "too good", i.e. if it isn't noisy or if it only whistles, then you will have to connect an external noise source to the Line input of the sound card, which for instance could be a radio that ist tuned to "white noise". Sometimes it also helps to simply shift up the microphone controls of the sound mixer. You'll have to try here for best results. If *EVPmaker* seems to "stutter" or if only a few segments are being repeated again and again, this usually means that the signal provided by the sound card isn't "randomly" enough. But perhaps this could have to do with the sample resolution. My *Soundblaster AWE64* for instance won't record any noise if at the same time a 16-bit signal is being played back. Thus if the WAV file used by *EVPmaker* has a sample resolution of 16 bit, I'll have to feed an external signal into the sound card, whereas when using an 8-bit WAV file, the produced noise is sufficient.

There will always be read 10240 sample values from the sound card at one go. If they are "used up", a new block of 10240 sample values will be read. This procedure repeats until the playback is stopped. When ▷ (Make EVP) is invoked for the first time, at first such a block will be read, before the random controlled playback will start. During the playback, new blocks of sample values will be read if required. During the recording of new random samples from the sound card, a line will appear in the title of the *EVPmaker* window which displays the used sample parameters, e.g. **Recording (44100 Hz, 16 bit) ...**.

The setting **Sound card** does work only with "Full Duplex" sound cards, i.e. the sound card must be capable of recording one signal while playing back another signal simultaneously. Otherwise, an error message will appear.

File

Here the required integer values for the generation of random numbers are being read from a file instead of the sound card. In principle, any file can be used, but the values which are read from it will be interpreted as signed 16-bit integer numbers. Thus if soundfiles are used, they should have been recorded