

## INSTRUCTIONS FOR RECORDING SPEECH AND LEADING IT INTO A COMPUTER

updated March 2008

### A. Global procedure

For recording speech a microphone is to be used in the “quiet” room (346) in the institute. The varying electrical voltage produced by the microphone is recorded onto a sound recording device (in this case a CD recorder for audio CD's) which is situated in an adjacent room (344). The recorded CD is taken out and can be used afterwards in the CD drive of the student's home pc, or in one of the “fonothek” pc's in the PC Hoofthuis. The recorded sound then is read and analysed or manipulated as required, by use of the program “Praat”. The resulting files (sounds or analysis data) can be saved on the hard drive (or on a removable medium). In next occasions the files can be fed from the (removable) disk into the program again for further analyses or manipulations.

### B. Recording of speech using an audio-CD-recorder

The microphone produces a very weak electrical voltage (even when you shout into the microphone, the output is about a thousandth of one volt; a battery, for example, gives 1.5 volts which is 1500 times as high!). A voltage like that is too low for our recording equipment and therefore has to be amplified. For this purpose we made special pre-amplifiers: small boxes, lying on the floor of the recording room, which can be plugged between the microphone and one of the connectors at the wall, using audio cables. On the other side of the wall (in the adjacent “equipment room”) this amplified signal can be connected with the “copying panel” using the corresponding connector. With this copying panel all possible connections can be made between the sound source equipment (microphones, CD players, cassette players, etc.) and the recording equipment (hifi video recorders, cassette recorders, CD recorders, etc.). With the use of this copying panel, for example, a copy can be made from an earlier recorded tape onto another tape or CD. In our case we take care that the copying panel connects our microphone signal with the input of the CD recorder. All equipment (with exception of the microphones and pre-amplifiers) is already connected with the panel and all possible connection combinations can be made via small switches without further cable connecting complications.

In principle, sound recording is a two-person job. One speaks and the other controls the equipment in the adjacent room. To be able to talk with each other, the copying panel contains an intercom facility. Through a little window in the separating wall people can see each other as well.

For the use of the various recorders and the copying panel extensive information is available in the individual equipment's user's manuals and in “Instructions for recording/copying of sound”.

For a first start here are the steps you must take for achieving a (perfect) recording:

1. Switch on all main switches (**Power**) of the appropriate equipment in the equipment room (344).
2. Place the black microphone (Sennheiser MKH 105 T) about 30 to 40 cm from the speaker's mouth, its front directed to the speaker. Connect the microphone (with a suitable microphone cable) with the proper pre-amplifier (marked “MKH 105 T”). Connect the output of the pre-amplifier with a connector on the little wall panel using a standard audio cable and memorize the number of the connector on the wall panel.
3. Be sure that the mains plug of the pre-amplifier is plugged into a mains outlet. The little red light on the pre-amplifier box should be on then.

NOTE: The pre-amplifier for this type of microphone has a built-in filter (which can be switched off) to attenuate sounds with very low frequencies (like walking sounds in other rooms). These sounds cannot be heard but sometimes can cause problems when recorded or analysed because of their relatively high intensities. It is advisable therefore to switch **on** this filter (position marked **80..30000 Hz**). Only for special recordings where the low frequencies must not be weakened, the filter can be switched off (position 20..30000 Hz).

4. Switch **off** the input fan and output fan in the recording room (recordings are useless otherwise!) using the two switches at the wall beside the door.
5. **Optionally** the red lamp at the outside can be used. The red lamp will flash with a very low frequency so that it's clear that persons have to be quiet when passing by. The lamp will automatically start flashing when the door is closed **and** the switched is turned on located at the wall beside the door in the recording room.

6. In the equipment room, connect the connector of the little wall panel, marked with the number you memorized, with the input "AUX L" of the copying panel, using a standard audio cable. (See NOTE at 2; the cable that runs through the hole in the wall must be connected directly with the "AUX L" input.)
7. From the row marked "FROM" switch off (0) all switches and only switch on (1) the "AUX L" switch. Obviously this selects the microphone as the sound source and switches off all other unwanted sound sources.

Now the speaking person must be audible via the headphones in the equipment room. If the switch on the small speaker box is on (pointing upwards) the speaking person is also audible via the speaker. Keep the volume very low to avoid picking up the sound from the speaker by the microphone again. (Otherwise it would produce a disturbing reverberation in the recording.) For the same reason: keep quiet in the equipment room as the sound isolation between equipment room and recording room is limited.

8. From the row marked "TO" switch on (1) the "L" and "R" switches in the column marked "CD-REC 2".
9. Be sure that the "LEVEL ADJUST" switch is in the **off** position and the switch "MONO/STEREO" is in the **MONO** position.

Explanation: sound equipment is almost always "stereo" equipment, which means that two **separate** sound channels are applied, called L(eft) and R(ight). This means that for music, for example, it is possible to use separate microphones for the left and right channel so that a spatial dimension is added to the recorded sound. Here we use one microphone so that we need only one channel. However, to avoid the sound coming into one ear only when listening to the recording, we make sure that the microphone signal is connected with both inputs **L** and **R** of the recorder, which is accomplished by steps 8 and 9. Of course this doesn't make the recording stereo: it remains mono because the sound, although being audible in both ears, comes from one channel only.

10. From the equipment room it is possible to speak to the person in the recording room by pressing the button on the microphone stand in the equipment room and keeping it depressed during the communication. (When the headphones are used the speaking person can be heard at the same time; when the speaker box is used, the button must be released to hear what the speaker is saying. This built-in feature avoids feedback of the sound from the loudspeaker into the microphone again.)
11. Make sure that on the right side of the display "**analog**" is lit on the CD recorder (Tascam CD-RW900). If not (e.g. optical or coaxial is displayed) then by using the switch "INPUT SELECTOR" of the CD recorder this can be changed.
12. Load a recordable audio CD (CD-R or CD-RW) into the recorder. (Open the CD drawer by pushing the button "OPEN/CLOSE"; put in the CD with the label upwards and close the drawer again with the same button.) Wait until the display doesn't change any more. The text "**Blank disc**" should be lit. If the disc is not empty it should be erased first. Press the "ERASE" button followed by twice the "MULTI JOG" button. The timer counts down for approximately 30 seconds. Afterwards "Blank disc" should be lit.

NOTE: A suitable audio CD-RW<sup>1</sup> can be borrowed from the electronics room (336). A data CD can be borrowed or bought as well to save the produced files and use them in your next computer sessions.

13. Push the button "RECORD" on the CD recorder. Now the level of the incoming signal is displayed by a "light bar". The actual recording has not been started yet. Let the speaker utter some idle texts so that the recording level can be adjusted with the "REC LEVEL" controls. The strongest peak in the signal should be kept below 0 to -2 dB (decibel).
14. Now start the recording by pushing the play button ( > ). Above the CD drawer a red light is displayed from this moment on, showing that the recording is going on. If the recording level should be readjusted, let the speaker start over again with the new adjustment, thus avoiding unnatural fluctuations in the recording level.
15. By pressing the pause button (||) followed by the play button, a new track will be inserted. The placed track numbers cannot be altered any more (unless the whole disk is erased, when a CD-RW is used).

---

<sup>1</sup> There are two types of recordable CD's: CD-R (read) and CD-RW (read/write). A **CD-R** which has been "finalized" cannot be used for recording any more. The finalized CD can be played by a normal modern stand-alone audio CD player or by a computer's CD drive. A **CD-RW**, however, can be erased, even after finalizing, and be used again for recording. Selective erasing is not possible: all tracks (recorded parts) can be erased integrally only. The recorded and finalized CD-RW can only be replayed using modern CD players or drives. If there is enough space left, both types of CD's can add further recordings **before they are finalized**. The so far recorded parts can only be read by this audio CD recorder. Only after finalizing, the CD-RW can be played by other players or drives.

16. When the speaker has finished the talking task, stop the CD recorder by pushing the stop button (□). To check the recording: on the copying panel switch off (0) the two switches for the CD recorder in the row marked "TO" and switch on (1) the two switches in the row marked "FROM". To avoid possible disturbing background noise from the microphone, switch off (0) the "AUX L" switch. Eventually you may use the buttons "|<< <<" and ">> >>|" on the CD recorder to search for a specific fragment.

NOTE: Don't forget to switch back these switches before making next recordings!

17. When you feel confident about the recordings, and nothing needs to be added to the disk in next sessions, you must "finalize" the CD to make it readable in other audio CD players or computer CD drives. Skip this finalizing step if you intent to add further recordings on this disk, now or later<sup>2</sup>). To finalize: Press the button "FINALIZE" followed by pressing twice the button "MULTI JOG". The timer counts down for approximately 60 seconds and will show "Finished" in the display when done.
18. Remove the CD from the recorder by pressing the button "OPEN/CLOSE", close the drawer again and switch off all equipment.

### C. Convert the recorded sound into WAV files by using ripping programs

The recorded CD contains audio CD files which cannot be analysed directly. A ripping program like "Audiograbber" can be used to convert them into "WAV files" which can then be analysed by e.g. Praat.

1. Open Audiograbber and Press the icon "Settings".
2. Select Browse to set the output folder and close the form afterwards.
3. Press the icon "Grab" so that all the files on the CD will be converted automatically into WAV stored in the selected output folder.
4. Now the files can be used by e.g. "Praat" for analyzing.

### D. When a ripping program cannot be used: convert the recorded sound into WAV files by using the program "Praat"

If a ripping programming cannot be used (see C) then it's possible to convert the audio CD files with the program "Praat". The recorded CD can be put into a computer's CD drive, read into an analysis program and stored as a computer file onto the hard disk and/or recordable CD. Although the sound is stored onto the CD digitally, it is read into the analysis program in analogous form via the sound card. Therefore it is necessary to make sure that the signal's level is not set too high (severe distortion of the waveform of the signal) or too low (excessive noise in the signal) during the reading process. Here are the steps to take:

1. If the computer is not started yet (in Windows), start it and wait, if necessary, until the virus scanner logo has disappeared. Load the CD into the CDROM drive. If everything is all right, a CD player window pops up and the CD is played back automatically. If the "Windows Media Player" starts instead, close it and start the CD player manually via the START menu at the lower left corner of the screen, or, if it is present, use the CD player icon on the desktop. Irrespectively of the sound being audible or not, stop the replay with the stop button of the CD player. Leave the window of the CD player open on the desktop.
2. Open the Windows mixer (double click the little speaker icon on the task bar). A playback mixer is displayed. Make sure that the checkbox "Mute" in the "CD" column is **not marked**. After that select **Properties** under "Options", select **Record** and then **OK**. This switches the mixer from playback mode to recording mode. Make sure now that the check box "Select" in the column "CD" is **marked** and the check box "Select" in the column "Microphone" is **not marked**. Leave this recording mixer open: you'll still need it to adjust the recording level when reading the sound into the analysis program.

NOTE: In computers with both a CDROM drive and a CD recorder the latter drive could be used as well. In that case the sound of that drive usually is accessible by selecting "AUX" instead of "CD".

3. Create your own **directory** (when you have more than one hard disk, select the one with the most space).

---

<sup>2</sup> If the CD is to be read by a computer's CD drive or by a common audio CD player, the CD has to be "finalized" first. However, nothing can be altered or added any more then, apart from erasing the whole disk in case a CD-RW is used. So, if more is to be added to the disk, don't finalize yet. However, in that case playing the so far recorded sound can only be done by using this CD recorder.

4. Open the program "Praat". Select **Record mono Sound** under "New". In the popped up "SoundRecorder" window, select **44100** at "Sample rate:" This offers very good quality but requires quite some storage space. If the type of analysis or manipulation of the speech signal is such that a lower quality suffices, a lower sample rate could be chosen. However, for short sounds (i.e. a few sentences) there is no need to make quality concessions.
5. Start the playback of the CD with the start button ( > ) of the (still open) CD player. Just before the wanted sound fragment begins, select the button **Record** in the Praat program's SoundRecorder window. Check the level of the sound in the "Meter" bar and adjust the CD sliders in the Windows **recording** mixer (see 2.) so that the highest peaks of the sound level remain just below the yellow and red areas in the "Meter" bar of Praat's "SoundRecorder".
6. After the end of the wanted fragment, select the button **Stop** in Praat's SoundRecorder, select **Save to list:** and then **Close**. Stop the CD playback with the stop ( □ ) or pause ( || ) button in the CD player window.
7. In "Praat": choose **Subtract mean** under "Modify -". Explanation: all audio equipment (and also sound cards in pc's) produces small erroneous constant voltages, which are added to the signal. For specific types of analyses it could be important that this error voltage is minimized. Therefore this function subtracts the mean value of the complete fragment (being equal to this error voltage) from each sample value.
8. The sound is now present in the (volatile) memory of the computer. To avoid that you may lose the carefully made sound object, you must save it onto the hard disk in your own directory. Select **Write to WAV file...** under "Write", select your directory, and fill in a name. Type a name which contains some information about its identity to save time, when looking for specific sound files afterwards.
9. At the end of your computer session, it is advisable to **copy** the saved files from your directory (and everything else you want to keep) onto your CD recordable using the CD recording program (disks can be borrowed or bought from the electronics room, see NOTE on page 2) and keep it with you.

Note: It is possible to use a 'ripping' program to copy tracks from the CD directly to .wav files, thus omitting the DA- and AD conversion of the sound card (see **C**). Here we have chosen the analogue way because its principle is valid for all other analogue sound sources that can be coupled to the computer's sound input. Besides, ripping programs still are not commonly present on pc's. From a quality point of view, the difference is negligible.