Manual (on) Transcription

Transcription Conventions, Software Guides and Practical Hints for Qualitative Researchers

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→ **audiotranskription.de**

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The manual can be downloaded for free:
http://www.audiotranskription.de/english/transcription-practicalguide.htm
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Preface

For some time now, the digital era has begun in the field of transcription and text analysis. Back in the day, a cassette recorder with a sizeable microphone was placed on the table when someone wanted to conduct an interview. While a little bit smaller than the *Myfirst Sony*, it was still big enough that one couldn't miss noticing it during the interview. Today, a small digital recording device is placed on a table. It is hardly bigger than a cell phone, and it is capable of even recording group conversations in large rooms without having to connect an external microphone. No cassette tape needs to be flipped or changed during the recording; gigabytes of digital memory allow us to record hours and hours in excellent quality.

With such a modern device, the life of a recorded interview in the social sciences is a strictly digital one. After the interview, the recording device is connected to a computer via a USB port and the digital transcription can begin using specially designed software – for instance *f4*. Now, simply import the transcribed data and the original audio file into qualitative data analysis software, such as MAXQDA, and you can start the analysis. The researcher now has synchronized access to the text, to audio data and to images. Incredibly simple, right?

Not entirely – looks may be deceiving. There are a number of substantial decisions to be made before a researcher reaches this

point. For instance, appropriate transcriptions rules need to be chosen, and the advantages and disadvantages of different transcription rule systems need to be considered. If one is to inform him/herself in this regard, he/she quickly realizes that there is a lack of instructions aimed at practice. All in all, literature on the subject of "transcription" is sparsely found, the available literature is highly specialized and consequently complicated enough to be of little help for decision-making.

This brochure, written by Thorsten Dresing, Thorsten Pehl and Christian Schmieder, fills a painful gap felt by all beginners. This is a text which finally addresses and answers all questions concerning transcription in day-to-day research in a practice-oriented way. It would be, of course, presumptuous to assume that transcription – a time-consuming task which is otherwise fulfilled rather grudgingly – would now be fun. Nonetheless, the authors have thought to compile a text which, in a comprehensible way, describes how to efficiently transcribe – and is fun to read.

We all dream of transcription being done automatically one day, but this is still a long way down the road. So far, speech recognition software relies on being trained to one's own voice, which renders it unsuitable for individual and group interviews. Thus, transcribing data is an unavoidable prerequisite before conducting computer-based analysis.

Transcription is an effort worth taking. Only through this effort can the numerous methods, ranging from grounded theory to qualitative content analysis, be applied in an efficient way. One is close to the data and is able to code, write memos, discover and visualize interconnections, interlink passages and even refer back to the original audio if necessary.

The digital revolution has also changed the methods of social research in a profound way. At first glance, it appears as if today nearly everyone can do almost everything without much preliminary training, and as if everything could be very easily done. At a second glance it becomes apparent that the advanced possibilities also demand for a higher degree of professionalization, such as informed choices concerning transcription rules and the manner of the text analysis that follows. This brochure is an important component of this professionalization since it provides young professionals with everything they need concerning transcription. Therefore, I hope that this manual reaches many readers.

Udo Kuckartz, June 2011

How to choose a recording device

Most qualitative researchers face the same question when preparing for their projects: Which recording device is best for recording my data? We had the same issue six years ago, when we (Thorsten Dresing and Thorsten Pehl) conducted our dissertation projects and started looking for a recording device for our own qualitative interviews. We tested all available gadgets ourselves, since no one else could provide us with a satisfying answer to this question. Ever since then, we have been testing recording devices and sharing the results with other researchers on our website http://www.audiotranskription.de/english . Our website provides an extensive and a consistently growing collection of recording equipment tests and comparisons of digital recorders. Today, we not only look for the best devices for interviewing, we also test and review equipment for recording music, ambient sound, dictation, nature sounds and more. In order to share more about our experience testing countless recording devices, we created the following guidelines to help others choose a recording device for a qualitative research project.

Recording quality

Obviously, recording quality itself is an important issue. It is crucial what "gets into the ears." However, there is no device with the 'best' recording quality. Many devices deliver outstanding recordings,

though with different recording characteristics. Whether these characteristics are 'good' depends on the recording situation.

Let's say you want to record narrators in order to create an audio book. This requires a voice recording which is as clear as possible and without ambient noises. There are devices that do this very well. But the same devices fail or do poorly when recording the sound of a drizzling rain or a chirping cricket.

You should always consider in which recording situation (e.g. interviews, ambient recordings, or music) and recording settings (e.g. in a studio or outside) you want to use the device. On our website, you can listen to sample recordings from several recorders (http://www.audiotranskription.de/english/fresh-sounds-in-2012). When listening, you should assess the sound quality with regard for the following four aspects:

- **Voice & detail perception:** How good can you recognize & distinguish between the narrators and the sources of other sounds? The subtler, yet distinguished the nuances are, the better.

- **Noise level:** How strong and perceivable is the hissing and humming background noise, especially during quiet passages? The less, the better.

- **Perception of space:** How good is the impression of depth and space? Do you get the feeling that you are immersed in the

recording situation or is the recording unnaturally flat? The more natural the space perception, the better the recorder is suited for recording atmosphere and group conversations; the more flat the recording, the better for recording individual speakers.

- **Representation of sound pitch (high and low):** Are high or low frequencies emphasized? When recording individual speakers, a pleasant sonority, or depth of sound, is often preferred, for room atmosphere recordings, a clear emphasis of high pitches is preferable.

Suitability for daily use (handling, battery life, craftsmanship and reliability)

In our opinion, this is a very important issue. Can the device be operated intuitively? Are the important functions easily accessible? Is the display easy to read? Does the battery last at least for a working day? How is the recorder designed and constructed? Are there flimsy parts? Is the recorder made mostly from plastic or metal? Are the buttons easy to press or do they wobble around? All of these things can be easily assessed if you hold the recorder in your hand, but product descriptions and photos alone do not provide reliable information. To compensate for this, we also focus on handling aspects and haptic perception in the reviews.

From our experience distributing recording devices via our website, we can make a few assertions regarding the reliability of some

recording devices based on those which have been returned to us under warranty for repair or replacement. We have noticed rather clear differences in product quality depending on the brand. Devices made by Olympus and Sony are very rarely sent back to us (fewer than 1 in 1,000), whereas products by Zoom and Tascam are returned more often. It must be duly noted, however, that this information is not universally valid for all devices and only applies to those we distribute.

Recording & file formats

For transcribing qualitative interviews and group discussions, MP3s provide an appropriate compromise between file compression, recording quality and flexible (cross-platform or cross-computer) file handling. Please make sure to use a set (not a variable) bit rate when generating an MP3 file. The WMA file format is equivalent to MP3s in terms of sound quality, but it cannot be played on Macs® without certain limitations. In principle, uncompressed recordings in PCM-WAV format can be used, but they barely provide quality advantages in interview settings and consume up to tenfold of the space on your computer or USB stick. A good many other audio and video formats are easily and quickly converted using free software.

If your data requires more complex processing, such as phonetic analysis or signal analysis, it is important that the recordings are available as uncompressed WAV files. Also, if your recordings are to be made available at a later date for linguistic databases, it is

preferable to use WAV format. Archives (such as the LDC in the USA, the ELRA in Europe, the BAS and IDS in Germany, and the MPI Nijmegen (for ethnological recordings)) require a file format which is open access and cross-platform, and which can be produced and used free of licensing while guaranteeing optimal quality. In practice, these demands mostly lead to using the WAV format. If you are interested in learning how to transform audio files, please refer to the chapter *'Converting audio files'* in this manual

DSS and DSSPro file formats used in dictaphones are unsuitable for transcription in the context of qualitative research or linguistic research. The sound quality is substandard and the file format requires proprietary software and hardware. Please note that converting these files into MP3s at a later point does not improve the sound quality.

External input

Current audio recorders usually have good internal microphones; for recording interviews and group discussions no additional external microphones are necessary. However, in certain situations, being able to connect an external microphone may be a positive aspect when choosing a recorder. Does the device feature a line-in as well as a separate microphone input (which is preferable)? Does the device offer genuine inputs for XLR-microphones with phantom power or only a 3.5mm jack plug? A 3.5mm jack plug can be flexibly used with many types of microphones: for instance with some lavaliere-style

microphones or with the output from a Hi-Fi-system for the purpose of digitalization. XLR-microphone inputs are vital for professional vocal microphones and for connecting to mixing consoles. The inch-thick XLR-plugs lock in firmly and they are suitable for situations calling for more a more sturdy connection.

Important functions

Long lists of device functions can easily be found in the product descriptions. In the case of recording interviews and group discussions, "automatic level control" is a term you should pay attention to. This means that the recording volume is automatically adjusted by the device. This is important if you don't want to be constantly glimpsing at the fader controller/meter while recording. The adjustments of this automatic level control can be perceived as light volume fluctuations. This is great for interview recordings, however, it is not recommended for music recordings.

Accessories and cost

For a good interview-recording device you should at plan a budget of roughly 200 Euros or 300 Dollars. When comparing prices, we recommend that paying attention to the accessories that come with the device because these may explain a higher price range. For recordings outside, we absolutely recommend a windshield. Even a slight breeze can make the recording inaudible. The sponge windscreen supplied with some devices does not always provide effective protection.

Sample recordings

If you consider these aspects you will reliably be able to choose the best recording device for YOUR purposes. The necessary information you need for that can be gathered from our many current (older) comparisons and individual tests on digital recorders. We compile these test reports with a lot of pleasure and using our ears – not on the basis of frequency measurements or technical data sheets. We listen "blindly" to sample recordings as a team and evaluate every recording individually. Afterwards we discuss, as a team, the results. Thereafter, we reveal/disclose which devices belong to the respective recordings. You can retrace our results for each device and even listen to sample recordings on:

http://www.audiotranskription.de/english/fresh-sounds-in-2012

Producing transcripts: The challenge of producing a text

Different transcription conventions – different data

Transcription (lat. trans-scribere = "to write over") is the transfer of an audio or video recording into a written form. A transcript usually originates from manually typing out the recorded content. Typically, recorded conversations, interviews or dictations are subject to transcription.

Verbal statements are evasive and highly complex; it is not possible to remember each and every detail of a spoken conversation. The aim of transcription is to overcome this problem. In a transcript, speech is represented in writing, and therefore stabilized: you can look at a word or a passage as long as you want to, and you can easily navigate back to it. This makes the recorded information more accessible and thereby more useful for analysis. The goal of transcription is to represent speech as detailed and multifaceted as possible in order to provide the reader with a good representation of the conversation and to thereby provide him/her with a good foundation for its reconstruction. This is done, for example, by including pauses, intonation, or overlapping speech in transcripts. But too many details and too much information can also make a transcript difficult to read. This tension between the need for

accurate representation and practical limitations require researchers to find a balance between the two poles.

There is a second reason that makes transcription an almost paradoxical task: with the pretense to accurately represent the multi-faceted verbal discourse, you create a written text that is a linear, one-dimensional document. In the end, transcription is a matter of compression, and this compression needs to be guided by conscious decisions by the researcher (for a great discussion of this process, see Skukauskaite 2012). Hence, the challenge of transcription lies in knowing about this discrepancy and in dealing with it as adequately as possible with respect to your methodological needs.

Anyone who transcribes or who works with transcripts should be aware beforehand that a transcript can never fully grasp the recording situation. Too many elements factor into communication, and it is impossible to transcribe them all. Even a transcript that has captured sounds in a very accurate way (e.g. phonetic transcription in linguistics), may omit non-verbal aspects such as odor, the room setting, time setting, visual components of the setting, facial expressions and gestures. It is therefore impossible to not draw a focus upon certain aspects of communication or speech. However, in order to comply with the quality standards of qualitative research, it is crucial to deliberately set this focus according to the aim of the research conducted or to the intended use of the transcript.

Leaving out – or including, or transforming – certain aspects of recorded speech may radically change the content a transcript conveys to its readers (especially if they do not have the chance to listen to the recording, or if they have not been present in the recording situation). An example: A researcher asks a manager whether he/she will cut jobs next year. The manager takes ten seconds to think, rubbing her chin. She then looks down to the floor, quietly stating "naaaaaho". This statement could simply be transcribed as "no". Another option would be to include pause length, gestures, speech volume and pitch in the transcript as well. A reader is very likely to interpret the same statement in the two transcripts in different ways.

In **simple transcripts**, paraverbal and non-verbal elements of communication are omitted. Dialect and colloquial language elements approximated to standard language. The focus of a simple transcript lies on readability. It is easier to learn to produce such a transcript, and it takes less time to transcribe the data. The transcription conventions according to Kallmeyer and Schütze (1976) and Hoffmann-Riem (1984) focus on this goal. Their conventions were supplemented by Kuckartz, et al in 2008, who consider increasingly common usage of qualitative data analysis (QDA) software. For this manual, we have revised and enhanced their suggestions. In many contexts for qualitative research, simple

transcription rules have became a standard – not least because of time restrictions in (academic) qualitative research.

A **detailed transcript** with a complex set of transcription rules is necessary if the intended analysis does not focus on the surface semantic content of a conversation. In such cases, prosodic elements (e.g. intonation, primary and secondary emphasis, voice volume and the speed & pitch of speech) are included. If necessary, a phonetic transcription is added (e.g. in research on dialect), or non-verbal phenomena are depicted in an even more complex way (e.g. in research on gestures or deictic expressions). [1]

To illustrate the difference between a simple and a more detailed transcript, we have included two short transcript passages below. They originate from the same recording, but they have been transcribed according to different conventions.

Simple transcript	Complex transcript
S1: ...or whether they'll get divorced after all.	S1: =<<dim> or WHEther they'll get divoced ↑`after all.>
S2: Hm. (...)	S2: ˇhm, (- -)
S1: This is still. (...) . It is a transition.	S1: <<pp> this is still - > ((breathes out for 2.1 sec)) <<p> t'is a ↑` transition.>

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[1] While simple transcripts can be easily produced in word processors and specialized programs such as f4, more complex transcriptions need partitures in order to represent an increased amount of complexity. Transcriptions in partiture also call for specialized data analysis software in order to be produced and managed (eg. ELAN or Transana)

S2: Our former neighbors, they are a good example for this. (...) Married for thirty years (...) the last kid was finally out of the house, took off to study, (...) left, you know, to Berlin.	S2: our former neighbors ↑` they are a good example for this (- - -) err (- - -) ↑ married for THIRty years °hh the last kid (.) `finally outta-the ´HOUSE, took off to STUdy, (-) ´LEFT, =´you know, °h to ber´LIN, °h

As you may have noticed, the simple transcript provides faster access to the surface content of the conversation. Details concerning intonation are omitted, which makes the transcript easier to read. The detailed transcript, on the other hand, provides the reader with a better impression of how the participants spoke since it includes intonation and vernacular. Participant 2 comes across more enthusiastic and interested, since he/she repeatedly emphasizes syllables. This aspect does not become that clear in the simple transcript. However, the many breaks the speaker makes are more obvious in the simple transcript.

You should decide how – and what – to transcribe according to your research method, your research expectations and pragmatic reasons (readability and, connected to the latter, time). You should not "just start" transcribing before thinking about the following questions:

- For what kind of analysis do I produce my transcript?

- What information should the transcript include?

- Is it important to include emphases?

- Does vernacular or dialect have to be represented in the transcript?

A clearly defined transcription convention and transcription rules help you make your transcripts comprehensible to yourself and to others. In the following chapters, we introduce a couple of transcription conventions, which may help you finding the transcription style best fitting your research needs.

A simple transcription procedure

Kuckartz et al. provide "consciously simple and quickly attainable transcription rules, which considerably smoothen language and set a focus on the content of the verbal contribution." (2008, p.27, translated)

We have applied this system in many extensive research projects, each of them involving several transcribers at the same time.[2] We have received feedback from transcribers, lectors and researchers who worked on transcripts obtained from hundreds of hours of interviews. Their feedback helped us to modify these guidelines and to add a few hints.

The underlying transcription rules

1. Transcribe literally – do not summarize, but do not transcribe phonetically. Dialect and colloquial language are to be accurately translated into standard language. If there is no suitable translation for a word or expression, the dialect or colloquial language is retained.

2. "Merged" words are not transcribed as such, but approximated to standard written language. For instance: "I'm-a-goin' to the movies" is transcribed as "I am going to the movies". The general construction of a proposition is retained, even if it

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[2] We presently provide transcription services (German only). The collaboration with our 40 typists further informed the development of the following transcription system.

contains syntactic "errors", for example: "To the shopping mall I went."

3. Discontinuation of sentences or abrupt stops within a word are indicated by a slash: /

4. Punctuation is polished up in favor of legibility. A short drop of the voice or an ambiguous intonation is rather indicated by a full stop than a comma.

5. Pauses are indicated by full stops in parentheses, corresponding to the pause length from 1 second (.) to three (...) seconds. Longer breaks are indicated by the pause length in parentheses (15).

6. Consentient or confirmative vocal interjections by the interviewer (like 'mhm') are not transcribed. Interjections by the interviewee such as 'mhm', 'ehm' and 'uh' are also not transcribed. Monosyllabic *answers*, however, (positive: 'mh = hm', 'ah = ha' or negative: 'hm = mh', 'eh = eh') are always included in the transcript, if appropriate as 'mhm (affirmative)' or 'hm-m (negative)'.

7. Emphasized words and utterances are capitalized. In the case of the emphasis of the personal pronoun "I", (or an emphasized "a" in the beginning of a sentence) we recommend to underline it in order to indicate emphasis.

8. Every speaker receives his/her own paragraph. There is a blank line between the speakers. Time intervals are inserted at the end of a paragraph, at the least.

9. Emotional, non-verbal utterances (of both the interviewee and the interviewer) that support or elucidate a statement (such as laughter, giggling or sighs) are transcribed in brackets.

10. Overlapping speech can be separately transcribed and separated by speakers. Passages with overlapping speech are indicated by double slashes at the beginning and end of the overlap:

I: // Oh, then you //

P: // Exactly, then we // finally arrived.

11. Incomprehensible words are indicated as follows: (inc.). You should indicate the reason for not being able to comprehend the audio if you come across longer inaudible passages, eg: (inc., cellphone ringing) or (inc., train passing by). For longer incomprehensible passages, you should also indicate how long the respective passage was, e.g. (inc., train passing by, 19 sec).

12. If you assume or guess a certain wording, the word or passage should be put in brackets and be supplemented with a question mark in brackets. For example: (xylomentazoline?). Generally, all inaudible or incomprehensible passages are

marked with a time stamp if there is no time stamp close by (1 minute before or after the respective passage).

13. Disturbances are noted in parentheses: (passing train, 10 seconds)

14. The interviewer is marked with an "I:", the interviewed person with "P:" (for participant). If there are several speakers, (e.g. in group interviews), a number can be added to the name: (e.g. "P1:") You can choose other, unambiguous names or abbreviations as well (e.g. "Peter:").

15. The transcript is saved in rich text format (.rtf file). This ensures compatibility with most word processing programs and even older qualitative data analysis programs. The name of the saved transcript should correlate with the audio file name. For example: interview_04022011.rtf or interview_smith.rtf

Hints toward creating a consistent transcript

These aspects concern the notation and may help to ensure that transcripts are consistent (especially if there are several people transcribing in your team).

1. Symbols and abbreviations such as *percentage* and *meter* are spelled out.
2. Contractions or abbreviations are transcribed exactly the way they were said, e.g. 'can't' instead of 'cannot' or 'stats' instead of 'statistics'

3. English spelling conventions concerning capitalization are also applied in an English transcript.

4. Numbers are transcribed as follows:

    a. Zero to twelve are spelled out, larger numbers are transcribed as numerals.

    b. Other numbers that make short words are also spelled out, especially round numbers: twenty, hundred, three thousand.

    c. Decimals and equations are always written in numerals. Thus: "4 + 5 = 9" and "3.5".

    d. Roughly estimated figures are spelled out, accurate figures are written in numerals. For instance: "The fifty million Euros of government debt".

    e. If there are fixed conventions concerning how to write down numbers, follow those conventions. House numbers, page numbers, telephone numbers, account numbers, dates or the like are never spelled out in full. For instance: "on page 11" or "16 Broad Street".

5. If direct speech is quoted in a recording, the quote is enclosed with quotation mark, e.g.: and he said "let's see about this"

6. Proper nouns are transcribed according to the rules of the language you are transcribing in.

7. Enumerations are transcribed with a capital letter without brackets ('I like it because A I think it is affordable, and B because I always wanted one.').

Sample transcript

I: Alright, what do you expect from your new field of study in Hamburg? # 00:01:01-0 #

P: Well, first and foremost I want to learn a lot of new things about criminology and law. Well, I studied educational science as a major, and my minor subjects were sociology and peace and conflict studies in MARBURG. And now, I would like to get into law, get to know new people and get some new impressions. And I also want to (explore?) a completely new profession. #00:01:26-1#

I: Okay, and what you expect concerning collaboration //amongst teenagers?// #00:02:11-2#

P: //SO far, I have// no exact idea. For criminologists there is no particular everyday professional life. (…) How can I put this, in such a profession you can do a LOT of different things. #00:02:32-4#

A complex transcription convention: GAT2

As opposed to the simple transcription notation mentioned in the previous chapter, more complex notation conventions draw an additional focus upon "how things were said". By doing so, a qualitative analysis of the data's phonetic and phonological features becomes possible. A complex transcript captures intonation, emphases, the exact length of breaks, overlapping speech, sudden cut-offs and cases of no breaks in between words. Such a transcript tries to represent more closely what was said in the recording (including dialect and colloquial speech).

The transcription notation GAT (Gesprächsanalytisches Transkriptionssystem – conversation analysis transcription notation) is mainly used in the German-speaking discourse. (cf. Dittmar 2004, pp. 150-164) During its development in 1997, the involved linguists had the goal to subsume existing notations in a unifying manner. While the GAT published in 1998 did distinguish between a basic and a refined transcript, the further developed version from 2009 (GAT2) introduced more fine distinctions between the poles (cf. Gesprächsforschung (10/2009) pp. 353 – 402). In terms of complexity, a rudimentary minimal transcript is followed by a basic transcript, which can be developed further according to the researchers' needs of inquiry.

A minimal transcript can be easily produced with the transcription software f4 since in the case of the minimal transcript, merely

phrases carrying emphases, pauses, speech overlaps, laughter, etc. are transcribed. Details such as accentuations within words and a finer representation of intonation are left out. However, even when producing a basic transcript, f4 reaches its limits in terms of ease of use. Such transcripts are more easily produced with the free software PRAAT (www.praat.org).

PRAAT has the advantage of displaying not only the sound file, but also an oscillogram and a spectrogram, as well as displaying a variety of values extracted from the sound file. This allows users to read accentuations and the voice pitch in a more reliable way, since the impression from listening to the data is complemented by visual information.

There is a catch, however: PRAAT produces a transcript in the TextGrid file format. The full information contained in such files can only be accessed when opened in PRAAT. The files are absolutely unsuitable for further processing in a regular text editor.[3]

Researchers at Albert-Ludwigs-University Freiburg have developed an award-winning, extensive online tutorial for GAT2, which helps users during their first steps with the notation system: http://paul.igl.uni-freiburg.de/GAT-TO/. In this web tutorial, the rules and conventions of GAT2 can be learned through a series of examples and consecutive texts. Here are some examples for transcripts according to GAT2:

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[3] The free program EXMARaLDA (http://www.exmaralda.org) and its appendant editor for transcript partitures are able to import TextGrid files created with PRAAT, and can display them as text files.

Example 1: Each intonational phrase is put into one line

01 A: and what about this idea

02 each flower get its own pot

03 °hh but not a different fertilizer

04 B: why not

05 A: (-) it would be too expensive otherwise

Example 2: Intonational phrases of a single speaker are linked consecutively and separated by the symbol "|". This transcript covers fewer rows, but cannot be expanded into a more elaborate transcript as easily.

01 A: and what about this idea | each flower get its own

02 pot | °hh but not a different fertilizer |

03 B: why not

04 A: (-) it would be too expensive otherwise

Example 3: A basic transcript (cf. Dittmar 2004: p 349) already contains considerably more information:

26 S2: an:d !EV!ery time he called the poLICE,

27 and he started ARGuing with the NEIG [bors,=right,](1.2)

28 S1: [phhh hohoho]

29 S2: and if someone just once used their HORN,

30 he stood out there in NO time;

31 and started YELLing;=

32 =i'll call the poLI:CE

Transcription conventions in conversation analysis

Using the transcription conventions developed in the English discourse on conversation analysis is another – quite similar – option. The system of transcript symbols in linguistic conversation analysis is, just as the more elaborated transcripts in GAT, quite complex (for an overview of transcription notations, see Jefferson 2004).[4] However, Emanuel Schegloff did compile a more simple transcription convention for the social sciences based on the notation developed by Gail Jefferson (http://www.asanet.org/journals/spq/transcriptions.cfm)[5], available on the American Sociological Association's (ASA) website; another list of conventions is available on Charles Antaki's tutorial website on conversation analysis:

http://www-staff.lboro.ac.uk/ssca1/notation.htm

Sample Transcript according to Schegloff/ASA

26 S2: .hhh an:d ↑EVery time he called the poLICE,

27 and he started arguing with the neig[bors,=right,](1.2)

28 S1: [((laughs))]

29 S2: and if someone just once used their HORN,

30 he stood out there in no time;

31 and started yelling;=

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[4] This is no coincidence: The conventions developed in GAT are following – and modifying – the transcription principles of CA as developed by Jefferson (cf. Selting et al 2009: 353).

[5] Note that this website does unfortunately not display the arrows indicating higher & lower pitch, as well as the sideway arrows indicating relevant lines for analysis. Those symbols are correctly displayed on Antaki's tutorial site.

32 <=↓i'll call the poLI:CE>

Amongst other details, this transcript features emphases (underlined text), it indicates louder passages (written in CAPITALS), more slowly spoken passages (in < >), and different levels of voice pitch (↓↑). As in the case of any transcription notation, you should assess which aspects of the recording are important to you, and then decide whether to include them into your transcript.

There is a series of educational tools for learning how to transcribe according to the conversation analysis' transcription notation. Two great places to start are
Emanuel Schegloff's TranscriptionProject website
(http://www.sscnet.ucla.edu/soc/faculty/schegloff/TranscriptionProject/index.html) and Charles Antaki's tutorial website on conversation analysis (http://www-staff.lboro.ac.uk/ssca1/notation.htm).

How long does it take to transcribe?

By no means underestimate the time that needs to be invested to produce a transcript! Oftentimes, one might not be aware that the transcription of an interview may take days. This can easily endanger the fragile schedule of a research project.

The time needed to produce a transcript depends on how fast you can type, and on how complex the final transcript is intended to be. Although it is difficult to pinpoint an exact number of work hours, it is possible to estimate a reliable time frame. The fastest transcription speed we have measured was a ratio of 1:3, meaning, it took the transcriber roughly three hours to transcribe one hour of interview data. However, the transcriber was only able to set this record speed because he/she only typed for about an hour, did not proofread the transcript, and applied only simple transcription rules. When applying very complex transcription conventions, transcription time increases considerably. Some researchers report that it took them between 30 and 60 minutes to transcribe one minute of data (cf. Ehlich & Reede 1994: 4; Lange 2008: 48). Aside from the complexity of the transcription rules, bad recording quality also influences transcription time in a negative way.

According to our experience and our review of relevant literature, one should estimate five to ten hours to transcribe and proofread one hour of interview data (cf. Dresing & Pehl 2010: 726) – granting that simple transcription rules are used. When working according to

the rules of a GAT2 basic transcription, the data is already partly interpreted, since transcribers have to make a high number of decisions during the process.[6] This directly translates into an enormous increase in the time needed to produce the transcript: assuming adequate practice, 5 minutes of audio recording may be transcribed within 1.5 to 2 hours. Under ideal circumstances, this results in a ratio of 1:30 (recording duration: transcription time). If work pauses are included in order to prevent exhaustion, this ratio may increase up to 1:45. This demonstrates that transcribing verbal data is time-consuming work.

In order to complete data transcription quickly, transcription software has proven to be useful. Furthermore we recommend working with hot keys instead of using a mouse while transcribing. A foot pedal further accelerates transcription by 10 to 30 percent. And keep in mind that pauses are necessary. It may sound trivial, but one simply cannot transcribe for 8 hours a day. The recommendations for the frequency of pauses in computer workspaces call for 5 to 10 minutes of break per hour of work in front of the screen. This rhythm has proven itself in our experience. It is not realistic to expect to transcribe for 6 hours without increasing the rate of errors above the normal level.

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[6] One should note that **every** transcript is an interpretation – because transcription is a series of decisions concerning reduction, representation and transformation. Since a more complex transcript calls for more (conscious) decisions, it does take more time to produce it.

For example: you should expect 50 to 100 work hours for ten interviews of one hour length each – assuming you use simple transcription conventions. If you transcribe for four to six hours per day, this translates into two to four weeks of work – a whole month! This can already take a big chunk of time out of a three-month project (e.g. a Bachelor's thesis or small assessment project).

General hints

1. It may sound trivial, but it is crucial nonetheless: back up your transcript from time to time and create an emergency copy. If possible, store it in a different location (e.g. on a USB stick or a second computer).

2. Qualitative data analysis software such as MAXQDA usually works with paragraph numbers. Software for data analysis and software for data transcription can generate these paragraph numbers automatically. Transcripts can also be printed directly in these programs.

3. If you work with a word processor instead of qualitative data analysis software, you can create paragraph numbers there. Highlight the whole document and click on the numbering button (in the 'Paragraph' section of the Home tab in Word™ 2010), and the paragraph numbers will appear.

4. Additionally, line numeration can be added in Word™ at a later point. Open the file containing the transcript in Word™ and go to the 'Page Layout' tab. Now select the 'line numbers' button.

Remarks concerning anonymization

Normally, transcribed text must be anonymized. This can be done by searching and replacing words in a word processor, or directly within the transcription software f4. For example, simply search for "Mr. Smith" and replace it with "Mr. XYZ". This is of course only the first step – you will have to read the text carefully in order to identify passages that might compromise your participants' anonymity.

It is important to anonymize data as far as possible directly after transcription. Not only does this protect your participants, it also saves time (and prevents stress) in the long run. Anonymizing data via 'search & replace' might change the line numbers in your word processing document – this would mean that you'd have to check all of your references in your report again if you anonymized after analysis & writing. Also, qualitative data analysis software does often not feature a 'search & replace' function – so you'd have to manually search and anonymize every piece of text within the program, which is much more painstaking than doing it in a word processor (especially because the ease of handling tasks of word processing is much lower in QDA software).   Of course you can export your data from QDA software into a text document and anonymize it in a word processor – but then you suddenly deal with two versions of your data, and you will always have to cross-check references in your research report.

Anonymizing data for your research reports is an important task – if you make mistakes, or if you miss to anonymize only one important piece of information, the whole effort was in vain, and the identities of your participants may be revealed. Thus, it is better to do this work as early as possible: Research projects tend to be more stressful towards the end, when deadlines are pressing – it is very exhausting to do delicate work such as anonymizing at this time. Also, anonymizing right after transcription gives you the chance to find mistakes or missing anonymizations while you analyze; this is an extra safety net for you and your participants.

Expecting and avoiding transcription errors

Each and every transcript contains mistakes after the first time through. These mistakes are usually checked and corrected in a second round, by reading the transcript while listening to the audio recording. Surprisingly, only few errors are pure spelling mistakes. The more problematic phenomenon is that often words are omitted, replaced, or added. These errors stem from the listener's natural tendency to "co-think" the speaker's statements while listening. Hence, inconsistencies are compensated and the listener fills gaps. By unconsciously "correcting" these inconsistencies, the original statements are further distorted. Even small differences can warp the meaning of the original message. For example: "I ate the apple" vs. "I hate the apple".

Isabelle Chiari (2006) demonstrates that untrained transcribers produce a mistake in almost every paragraph. Close to 37% of these mistakes lead to a semantic distortion of the statement. Therefore it is advisable to proofread the completed transcript at least once or have another person proof-read the text ("two-man rule"). By doing this, most mistakes are tracked down reliably. If it is not possible to have someone else proofread the transcript, you should read them yourself, allowing some time to pass between the transcription and the proofreading.

Transcribing – and how software & hardware can help

Can speech recognition software take some work off my shoulders?

Unfortunately, this is not possible yet. We have thoroughly and repeatedly run tests of speech recognition software and the tested programs prove themselves incapable of providing automated recognition of interviews and group discussions/focus groups. (Dresing et al 2008) In interview situations, people often speak in dialect, with accents or in colloquial language. Speech recognition software cannot identify such variety. Additionally, the software is unable to register breaks and emphases.

There is only one option for using speech recognition software for transcribing interviews: training the program to recognize your own voice. By this method, you listen to the data and re-narrate what is said in the recording. However, even compared to using the hunt-and-peck method (100 characters per minute), such a method does not provide advantages in terms of work time, since the time saved is consumed by the time it will take to incorporate corrections and refinements. According to our tests, using speech recognition software in the manner outlined above was no match for regular transcription in terms of time effort.

You will find further literature, comparative tests and additional information on the possibilities and limits of speech recognition software in academia on our website:

http://www.audiotranskription .de/Spracherkennung

(content in German language).

Use transcription software – not iTunes™

Even though using speech recognition software does not work yet, some type of software is needed to transcribe digital data. The first – and obvious – thought would be to use a digital music player and a word processor. Unfortunately, common programs (such as Windows™ media player or iTunes™, among others) are not useful for transcribing data. They lack major functions which can support and abbreviate the transcription process, for example:

- slowing down playback speed without distorting the sound pitch
- automated intervals for rewinding when the tape is paused (which enables you to hear the last few words after you paused the recording)
- insertion of time stamps (which can be used as links to the exact recording position in word processors or qualitative data analysis software)
- (customizable) text elements (e.g. shortcuts for speakers etc.)
- control of the player with hotkeys or via USB foot pedal.

Specific programs for audio transcription were not available during our PhD research in 2004. Because of this, we developed such a program ourselves: "f4"– although it came out a bit too late to help us in our own research…

By now, f4 has been downloaded over 325,000 times, and it is one of the most well known transcription programs in Germany. F4 was developed for Windows™ users; for Mac® users, we developed f5 in 2010. We continuously develop both programs, and the newest versions are available to download on our website http://www.audiotranskription.de/english/

Step-by-step guide for f4 (Windows™) and f5 (Mac®)

F4 and f5 aid you when transcribing your data, e.g. whenever you manually type audio or video recordings. The programs facilitate your work in different ways:

- You can optionally slow down the replay speed (without distorting sound pitch)
- The software can be controlled by using the F4 and F5 keys (hence the name)
- You can be set it up to automatically rewind the recording for a few seconds after you paused the tape
- Time stamps can be (automatically or manually) inserted
- Text blocks can be inserted via keyboard shortcuts (e.g. for the initials of different speakers)

Transcripts produced in f4 and f5 (including optional time stamps), are saved as RTF files, a widely compatible word processing file format.

1. Installing the program

    Download f4 for Windows™ or f5 for Mac OS® from http://www.audiotranskription.de/english/. You will also find detailed instructions on how to install the program on the site.

2. Setting up the software

    Open the program. First, set a location for saving backups (you can do this in the 'preferences' menu). Now open an audio or

video file via the 'file' tab or drag-and-drop the desired files into the main f4/f5 program window. Next, customize the sound output volume, the replay speed and rewinding/forwarding intervals. The standard settings normally accommodate most users; only the replay speed should be reduced when transcribing passages with fast or overlapping speech. When transcribing two-person conversations you can activate a feature that automatically inserts the name/abbreviation of the alternating speakers. You can suppress this function at any time by holding down the shift key and the enter-key to create a new paragraph.

3. Transcribing quickly and conveniently

The 'F4' key (or 'F5' key in f5 for Mac®) controls the core functions of our software: starting and stopping the playback and automatically rewinding the recording in short intervals. The functions of f4 & f5 can also be operated via the 'F4'/'F5' key when other programs are running in the foreground, such as continuing to navigate through an audio file while checking analysis results in a word processing program. Use the 'F3' and 'F5' keys (or 'F4' and 'F6' keys on Mac®) to rewind or fast-forward the audio. By using a foot pedal, the programs can be controlled even quicker. (Also, in both programs, spoken audio remains decipherable while rewinding or fast-forwarding).

4. Time stamps – inserted manually or automatically

   Time stamps are important for orientation within a transcript and allow for a quick reference to the original audio source. They are either automatically inserted at the end of each paragraph, or they can be inserted at anytime by pressing the 'F8' button. In f4 & f5 as well as in the qualitative data analysis software MAXQDA or ATLAS.ti, these time stamp references are active links. In both programs, clicking on the times tamp triggers the playback of the relevant part of the audio or video recording. When saving a file in f4 & f5, you can choose whether to save the transcript with or without time stamps. If you transcribe movies or movie fragments, you can define a time offset, so that time stamps do not start at zero, but with the respective time within the movie.

5. Tutorials - We have created a series of video tutorials which can be viewed on our website www.audiotranskription.de/english/f4.htm

Time stamps are useful!

We have already mentioned time stamps earlier. Their usefulness is extraordinary, and this is why we would like to cover them explicitly. Time stamps are simple numbers indicating a respective position on the audio or video track. They enable you to check the transcript for possible errors, or to review semantic and ambiguities in intonation much later in the analytic process.

In f4 and f5 they are clickable links. Clicking on a time stamp winds the recording to the respective passage and starts the replay. The great thing about time stamps is that they also work in the qualitative analysis programs MAXQDA and ATLAS.ti. These programs recognize time stamps from f4 and f5 and enable you to play back the respective sequence of audio on one click. You can go directly back to your original recorded data in order to answer analytic questions, or to review controversial or odd transcript passages. Oftentimes, being able to quickly and conveniently listen to an original passage supports you in creating valuable interpretations which are grounded directly in your data. Another advantage of time stamps: you can reduce the amount of text you transcribe. For example, you can create an inventory of topics from an interview, and supplement this summary with time stamps. The time stamps allow for quick access to the interview data, and needed passages can be transcribed later in the process.

Using time stamps in computer-aided analysis

Time stamps from f4 & f5 work in the qualitative data analysis programs MAXQDA and ATLAS.ti . As an introduction, we are going to show you examples of how to use your f4 and f5 transcripts with time stamps in MAXQDA.

By clicking on a time stamp, it is possible to simply play back the actual audio or video data – for example while coding your data. This enables you, for example, to hear how a statement was accentuated. And this is how it is done:

Import of the transcript and the media file

With MAXQDA 2010 it is possible to link f4 and f5 transcripts with your audio or video files in MAXQDA's documents system. In the window "Document System," texts with multimedia files are marked with a special icon that includes a small music note symbol.

Simply import your f4/f5 transcript (* .rtf-file). Usually MAXQDA will ask you right away for the location of the matching media file. If not, right-click on the imported text, select 'properties' and select the location of the audio or video file located on your computer.

Activating the media player

In order to play back a paragraph upon clicking, you'll have to open the MAXQDA media player. Click on the 'toolbars' tab on the top of the menu bar, then select the media player icon

The player bar will be placed on the toolbar and you can move it around within the toolbar. In order to activate the media player, click on the small flag on the toolbar.


Now, a new column visualizing the time stamps appears in the document browser window.
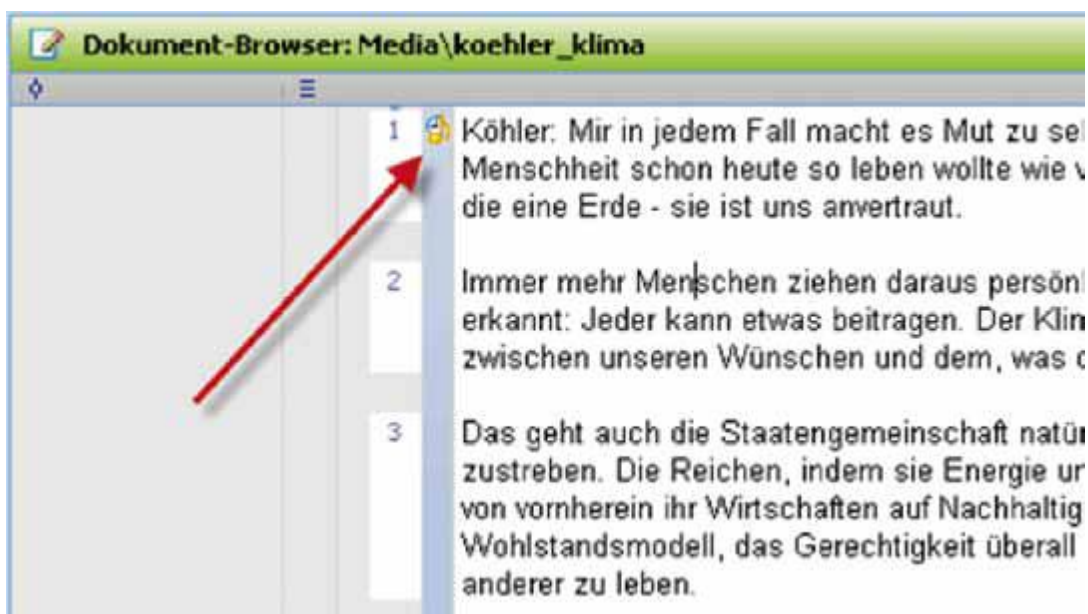
Play back of audio & video

Upon clicking one of the time stamp symbols, the recording starts playing at the respective position. The playback of video files works the same way. However, in order to not only listen to but also see the video, you have to also open the video player. Do this by simply clicking the video window button.

A very practical tip: If you activate the 'sync mode' ((ICON)) during longer playback, the time stamp column on the left of the text changes its color to blue when the respective passages are playing just like a teleprompter.
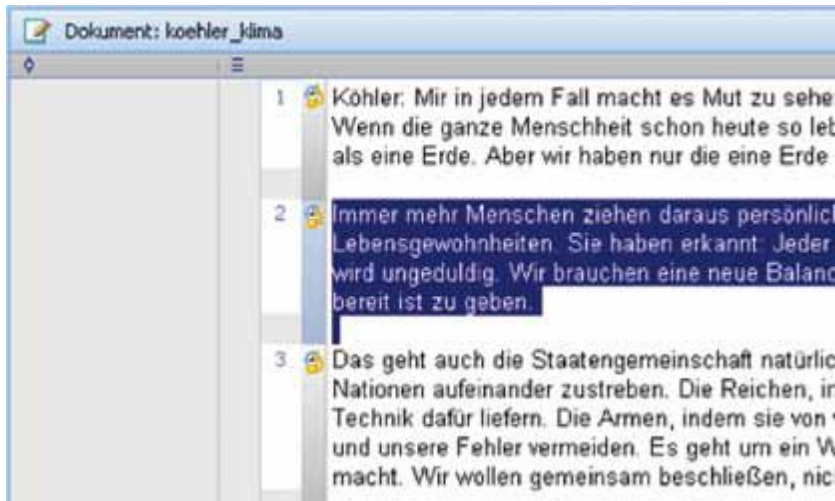
In order see a list of all your time stamps, click on the 'list timestamps' icon. In the overview, you can enter a comment for each passage surrounded by the two time stamps.
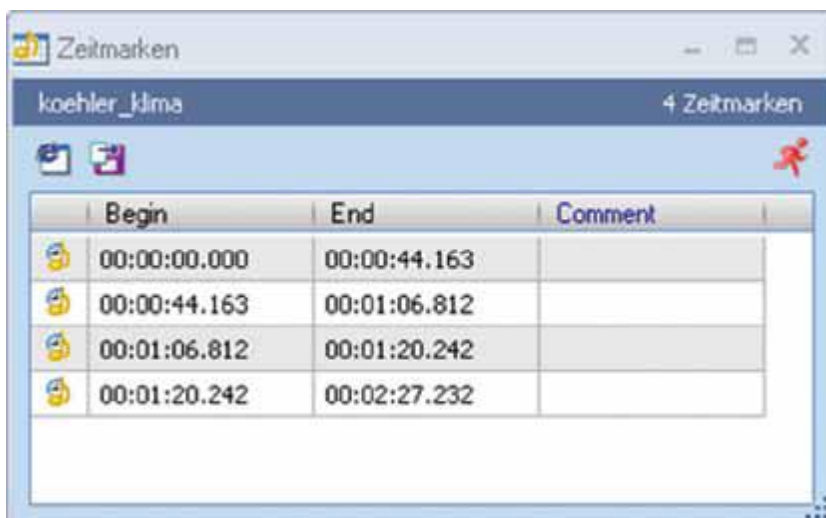
Please note that audio and video files are generally not integrated in your MAXQDA project file. They are linked and read from external locations (e.g. a folder on your hard drive). This is done in order to

keep the overall project file size low and preserves the program's mobility and speed. You have the option to set the external saving location in order to organize your project uniformly. You can learn how to do this in MAXQDA's online tutorial on www.maxqda.com.

Hints for recording & handling files in particular situations

At www.audiotranskription.de, researchers have repeatedly contacted us with technical questions concerning recording and transcription issues they have come across in their research practice. We have tried to answer most of them, and we would like to introduce some of them, all of which come from the collection of tutorials available on our website. We hope that our technical hints will save you some time and effort, or even open up some new possibilities, for your research.

Recording telephone interviews

Telephone interviews are an important and cost-efficient method of data collection. In the case of phone interviews, the technical task is to record both speakers in a reasonable quality. However, the recording quality will always be worse than the recording of a face-to-face interview recorded by a recording device.

With our small phone recording adapter, telephone conversations can be easily recorded. The cable of the receiver has to be connected to the telephone by a plug. Detach this plug, place the adapter in between. Now connect the adapter's jack plug with the line-in of your recording device. Now you are ready to record all phone conversations.

Alternatively the adapter can be connected to your computer's microphone input, and the telephone conversations can be recorded via recording software. We recommend free programs such as Audacity, No23 Recorder or RecOnPhone. A noise filter ensures good quality even in soft-spoken passages. When recording the phone conversation with a computer, basic knowledge of the control panel may be necessary in order to modulate the optimum recording level.

Another alternative is the telephone adapter (TP-7) manufactured by Olympus, which we do not necessarily recommend due to its uncomfortable handling and its hygiene issues. If you use this device, the type of the phone (wireless phone, cell phone, phone connected with wire) does not matter because the adapter is worn in the ear, just like a small set of headphones.

However, inserting the adapter in the ear is rather uncomfortable, and due to hygiene reasons it is less suitable if it is to be used by several persons (e.g. if it is to be rented out by a library or a department).

Recording phone conversations with Skype

Phone calls can be easily recorded if you conduct your phone interviews via Skype. There is a series of add-ons and programs which allow you to record phone conversations as well as conversations with other Skype users. You'll find a commented list of Skype recorders on http://www.aboutonlinetips.com/free-skype-call-recorders-3308/

This guide will introduce you to the free "Mp3 Skype Recorder", which – as the name suggests – saves your conversations as mp3 files. If you want to try out different programs: Wee have created two video tutorials on using two other recorders, "wiretap" & "callgraph". The tutorials are available on audiotranskription.de (German only).

Although recording via Skype can make the recording of phone/VoIP data much easier, there is also a range of possible technical issues. The call quality when using Skype can dramatically diverge, depending on your internet and computer speed. If you call another Skype user, his/her internet quality and computer speed will also drastically influence the call quality. If the connection is bad, you and your interviewees might sound very choppy, break up, sound somewhat "distant" or distorted, and there might be a delay or echo when speaking (especially if you or your interviewees use speakers instead of earphones). These technical issues can make interviewees feel less comfortable with the overall interview situation or leave

them somewhat confused – especially if your interviewees are not familiar with VoIP technology and its deficiencies. If you suspect sound issues you should explain prior to the interview that you are calling from a computer, and that your voice might sound choppy sometimes, or that the conversation might break up – but that you'll call again right away. Before you start to conduct interviews via Skype you should therefore not only make sure that you and your interviewees feel comfortable with the mode of communication – but also check if you and the interviewees are familiar with the technology (and problems) connected to it. For some additional methodological remarks on Skype interviewing, see http://squaremethodology.com/2011/01/initial-thoughts-on-interviews-via-skype/

What you need

- Skype is free, and it is free to call other Skype users. If you want to call phones from your computer, you need to buy calling credit from Skype.
- A microphone & headphones (or a headset). We do not recommend using speakers, because they sometimes create annoying feedback. (If you interview other Skype users, you should make sure your interview partners have a microphone & headphones as well...)
- "Mp3 Skype Recorder" (free), download:

http://voipcallrecording.com

Installing and setting up the recorder

Download the recorder and install it on your computer. Start the recorder, and then start Skype. During the very first start, Skype will ask you whether you want to allow the recorder to connect with Skype – click on "yes" at this point. Depending on your firewall settings, a warning might pop up, informing you that the recorder is trying to access Skype. You will have to allow this; otherwise, the recorder will not be able to record your calls.

If you want to change the recorder's access to Skype at a later point: You can manage the access of external programs in Skype under Tools -> Options -> "Advanced" tab -> "manage other program's access to Skype".

Recorder options

To record a Skype phone call or a conversation with another Skype user, Skype as well as the recorder have to run.

The recorder functions are pretty straightforward: You can change the bit rate of the recording, and you can choose whether you want to record mono, stereo (caller on one channel, called person on the other) or joint stereo. Furthermore you can specify whether the

program should start on Windows™ startup, and you can change the folder in which the program stores your conversations (which we recommend since the default folder is somewhat hidden). The conversations will be saved as mp3 files.

How to record

The recorder can be set up to start a recording as soon as your conversation partner picks up (We strongly discourage this setting, because it might lead to accidental recordings without the interviewee's prior consent). If the recording button has no square around (click on the recording button prior to the Skype conversation), the recording will automatically start as soon as the next Skype conversation starts (note that the recorder is not recording prior to the call).
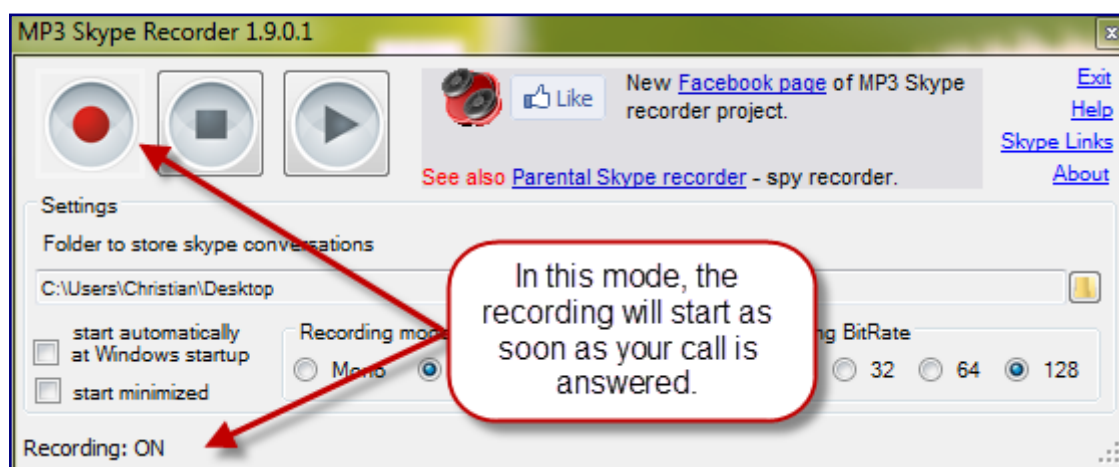
If the recording button doesn't have a square surrounding it, the recording will NOT start on start of the conversation – you can start it manually whenever you want to during the conversation. If the

player is set up like this and not recording, you will see a red bar on the bottom of the recorder with the message "recording off".

Every time a recording is started, this window will pop up for a short time (check the bottom right of your screen), indicating that you are actually recording:

The recording will stop either when you push the stop button or when you hang up your call. The file will then be automatically saved – another pop-up window will inform you of that. The file will be saved in the location that is shown on the player.

Before calling your interview partners, you should do some test calls in order to get acquainted with the controls, and to make sure the quality is alright.

Converting audio files

It is sometimes necessary to convert your recordings, for instance if you work on a Mac®, but your interviews are saved as WMA file; or if you have an uncompressed recording from a high quality recorder which leaves you with a file of over 500 MB.

For converting audio files, we recommend programs such as Audacity (Mac® and PC), all2mp3 (Mac®), Switch and xrecord. They are perfectly able to convert audio recordings into other formats (e.g. mp3). We will show you how easy file conversion is by example of the software Switch[7]:

1. Select audio file

Install and start Switch. Select the files you want to convert or drag the files into the open program window. It is also possible to select various audio recordings or a whole folder.

2. Specify the destination and format

On the lower part of the program window specify the preferred output format, for example OGG or MP3. You can indicate the preferred output folder in the input field above.

3. Converting

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[7] Free download available at: http://www.nch.com.au/switch/de/index.html

Upon clicking on the 'convert' symbol (top right), converting begins. This process can take a few minutes depending on the file size. If you convert files into MP3s, a window for the codec settings is displayed first. Click on 'OK'. The conversion is complete when the progress bar reaches 100 percent. The file will be located in the folder you previously selected.

Noise Removal

With the free software Audacity (http://audacity.sourceforge.net/), which supports all common audio formats, it is possible to reduce noise from an audio recording easily and within a few clicks. The procedure is as follows:

1. Determine the noise profile

Install and start Audacity, open the interview via the the 'File' menu. You can now see the file in waveform. You can listen to the file by clicking the "Play" button; a vertical bar indicates the current position in the file. In order to skip to a certain position, just click on the wave form. Search for a position where you only hear background noise (for instance, a short conversation break), select the part that's silent except for the noise. Then choose 'Noise Removal' from the 'Effect' Menu and click 'Get Profile'.

2. Remove noise

Select all of the audio (CTRL + A), choose 'Effect' > 'Noise Removal' again. This time, select the "Noise Removal" button. Now click on 'preview'

3. How to get optimal results

In order to optimize the result, you can experiment with adjusting the noise threshold with a different noise removal level. If you get a satisfactory result, click on 'OK'.

4. Finishing up and exporting

In order to finalize the changes in the audio recording, the project must be exported. Go to the 'File' menu and choose 'Export'. If necessary, add metadata to your file and confirm with 'OK'. In the subsequent window, select your preferred file type (most commonly MP3) and the saving location.

Trimming audio files

Sometimes a recording contains unwanted content from before or after the interview itself. For trimming audio files, we also recommend Audacity for trimming audio files.

1. Selecting a file

Install and start Audacity, open the interview via the 'File' menu. You can now see the file in waveform. You can listen to the file by clicking the 'Play' button; a vertical bar indicates the current position in the file. In order to skip to a certain position, just click on the wave form. Highlight a selection you want to cut by holding the left mouse button and moving the mouse.

2. Trimming

You can delete the selected part by pressing the 'Del' key on your keyboard.

3. Cutting and exporting

Would you like to store the actual selection as a separate file (For example; as a sound sample for a transcription service)? Select the 'File' menu, then 'Export'. Your snippet will now be shown in a new window.

4. Finishing up and exporting

In order to finalize the changes in the audio recording, the project must be exported. Go to the 'File' menu and choose 'Export'. If

necessary, add metadata to your file and confirm with 'OK'. In the subsequent window, select your preferred file type (most commonly MP3) and the saving location.

Data security and recovering deleted data

Deleting data by mistake is annoying. Whether it is the important interview, the written transcript or any other data; once deleted unintentionally, one can be sure of a surge of adrenaline. Fortunately, there is a free tool that can help in such a situation: Recuva.

1. Make preparations

If possible you should not save additional data on the drive where the deleted data is located – at least until the recovery is complete, so that the lost data is not overwritten. Download and install the software from: http://www.piriform.com/recuva.

2. Using the wizard for recovery

Open Recuva and use the wizard. It is best to search for all file types. In the next step, make sure that 'in-depth scan' is activated - only then Recuva can really find most of the data.

3. Searching and restoring lost data

The search itself can take between ten minutes and several hours (400 GB hard drive approximately takes 6 hours to scan). The search result is listed in a table, from which you can select single, several or all restorable data and save it onto another drive. After selecting the files, press the button 'recover' and all the selected data is restored – impressive.

An important conclusion

While we were very happy with the results Recuva delivered, we found out something interesting. You can restore nearly almost all data with Recuva. Not only data that was deleted an hour ago can be restored, but also data from a completely formatted hard drive (which had been used earlier).

Not a problem? But yes! Think about the following situation:

You sell your old notebook, your external hard drive or your USB flash drive. The buyer has the possibility to restore data with Recuva and therefore can get into possession of information that was not meant to be his or hers.

Or: You have a rental recording device. In this case, every subsequent user can at least recover and listen to a part of previously deleted interviews.

After consulting computer scientists we realized that empty and formatted storage media are never completely empty. If you deal with sensitive information such as interviews (which are subject to privacy policies and informed consent agreements), analysis results, images and much more, you cannot pass your data storage hardware on to someone else without making sure that the data is permanently deleted.

Deleting data safely (permanently!)

Overwriting data once should normally do the job. It is also sufficient to simply delete the sensitive data and then to fill the device to the brim with useless data manually.[8]

Repeated overwriting is not necessary in the case of magnetic hard drives or flash memory drives. In the case of flash drives it might happen that some data is retained in flash cells that only serve as buffers or as replacement of defective cells.

The probability that something usable remains in these cells is on one hand very low, and it would, on the other hand, call for a huge effort to retrieve the data. Our recommendation is to use a special deletion program. "Eraser" is a good solution, which is recommended by the computer magazine c't and the German Federal Commissioner for Data Protection and Freedom of Information

But if you have *really* sensitive data, you should destroy flash-media (and of course CDs) physically.

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[8] The program "H2testw v1.4" provided by the computer magazine c't fills storage memory completely upon testing hardware and therefore should be able to overwrite all data: http://www.heise.de/software/download/h2testw/50539

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