

Using & Preparing Multimedia Data in CAQDAS Packages

The material provided here will help in preparing and using different types of multimedia data with various CAQDAS packages, although it does not provide guidance on how to analyse such data. The following sections discuss:

1. using multimedia data in CAQDAS packages (codecs, streaming, synchronizing)
2. preparing different file formats for the use in CAQDAS packages (images, audio files, video files)
3. work-arounds for potential problems, when working with multimedia files in CAQDAS packages.

The document starts with outlining general information about digital media data including aspects of codecs, streaming and synchronizing. After a general introduction this document will discuss preparation tasks (issue of collecting data, aspects of editing including synchronization of multiple media files, data handling in different CAQDAS packages) for each file format separately: image, audio and video. For further information, the last section of this document - 'further resources' - provides links to related topics and sources. Please note that the advice given here is by no means fully exhaustive but should provide a starting point for planning for the analysis of multi-media data using CAQDAS packages.

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Some Preliminaries

The following sections will discuss three aspects of data preparation, codecs, streaming and synchronizing. Before using multimedia data with any CAQDAS package, it might be necessary to convert media files into appropriate formats or to merge media files for easier data handling.

Codecs

Codecs are devices used to compress (and decompress) digital data in order to limit file size. CAQDAS packages handle codecs differently and it may be that data is derived in a format your chosen software cannot handle. For example, *NVivo 8*, *HyperRESEARCH 2.8*, and *Qualrus 2* use internal rendering machines for videos, whereas *DRS*, *MiMeG*, *Transana* and *ATLAS.ti* rely on video software already installed on your computer. Thus, a file supported by *Windows Media Player*, *Apple Quicktime (Pro)* or your default media player should be replayed un-problematically by the latter four CAQDAS programs, but not necessarily within the former ones. However, some packages, including *DRS*, *MiMeG*, *Transana* and *ATLAS.ti*, might not be able to replay the file if it is a movie clip (e.g. DVD files, MOD) as these formats may not be recognized as media files. Such files will have to be converted into a smaller file format.

Different file types rely on different codec's in order to be viewed. Recording devices normally offer options for encoding files and it might be useful to use the default option and select save as 'best quality' in order to achieve high image and sound quality. For more information on codecs see the last section of this document 'further resources'.

When using *NVivo 8*, *HyperRESEARCH 2.8* or *Qualrus 2*, you will need to convert video and/or audio data into a format that is supported by these programs, while for *Transana* and *ATLAS.ti* you might only need to install the relevant codecs. However, it might be beneficial to convert the media files before using them into a format most of the CAQDAS packages can read in case a different CAQDAS package appears to be more appropriate at a later point.

Streaming

Streaming refers to the delivery method of data. For example data collected from the internet is often delivered as a stream in order to be viewed by the end-user (e.g. radio, online TV, etc). The internet allows streams to be viewed without downloading the whole media file, which enables faster online playback. However, if you want to analyse data that exists as a stream it is necessary to download it

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separately in order to save it as a non-stream file to the hard drive, which requires an additional recording program. Options include the following:

- [Adobe Flash Media Server](#) (flv, fla)
- [Quick Time Streaming](#) (avi)
- [Real Time Streaming Protocol](#), a protocol used by many media types, e.g. rm/ram, wma/wmv

These recording systems allow the viewing and saving of streams to the hard drive. Another advantage of installing one of these recording systems is that when downloading another stream the system will recognize the need for streaming it and open automatically if set as default.

Synchronizing

Synchronizing multiple media files is supported by DRS and Transana, which allows different media files to be played and analysed simultaneously. However, the process of synchronizing media files using Transana and DRS can sometimes result in less picture quality (the picture is more pixilated) or in a slight delay when replaying the files simultaneously. Thus, it might be advantageous to synchronize multiple multimedia files before using them with a CAQDAS package by using video editing software. Some options include:

- [Adobe Systems](#)
- [Avid Technology](#)
- [Apple inc: iMovie, Final Pro Cut](#)

In addition, synchronizing media files using video editing software would allow the use of CAQDAS packages that do not themselves replay multiple multimedia files simultaneously. However, the original files should always be saved separately as synchronizing can be faulty.

Choice of File Formats

The choice of file format depends on various factors, the choice of CAQDAS package being only one. Although data might only be used in one CAQDAS package it might be analysed in a specific way that requires high video and or sound quality, e.g. for analysing nonverbal behavior (gestures) the use of the highest resolution for pictures and video frames is probably preferable. Compressing a file is always easier than decompressing a file so it is recommended to start with the best quality and then reduce it if necessary. Decompressing a file that has been compressed beforehand might result in loss of data.

Open source formats offer very good solutions in terms of converting files into high quality files compatible with CAQDAS packages. The AVS Video Converter website offers a number of freeware video converter ready to download as well as shareware and commercial products.

<http://software.informer.com/getfree-open-source-avi-to-mpg-convert/>

Legal and ethical Issues

Using multimedia data might inhibit legal and ethical issues, especially if collected from the internet and or involving children. This document does not discuss these issues in detail but we do suggest considering

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aspects such as privacy, data protection (anonymising images, voices, etc.), data storage, informed consent forms, agreement of parents etc. when planning projects.

CAQDAS Software and Multimedia Files

Different CAQDAS packages have different capabilities for handling multimedia files. Table 1 provides a broad overview of the multimedia functionalities of eight common CAQDAS packages.

	ATLAS.ti 6	DRS 1.0 rc-7	HyperRESEARCH 2.8	MAXqda 10	Nvivo 8	QDA Miner 3.2	Qualrus	Transana
Support for the import/assignment of image files	all major formats	all major formats	all major formats	all major formats	all major formats	all major formats	all major formats	no ¹
Support for the import/assignment of sound files	all major formats and those codecs that are installed on the system	all major formats partially supported, full functionality only with Quicktime	most major formats and some codecs that are installed on the system are supported	all major formats and those codecs that are installed on the system	all major formats and those codecs that are installed on the system	none	all major formats and those codecs that are installed on the system	all major formats and those codecs that are installed on the system
Support for the import/assignment of video files	major formats and those codecs that are installed	major formats, full functionality only with <i>Quicktime</i>	major formats, some codecs (primarily <i>Apple</i> formats)	major formats and those codecs that are installed	major formats and some codecs that are installed	none	major formats and those codecs that are installed	all major formats and those codecs that are installed
Hyperlinks to external multimedia files	no	yes	no	yes	yes	yes	yes	no
Import/Assign independent textual data	yes	yes	yes	yes	yes	yes	yes	no

Table 1 Selected Multimedia Capabilities of CAQDAS packages

Preparing still images for use with CAQDAS packages

¹

As a workaround, image files can be converted into video files with the image being a repeated frame.

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This section discusses the preparation of still images for the use with CAQDAS packages by addressing issues of collection, editing and working with still images. Still images are probably the easiest multimedia files to be handled by any CAQDAS package, however some issues arise which are worth considering at the outset of a project.

Collection Issues for still images

There are several ways of using and reusing still images for research purposes, each of which involves different issues: Collecting one's own images, reusing existing still images and using images taken by participants. Using data collected by the researcher him or herself is probably the easiest way of making sure that the requirements of data size, format etc. meet the research purpose, thus involving the least difficulties in preparing data. However, reusing existing still images, for instance those harvested from the internet might require further editing as the picture resolution might be too high or too low or the colours not strong enough for analytical purposes. This might also be the issue when using pictures taken by participants, although doing so might add another analytical level and therefore be of advantage. Still images taken with a mobile phone are likely to result in a low resolution, thus might not be usable for further detailed analysis. Cell phone cameras and web cams usually do not yet go beyond 3 Megapixels, which at times will result in fairly pixilated images. Digital devices with more than 5 megapixels should allow good quality and higher resolution suitable for further research purposes.

Harvesting images from existing data sources does not usually cause problems. Most internet browsers (*Internet Explorer, Safari, Firefox, Opera, Konquerer, Google Chrome*) allow images to be saved through right-clicking on the picture. Some websites attempt to disable this feature, but you can always view the source code (in most browsers under *View → Source*) to find the address of a picture, which you then to paste into your browser's URL bar.

Editing still images

Preparing still images for further usage in a CQADAS program might require further editing, either to rectify insufficiencies or to improve the picture quality. CAQDAS programs do not always allow efficient zooming, resizing or rotating, thus using an image editor to enlarge or otherwise manipulate an image before working on it might be beneficial in the long run. Figure 1. illustrates the dramatic effect which can be achieved to improve picture quality by brightening an image.



Figure 1 Brightening

The needs of a particular research project will determine the appropriateness of editing images prior to analysis, but it might be useful to sharpen a picture to identify details, or, to enlarge (parts of) a picture. Depending on the size of the picture resizing can also lead to lower resolution.

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There are a wide variety of image editors from which to choose:

- **[Paint](#)**
Microsoft's built in editor is a commonly used picture editor, although it is quite rudimentary.
- **[Picasa](#)**
Google has developed this functional freeware image storage and simple editor.
- **[Adobe Photoshop](#)**
This proprietary program is a common commercial package for picture editing.
- **[Irfanview](#)**
This freeware editor performs the functions most social researchers will need for their analysis, and it has a very intuitive interface.
- **[GIMP](#)**
This freeware is more versatile than Irfanview or Picasa, but its interface is consequently much more cluttered.
- **[iPhoto](#)**
An image storage system and photo editor for Apple systems.

Working with images in CAQDAS packages

CAQDAS programs have different capabilities for handling images. For example, Transana, does not directly support still images, but you could create a video out of a selection of still images for analysis. DRS, which focuses on the analysis of heterogeneous data over time, will allow you to link images to a time line. Most other CAQDAS packages have more standard image analysis functions which are summarized in Table 2.

	ATLAS.ti 6	DRS 1.0 rc-7	Hyper RESEARCH H 2.8	MAXqda 10	Nvivo 8	QDA Miner 3.2	Qualrus	Transana
Support for the import of image files	all major formats	all major formats	all major formats	all major formats	all major formats	all major formats	all major formats	no ²
Hyperlinks to external multimedia files	no	yes	no	yes	yes	yes	yes	no
Code an image file	yes	yes	yes	yes	yes	yes	yes	no
Code sections of an image file	rectangular selections	no	rectangular selections	rectangular selections	rectangular selections	rectangular selections	rectangular selections	not applicable
Apply annotations/me	yes	no	yes	yes	yes	no	yes	not applicable

²

You can transform still images into a video.

mos to images								
Zoom	yes, some resampling	yes, but no resampling	no, fixed size	yes, but no resampling filter	size depends on window size, no resampling filter, full image is always shown	yes, but no resampling filter	no, fixed size	not applicable

Table 2 Image Capabilities of CAQDAS Programs

Preparing audio files for use with CAQDAS packages

This section will discuss how to prepare audio files for the use in CAQDAS packages, including the following aspects: suitable audio file formats; converting audio files; collecting audio data; editing audio data; and data handling of audio data in different CAQDAS packages. For more a detailed technical description on best practices in using digital audio data, please consult [Digital Audio Best Practices](#).

Accepted audio formats

The easiest option would be to collect data in the format you want to store it in, but numerous converters are available, if this is not possible. The most important audio [codecs](#) and file formats are:

- **[Waveform \(WAV\)](#)**

wav is the most basic audio format; it produces the best audio quality and is suitable for all CAQDAS packages that process multimedia data. Its main drawback is bulky file sizes. However, as the availability of disk space and bandwidth increases this becomes less of a problem.

- **[MPEG-1 Audio Layer 3 \(MP3\)](#)**

mp3 is the most common compressed propriety format, for which a number of free converters into wav are available. The quality of mp3 files varies with their compression and frame rates. Usually, frame rates of 128kpbs and more achieve CD quality. CAQDAS programs that accept multimedia files, will accept most mp3s.

- **[RealAudio Media \(rm, sometimes also abbreviated ram\)](#)**

Real Networks' proprietary format, which is difficult to handle in most CAQDAS packages. It should therefore be converted into the more standard mp3 or wav formats, before it is used in those programs.

- **[OGG Vorbis](#)**

ogg is an open source format for compressed audio files. It is nevertheless fairly uncommon. It offers, however, better quality and higher compression than mp3, and is fairly well suited for CAQDAS packages as well. If you reject the wav format for reasons of disk or memory space, this is a good alternative.

- **[Windows Media Audio \(WMA\)](#)**

wma is *Microsoft's* standard format for audio compression. A number of different plug-in codecs are available for

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this format. Hence, compatibility with CAQDAS packages varies more than with other compression formats, which means that, if you can use a particular wma file in the program that you are working with, not necessarily all other files of this type will be supported. Thus, files of this type are better converted.

- [Advanced Audio Coding \(AAC\)](#)

Apple's proprietary compression format aac works best in the Apple environment. It is accepted by most CAQDAS programs that accept multimedia, but you might want to consider converting it, if you work in a *Linux* or *Windows* environment.

Audio converters

Not all CAQDAS packages process all types of audio files, so at times it is necessary to convert files to a specific audio format. Various audio file converters exist, including the following:

- [Switch](#)

Switch in its freeware version allows you to convert most common audio files except for AACplus into wav or mp3.

- [CyberPower Converter](#)

This alternative freeware converter allows you to convert the most common audio data formats except aac.

- [AVS Audio Converter](#) AVS Audio Converter converts audio between various formats: WAV, PCM, MP3, WMA, OGG, AAC, M4A, AMR and others. Add text information to your audio files.

Collection issues for audio files

Collecting audio data can be undertaken in different ways and thus produce different file formats, e.g. audio recorded with a tape recorder, audio recorder with a digital recorder, audios recorded with a microphone or without a microphone, audios recorded with a mobile phone. For instance, data that has been recorded with a tape recorder and then put on a CD might have to be converted into a wav or mp3 file, which the above converters might be helpful. Additionally, audio data not collected by the researcher him or herself might have been recorded in a different format or include unnecessary information in the beginning and so need to be converted and edited.

In contrast, audio data retrieved from the internet can often be used in CAQDAS packages without any conversion. However, [streamed audio files](#), would also need to be converted by a recording system in order to be downloaded and saved properly.

Audio editing

Whether self-created or harvested, not all audio files will meet the requirements for an effective analysis. In such cases several audio editors exist. These editors allow noise reduction, cutting sections, splitting files, merging files etc. in order to prepare the audio file in the most effective way for further analysis. Audio editors range from commercial solutions such as [Adobe Audition](#). to freeware editors like [Audacity](#). Other sound editors include [Bias Peak](#) and [Sony Sound Forge](#), both commercial, as well as

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the open source program [Ardour](#) (for *OS-X* and *Linux*). If financial restraints are not an important issue, however, any editors will facilitate complicated tasks such as noise reduction.

[Adobe Audition](#) Allow recording and mixing of multiple audio files, as well as editing, converting and mastering audio files. It is a very useful software easy to use but commercial.

- [Audacity](#)
Audacity® is free, open source software for recording and editing sounds. It is available for Mac OS X, Microsoft Windows, GNU/Linux, and other operating systems.
- [AVS Audio Editor](#)
AVS Audio Editor edits audio collections, records audio data, converts between all popular audio formats, applies effects and filters. It is a very useful tool and freeware.

Noise Reduction

A common problem is that an audio file might contain too many distractions — noise — in its recording; for instance, the humming of an air conditioning unit, a TV running in the background or car traffic. In some cases these background noises might be part of the analysis whereas in other cases these might be completely redundant. It is therefore worthwhile to consider these aspects before carrying out a noise reduction task (Hall *et al.*, 2008). However, noise removal effects are by no means perfect and can create sound artifacts that themselves are distracting, which may prompt you to use noise reduction effects sparingly (Clukey, 2006).

Splitting

There may be a number of reasons to split audio files into shorter clips especially if only parts of an audio file are of analytical interest. The audio editors mentioned above can help to select the sequence in the audio file, extract it in order to edit it further or even convert it into a different file format.

Synchronizing

In contrast to splitting data it might also be suitable to merge two audio files by synchronizing them, for example, where two audio files have been recorded at different locations but represent the same event. This might require exact synchronization which most CAQDAS packages do not support very well, except Transana and DRS. However, it might be more efficient to perform this task upfront using an audio editor.

Separating Sources

Separating sources might be applicable if an audio file has different speakers each recorder with a different microphone for instance. Separating different voices might be useful for the purpose of analysis to detect overlapping talk, possibly even with different volume.

Handling Audio Data in CAQDAS Packages

Apart from the fact that different CAQDAS packages have different functionalities with respect to the handling of audio files, they also have different approaches for dealing with audio data. The following table overviews the audio file capabilities for selected CAQDAS packages.

	ATLAS.ti 6.1	DRS 1.0 rc-7	Hyper RESEARCH 2.8	MAXqda 10	Nvivo 8	QDA Miner 3.2	Qualrus
Import /Assign an audio file	conceptualized in a way that you always only link to files	yes	yes	yes, from version 10	yes, from Version 8 onwards	not applicable	yes
Import /Assignment problems	usually none	some functions e.g. timing, do not function with some audio files. preferably covert to a Apple format	usually none	usually none	usually none	not applicable	usually none
Code an audio file	yes	yes (coding type "untimed")	yes	yes	yes	no	yes
Code section of an audiofile	yes	yes	yes	yes	yes	not available	yes
Import /Assign or create synchronized transcript	yes (via F4 transcript)	yes (via Transana) or within DRS	no	Yes (via F4 transcript or within software)	yes via import from Word or within NVivo	not available	only as annotations
Handle multiple concurrent audios	no	yes	no	no	no	no	no

Table 3 Audio Functions of selected CAQDAS packages

Preparing video files for use with CAQDAS packages

This section discusses preparation of video data for the use in CAQDAS packages by looking at supported file formats, converting video data, collecting issues for video data, editing video data and the handling of video data in different CAQDAS packages.

Accepted video formats

Similar to audio data, the best way is to initially save the video data in a format that is useful for further use in any CAQDAS package. However, this might often not be possible and additional converting is required. Several converters are available to do so:

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- [Apple Intermediate Codec \(AIC\)](#)
Apple's most common codec is proprietary and knows different levels of quality.
- [divX](#)
A common, lossy codec, also proprietary
- [Real Video](#) (RM/RAM)
A proprietary, lossy codec.
- [Windows Media Video](#) (WMV)
Microsoft's codec family.
- [Ogg Theora](#) (ogv)
An open-source, lossy video compression algorithm.
- [Ogg FLAC](#) (ogv)
An open-source, lossy video compression algorithm .

It is recommended to install the relevant codec before working with one of the CAQDAS packages (ATLAS.ti, DRS, or Transana). However, it is also suggested installing the software package the video device used for recording the data as some video devices only allow viewing and editing data if the related software package is installed on the computer beforehand.

Video converters

Since there are many different types of video file, there are an equally large number of video converters. The following links and converters are most common options:

- [Any Video Converter](#)
Freeware.
- [AVS Video Converter](#)
The most versatile batch converter for videos.
- [Prism](#)
A commercial video converter for both Windows and Apple systems.
- [Handbrake](#)
A freeware converter, which converts from many codecs into a number of standard formats.

Collection issues for video data

Collecting video data can be undertaken in different ways similar to collecting still images or audio files. [JISC's moving images resource](#) gives advice for basic guidelines on how to create your video files. As mentioned above many video files harvested from the Internet can be either straightforwardly used in CAQDAS packages if non-streamed video files or only need to be converted in order to be imported or assigned to CAQDAS programs. In contrast, streamed video files, collected from website like youtube, need to be converted by special recording systems as outlined in the section Codecs.

Editing

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It may be necessary to edit video data before saving for use in your chosen CAQDAS package. For example, if there is a lot of superfluous material not required for the analysis, where there is a need to synchronize multiple video files or where there are data distortions which require rectification. A wide variety of video editing software packages exist. Common options include:

- [Adobe Premiere](#)

Premiere is a widely used video editing program; it performs all the tasks you might want, but is not free.

- [Avidemux](#)

Avidemux is not as user-friendly as *Premiere*, but it is commonly used and is a versatile *freeware* video editor.

- [imovie](#)

With iMovie, you can label clips — or parts of clips — as “favorite” or “rejected,” tag video with preset or custom keywords, then filter your entire library by rating and/or keyword.

- [Quick Time Player Pro](#)

QuickTime 7 Pro, allows converting media files to different formats and record and edit them.

Editing tasks for video files

Most editors include a range of features which may be relevant to preparing video data for analysis. These include filters for sharpening video and extracting specific frames or zooming. Extracting specific frames can be useful where specific details warrant a separate analysis. Likewise, the zooming feature might help identifying certain details in videos. The *Avidemux* manual provides useful comment on [how to cut videos](#).

Synchronizing

In contrast, it might be the case that several video files have been collected from the same event, perhaps different camera angles, for example, but need to be viewed and analyzed simultaneously. Quick Time Player Pro allows the synchronizing of multiple video files. Alternatively, Transana and DRS also enable users to synchronize multiple video files however, this might result in quality loss and slow down the program. Thus, it may be more efficient to synchronize video files before analyzing them.

Handling Video Data in CAQDAS packages

The CAQDAS packages that handle video data offer different features for working with and storing data. Table 4 gives an overview of the video file capabilities for the different CAQDAS packages.

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	ATLAS.ti 6.1	DRS 1.0 rc-7	Hyper RESEARCH 2.8	MAXqda 10	Nvivo 8	QDA Miner 3.2	Qualrus	
Import /Assign a video file	conceptualized in a way that you always only link to files	yes	yes	links to multimedia files in RTF files are allowed as well as the import of video files	yes, from Version 8 onwards	links to multimedia files in RTF files are allowed, but no import facilities	yes	
Import /Assignment problems	all files that your computer system allows for are supported - if not supported use appropriate video codec	some functions e.g. timing, do not function with most video files. To fix convert video files into mpeg format	not all but most video files are supported - if not supported use video converters	not applicable	not all, but most video files are supported- if not supported use video converters	not applicable	not all but most video files are supported - if not supported use video converters	
Code a video file	yes	yes (coding type "untimed")	yes	yes	yes	yes	yes	
Code section of a video file	yes	yes	yes	Workaround by coding e.g. F4 transcription links to relevant section of video	yes	not available	yes	
Import /Assign or create synchronized transcript	yes (via F4 transcript)	yes (via Transana) or within DRS	no	Yes (via F4 transcript or within software)	yes via import from Word or within NVivo	not available and no viable workaround	only as annotations	
Handle	no	yes	no	no	no	no	no	

multiple concurrent videos								
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Table 4 Video Functionalities of selected CAQDAS Packages

Conclusion

Most CAQDAS packages handle still images, audio files or video files. However, some are better than others in terms of the tools they provide to facilitate the analysis. The following four packages provide most flexibility: ATLAS.ti, DRS, NVivo and Transana, but individual projects have specific needs and therefore it is recommended that the options are investigated in order to make an informed choice. We also recommend preparing multimedia files before assigning them to any CAQDAS package to increase compatibility and to work on copies within CAQDAS packages; storing the original files in a different location to avoid loss of data. If possible collect data and save it from the very beginning in a file format that suits most CAQDAS packages. Always be prepared to convert files, however, as the choice of CAQDAS package might involve downloading a suitable converter and editing program before starting to analyze the data.

References

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Further Resources

- [JISC Digital Media](#)
Jisc's most extensive resource on digital media in the social sciences.
- [Duncan Bradley's resource on audio in NVivo](#)
(slightly dated).
- [Audio-Visual Equipment \(ESDS\)](#)
Advice about technical hardware.

