# How has Computer-Assisted Qualitative Data Analysis Software affected qualitative research?

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# **Context and rationale for the research**

Computer-Assisted Qualitative Data Analysis software (CAQDAS) packages

- Specialised programs for analysing qualitative data

    Eg NUD*IST, N Vivo, Atlas ti, HyperResearch, QUALRUS,

    MaxQDA, QDA Miner, the Ethnograph, Leximancer, Transana


- Now an established tool for qualitative research
    - In use since early 1980s
    - Widespread usage
    - Sometimes divisive
        - Software users and non-users
        - Allegiances to specific programs
        - Advocates and critics

# Questions and controversies about CAQDAS

- What can (or can't) be done with programs?

  (c.f. Seidel and Clark 1984; Muhr 1991; Di Gregorio 2000; Bazeley 2002; Hutchinson, Johnston and Breckon 2010)?

- Are computer-assisted analyses more rigorous, transparent, credible or trustworthy?

  (cf Tallerico 1991; Dainty et al 1998; Bong 2002; Smyth 2006)

- How does using software change the process and experience of analysis?

  (c.f. Richards and Richards 1987; Kelle 1995; Weitzman 1999; Gilbert 2002; Davidson and Skinner 2010)

- Do programs 'impose' methodologies or 'drive' the analysis?

  (c.f. Bryman and Burgess 1994; Lee 2002; Seror 2005)

# Questions and controversies about CAQDAS

- How do we choose between programs?
  - Which programs 'best' suit specific analytical approaches? (cf MacMillan 2005)

  - Are programs comparable in their features and functions? (cf  The KWALON 2010 experiment)

  - Does using (any or all) CAQDAS programs compromise creative freedom? (cf DeNardo & Levers 2002)

- How do we guide new researchers through these choices? (cf Kaczynski 2003)

# Our research interest and focus

Our focus in this study:

- How *has* the technology evolved?

- What implications has this had for qualitative research practices for

  - Creating and collecting data?

  - Analysing data?

  - Presenting data?

Our research interest:

- Computer-assisted qualitative data analysis as a form of 'professional practice' utilising

  - Technical reasoning and wisdom (techne)

  - Practical reasoning and wisdom (phronesis)

- Experiential learning and collective wisdom

# **Research method**

Analysis of methodological literature from 1980 to 2012

Dataset generated by purposive sampling:

– Initial search for literature for

- the terms CAQDA, CAQDAS, "qualitative data analysis software", "qualitative data analysis program" and "computer-aided qualitative data analysis".
- names of specific programs eg NUD*IST, Ethnograph etc.

- Subsequently supplemented by program descriptions from manufacturers

Final data set: 163 items

# Research method

Analytical strategy:

- Reviewed literature in chronological order to identify debates and trace discussions over time

- Read and wrote memo for each article detailing key points and arguments relevant to research question

- Intended to use N Vivo (version 10) to
  - Record notes about each publication
  - Develop data categorisation system reflecting discussions of
    - Program features
    - techniques supported by programs
  - Develop conceptual model illustrating relationships

- Subsequently used Word to chart the data, N Vivo to develop conceptual model

# Chart: exemplar entry

| Program feature | Program | Source detailing | Applications | Source |
|---|---|---|---|---|
| **Handles coding directly from audio files** | Atlas ti | Evers 2011 | Working directly with digital forms/ audio recording enables retention of tone etc | Lee 2002 |
| | N Vivo 8 | Evers 2011 | | |
| | HyperRESEARCH | Man. Website 2009 | | |
| | Qualrus | Man. Website 2013 | Reduces, eliminates need for transcription | Evers 2011 |
| | Transana | Man. Website 2013 | | |

# **Historical development**

- 1970s-early 1980s: introduction of computers to support qualitative analysis of data

- Mid 1980s to mid 1990s: introduction of dedicated CAQDAS programs

- Development of original CAQDAS programs
  - Refinement of original features and functionality
  - Introduction of additional features and functionality

- Development of additional programs

# Features for data collection and creation

- Files types/ data sources that can be accommodated by programs
  - Text files eg transcripts of interviews
    - Initial formats – plain text; later formats - Rich text, HTML and PDF
  - Audio and video files
  - Pre-coded survey data
  - Data from online technologies such as web-based communication forums eg Twitter, Facebook
  - Geo data

- Creating data files
  - Text files: Initially created in WP then imported, Later created in programs with text editing functionality and transcription functionality
  - Other files types: create in other programs then import

# Impact on data collection and creation

- Formatting of data files
  - Initially:
    - Structure of source documents
    - Formats of text files
    - Size of text unit
    - Number lines of text to create 'addresses' for coded sections
  - Subsequently
    - Conversions of formats for use in software programs

- Volume of data collected
- Types of data being used
- Integration and compatibility of programs

# **Features for data analysis**

Marking up data with codes, tags or symbols

- By researcher assigning tags
  - Select text, assign tag
- By program assigning tags (Autocoding)
  - Specified by researcher
  - Specified by program

Indexing, categorising data

- Initially used separate database management programs as file directory
- Subsequently, indexing systems in programs to categorise data
- Editing coding/ indexing systems after applied
- Cross indexing of data

# Impact on data analysis

- Retrieval of coded material
  - According to code assigned (by researcher or program)
  - For review in original context

- Identification of 'key' concepts

- Boolean searching and linking codes to:
  - Retrieve text fitting set parameters
  - Develop propositional relationships regarding concepts and participant characteristics
  - Investigate extent of data support for hypotheses

- Conversion of data for subsequent analysis
  - Eg converting codes into variables

# Features for data analysis

Memoing

– Initially: noted in memos

– Subsequently: hyperlinking of memos to data and other elements (annotating original data source)

Integration of analyses by team members

- Initially: by merging projects

- Subsequently:

  - By supporting multiple users in project

  - By enabling simultaneous working

  - Restricting levels of access

Calculation of coding consistency scores

   Eg percentage agreement between coders, Krippendorf's alpha

# Impact on data analysis

- Logging of project decisions, actions, outcomes

- Documenting chain of evidence between data and conclusions

- Establishment of 'team rules' for analysis

- Determining consistency of coding approaches

- Objective determination of coding similarity

# **Presentation of data**

- Data display / visualisations
  - In imported format eg original transcript)

  - Data to which code is attached (eg text units)
    - Reviewing content of data categories
    - Coding reports
    - Coding stripes

  - Coding matrices
    - Counts of text
    - displaying text in cells

  - Hierarchical systems of major and subsidiary data categories
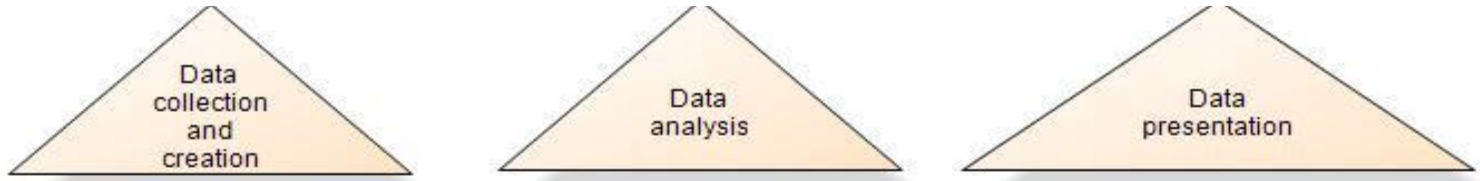    - Illustrating data topics eg responses given to question

# **Presentation of data**

- Data display / visualisations
  - Illustrations of networks
    - Linkages between concepts
    - Linkages between sources, project items

  - Graphs and charts

  - Tag clouds

  - Key words in context
    - Word trees
    - Clustering
    - Proximity and sequence with other terms

# Impact on data presentation

- Presentation in original context

- Illustration of co-occurrances of codes

- Demonstration of data support for propositions
  - Similarity and difference across groups
  - Co-occurance of concepts

- Demonstration of face validity
  - of coding
  - of conclusions

- Illustration of dynamic analytic processes for handling data

# Models of CAQDAS-supported research approaches

# **Next questions….**

- How do the current technologies influence creative freedom?
  - What techniques do they support (or not)?
  - What technical wisdom is required?
  - What practical wisdom is developed?

- At what point do technical requirements dominate?
  - In research planning?
  - In research practice?

- What implications does this have for notions of 'professional practice'?

# **Next questions…**

- Which features, techniques and forms of wisdom are
    - Program-specific?
    - Common across programs ?
    - Common across research approaches?
    - Common across user groups?


- How can we best learn from user experiences?
    - What do we want researchers to explain, and how?
    - How do we want people to validate their methodologies?


- How do we best teach new users to develop their wisdom?

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