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

Megan Woods, PhD,
Rob Macklin, PhD,
Gemma Lewis, PhD,
University of Tasmania
Australia
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?
  – 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

<table>
<thead>
<tr>
<th>Program feature</th>
<th>Program</th>
<th>Source detailing</th>
<th>Applications</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Handles coding directly from audio files</td>
<td>Atlas ti</td>
<td>Evers 2011</td>
<td>Working directly with digital forms/audio recording enables retention of tone etc</td>
<td>Lee 2002</td>
</tr>
<tr>
<td></td>
<td>N Vivo 8</td>
<td>Evers 2011</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>HyperRESEARCH</td>
<td>Man. Website 2009</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Qualrus</td>
<td>Man. Website 2009</td>
<td></td>
<td>Evers 2011</td>
</tr>
<tr>
<td></td>
<td>Transana</td>
<td>Man. Website 2013</td>
<td>Reduces, eliminates need for transcription</td>
<td></td>
</tr>
</tbody>
</table>
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-occurrences of codes

• Demonstration of data support for propositions
  – Similarity and difference across groups
  – Co-occurrence of concepts

• Demonstration of face validity
  – of coding
  – of conclusions

• Illustration of dynamic analytic processes for handling data
Models of CAQDAS-supported research approaches

1. **Data collection and creation**
   - Using CAQDAS to replicate 'manual' approaches
   - Create electronic versions of hard copy data files

2. **Data analysis**
   - Using CAQDAS to undertake previously 'impractical' approaches
   - Examine types and volumes of data 'too hard' to manage without CAQDAS support
   - Undertake 'theoretically possible but impractical' analyses

3. **Data presentation**
   - Using CAQDAS to develop and execute CAQDAS-specific approaches
   - Integration of data from multiple technologies
   - Analytical techniques for which computer functionality and support is essential
   - Presentation techniques for which computer functionality and support is essential
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?
References


References


References


