

Current Reporting Practices Of ATLAS.ti User In Published Research Studies

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Abstract

Scholars investigating Computer-Assisted Qualitative Data Analysis Software (CAQDAS) have noted that we know relatively little about how researchers use packages such as ATLAS.ti in their practice. We report findings of a content analysis of 321 empirical articles, published between 1994 and 2013, on the use of data analysis software. The purpose of this analysis was to characterize both who is reporting the use of CAQDAS tools, and how they are reporting that use in their publications. Studies were analyzed for subject discipline and researcher country of origin, overall methodological approach, and use of the software in different phases of the research process. We found that researchers were predominantly from the health sciences (69%) and published in health sciences journals (66%). Forty-eight percent of corresponding authors were from the United States, with 43 countries represented. Interview and focus groups were the most common data sources used; most studies did not identify a particular methodology beyond "qualitative". Few studies (13%) provided any details on their use of ATLAS.ti beyond mentioning that it was used, and 97.5% of the articles used it only for data analysis. We encourage researchers to provide more detail as to their use of ATLAS.ti and explore the potential for ATLAS.ti to support aspects of their study beyond data analysis.

Keywords

ATLAS.ti, reporting practices, journal articles, CAQDAS, method, methodology, description of data analysis

Introduction

Computer-assisted qualitative data analysis tools have been with us for over 30 years now. As desktop computing and mobile devices have become more prevalent and powerful, so has the use of these packages. The CAQDAS Networking Project in the UK, funded from 1994 to 2011 by the Economic and Social Research Council (ESRC), served as a focal point for methodological, epistemological, and logistical discussions around the use of this software by the qualitative research community. It is, however, hard to know how many qualitative researchers are using this software, and, aside from work by Fielding and Lee (1998; 2002), little is known about researchers' experiences of adopting and using such programs (Silver, 2010). This paper takes a step towards a greater understanding of CAQDAS use, starting with a description of how the use of ATLAS.ti software is reported in peer-reviewed journal articles.

Understanding how researchers report their usage of CAQDAS is beneficial for several reasons. Since their introduction, it has been suggested that CAQDAS could help researchers better demonstrate their analytical techniques and the processes by which they develop their analytical conclusions (Conrad & Reinharz, 1984; Tesch, 1991; Crowley, Harre & Tagg 2002; Johnston, 2006). Lack of detail in these areas prompted allegations that qualitative research is insufficiently thorough (Welsh, 2002) and caused research audiences to doubt the validity, robustness (Davidson & Skinner, 2010) and trustworthiness of the approach (Catterall & Maclaren, 1998). There have been calls for detailed explanations of analytical strategies and their benefits and limitations so that research audiences can evaluate the quality of qualitative research (Morrison & Moir, 1998). Researchers have proposed that CAQDAS has the potential to help researchers make the sense-making process of qualitative data analysis more explicit (Demb-

kowski & Hammer Lloyd 1995). Researcher have also argued such programs could help to demystify the research process and facilitate critical review (Bonk 2002) and better demonstrate the value of qualitative research by clarifying what qualitative data analysis entails and by removing the perceptions that it is “akin to “impression analysis” (Welsh 2002 p 6).

Reports of CAQDAS usage are also beneficial for understanding how CAQDAS tools influence the research process and outcomes. In the first instance, discussions of CAQDAS technology are critical to understanding how practitioners use qualitative analysis software in their research (Tallerico, 1991). Technological developments influence what qualitative research can achieve (Brown, 2002), and the evolution of CAQDAS technology has fostered methodological innovations (Marshall, 2002) as researchers use CAQDAS to do new things and do old things in new ways. This has created a need to understand how this is occurring so that these developments can be integrated with and inform the methodological literature (Richards 2002). Explicit calls have been made for detailed and transparent accounts of computer-assisted qualitative data analysis. This is because reports of CAQDAS use in specific contexts, and their “practical and theoretical implications for qualitative research” are necessary to ensure that software’s potential is understood (Seror, 2005 p.326). Such accounts are necessary to understanding the application, usefulness and limitations of CAQDAS programs (Dainty, Bagilhole & Neale, 1997; Blismas & Dainty, 2003) and to helping researchers understand whether and how CAQDAS changes the analytical process and the consequences for the quality of the research (Bringer, Johnston & Brackenridge, 2004). By reporting how they have used CAQDAS, researchers can demonstrate how their data have been “manipulated, managed and represented,” and enhance methodological practices by helping others avoid common mistakes (Sin 2007, p 117). Moreover, such accounts provide the basis for critical evaluation of CAQDAS technology and adequate debate of the methodological implications of using CAQDAS technology (Dembkowski & Hammer Lloyd 1995). Hence, accounts of CAQDAS help the qualitative research community to identify how best to guide new CAQDAS users to avoid pitfalls and problems in qualitative research (Mangabeira, Lee & Fielding 2004) and contribute to the ongoing development of the qualitative research community.

This study was undertaken to test empirical support for enduring suggestions in the methodological literature that CAQDAS can enhance research practices by fostering methodological innovation, creating transparent accounts of research decisions, allowing more detailed reporting of CAQDAS usage.

Methods

We conducted a content analysis of 321 empirical studies published between 1994 (the year that the CAQDAS Network Project was founded) and 2013 that reported the use of ATLAS.ti. We selected a broad, multidisciplinary journal citation database, *Scopus* (Elsevier), to give us the most comprehensive collection of peer-reviewed journal articles for analysis. Before selecting *Scopus*, we evaluated it along with *Web of Science* (Thomson Reuters) and *Academic Search Premier* (Ebsco) on the databases’ re-

spective accessibility, peer-reviewed journal literature indexing, size, complex search support, and multidisciplinary.

We conducted our databases searches using CAQDAS software names (e.g. ATLAS.ti¹, NVivo, QDAMinor), and more general concepts (e.g. “computer assisted qualitative research”) as our search terminology. We further limited our search to peer-reviewed journal articles published in English. We replicated this strategy across all three databases, comparing the results. *Scopus* (1294 unique cites) and *Web of Science* (1301 unique cites) proved compatible with our criteria of accessibility, academic and size of data set. As *Scopus* and *Web of Science* do not support article full-text searching, we only located articles containing ‘ATLAS.ti’ in the databases’ citation fields (Title, Abstract, Subject, Keywords). While both proved significant multidisciplinary databases, *Scopus* was found to have an edge in business literature coverage, helpful post-search analytics, and citation download formats, and was thus selected as our source for English language peer-reviewed journal articles. Each *Scopus* citation also contains a URL which greatly assists in locating electronic copies of the articles.

Our *Scopus* search returned over 420 article citations for ‘ATLAS.ti’. We then pared down this set to 340 usable articles, manually removing duplicated cites, non-English articles, and other errant *Scopus* citations. We also removed cites to articles we were unable to locate and code in time for this publication. We divided this set in to four separate sets for analysis. Each of the researchers reviewed and coded one article set using a coding spread sheet as is described next.

Data Analysis

Analysis was undertaken to determine the characteristics of the articles and to identify how the authors reported using the ATLAS.ti program. To achieve this, we reviewed all of the articles in the data set and coded the data in an Excel spreadsheet. Our coding scheme used three sets of codes: bibliographic codes, application codes, and coder’s thoughts/reflections. We selected Excel at this stage of our analysis both due to its flexibility and the fact that all four members of our research team has access to the software – half of us have access to NVIVO and the other half to ATLAS.ti. Bibliographic codes described the subject and characteristics for each article, including characteristics of the article, journal, and authors. Basic bibliographic data was automatically populated into a spreadsheet. We then used a predefined code set for these data to manual record details such as the disciplines of the journal and authors, the nature of the empirical research they were reporting, for example research approaches, and the types of data used (see Table 1). Since this initial focus is on how researchers report their use of ATLAS.ti to support empirical research, the next analytical step was to categorize each article as either *empirical* (reporting findings of a research study in which ATLAS.ti was used), *methodological* (focusing on the use of

¹While we did not search for misspellings or alternate spellings of the software packages we did account for alternate or earlier names of the software packages to the extent we could identify these on the company websites and in Wikipedia.

ATLAS.ti in general), or *other*, so we could focus this analysis only on empirical studies. We also noted the country of origin of the corresponding author.

Application codes were used to identify and categorize how authors reported using the software in their research. Categories in this family included data types, methodology, phase of research process uses (e.g., for data collection/creation, data analysis, data presentation and illustration), and degree of detail. We used predefined codes for data types (e.g., interview, focus groups, video). We categorized the study's methodology according to the qualitative research design specified by the authors (e.g., grounded theory, phenomenology, ethnography): where none was specified we noted the research focus (e.g., exploratory study undertaken to explore...). For five different recorded uses of ATLAS.ti, we created free text data sets consisting of illustrative text copied and pasted from the directly from the articles. Finally, we coded each article as to whether it provided a minimal, moderate or substantive level of detail around how ATLAS.ti was used for these purposes.

Coder's Thoughts and Reflections field were used to record any additional detail about the articles or their coding. This enabled us to record and compare each coder's thoughts and clarify coding decisions when necessary.

Coding category	Codes (drop-down selection)
Bibliographic Codes	
Focus of the journal	Selected from: Empirical, methodological, other
Journal discipline	Selected from: Agricultural sciences; Arts, language music & humanities; Business; Communication & information sciences; computer science; education; engineering & applied sciences; health sciences; math & statistics; multidisciplinary; physical & natural sciences; social sciences; social work; other (adapted from Paulus, Phipps, Harrison & Varga 2012).
Author discipline	Selected from: Agricultural sciences; Arts, language music & humanities; Business; Communication & information sciences; computer science; education; engineering & applied sciences; health sciences; math & statistics; multidisciplinary; physical & natural sciences; social sciences; social work; other
Country of corresponding author	Selected from country list taken from ISO 3166 Country Codes (http://www.iso.org/iso/country_codes)
Application codes	
Methodologies	Excerpted from text of article based on author description
Types of data	Selected from: Interview data; observational field notes; focus groups; conversational data; video; documents; websites; online social media data; other
Reported uses of CAQDAS for phase of research process: literature review, data collection, data/project management, data analysis, data presentation and display	Reported uses, if any, copied from text of article based on author description
Degree of detail provided about CAQDAS use	Selected from: Minimal, moderate, substantive
Coder's thoughts and reflections	
Other points of interest	Notes taken by coder

Table 1: Description of coding categories and codes.

To ensure accurate data entry and to enable data filtering by code, we used techniques developed by Wickham (cf. Wickham & Dunn, forthcoming; Wickham, Dunn, & Sweeney, 2012) for managing large

scale literature reviews. We created drop-down menus for coding article type, journal type, journal discipline, author discipline, country of corresponding author, data types, and programs used. This meant all coders were using a consistent set of codes and facilitated subsequent merging and searching of our respective spreadsheets.

We ensured inter-coder consistency by pilot testing the coding strategies, using ongoing email discussions between team members to address emergent issues, and pilot testing coding with a sub-sample of ten articles. These were coded independently by each of us, after which we conferred to discuss our coding and identify and rectify any inconsistencies. As coding of the remaining articles proceeded, team members used regular Skype video-conferences and group emails to raise and resolve emergent questions about coding processes. Once coding had been completed, our four, individual spreadsheets were merged into a master file data set. We then used MS Excel and MS Access to generate our reports and findings.

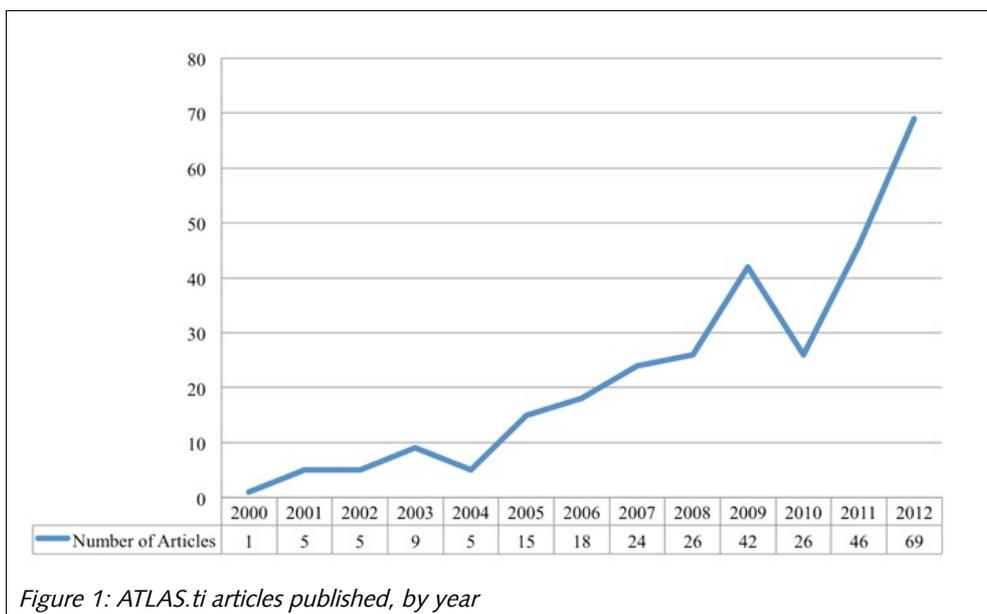
Findings

Article Types

'Empirical' dominated our article sample, comprising 95% (321 articles, n=340). 11 articles were coded 'Methodological' and 7 were coded 'Other.' For this study, we based all subsequent analysis and findings on these 321 empirical articles.

Articles By Publication Year

Figure 1 illustrates the upward trend in ATLAS.ti publications between 2000 and 2012.



Empirical research articles mentioning ATLAS.ti spanned from 2000 (1 article) to the present (69 articles in 2012). In our sample, 2012 illustrates a 50% increase in the numbers of articles published over the previous year.

Subject Disciplines By Journal And Author

211 (65.73%) articles were published in health sciences journals. Also, 220 (68.54%) were written by members of the health sciences profession. Social sciences account for the second most articles with 32 (9.9%) of the authors and 30 (9.3%) of the journals.

	by Journal	by Author
Health sciences	211	220
Social sciences	30	32
Multidisciplinary	21	5
Education	18	19
Communication & information sciences	12	10
Business	11	8
Social work	7	11
Other	5	8
Agricultural sciences	2	2
Engineering and applied sciences	2	3
Arts, languages, music and humanities	1	1
Physical and natural sciences	1	1
Math and statistics	0	1
		n=321

Table 2: Articles by Subject Discipline, Journal and Author

While much of the ATLAS.ti literature comes from the Health sciences, some of this discipline's dominance in findings could be attributed to a subject bias within *Scopus*. Elsevier, the *Scopus* publisher, reports this database includes 100% of *Medline*, the premier health sciences database. Thirty three percent of *Scopus'* 19,400 indexed peer-reviewed journals (approximately 6,400 titles) are categorized as Health sciences journals. Arts, Humanities, and Social Sciences (AHSS) journals account for 20% of *Scopus* journal title coverage. In 2012, *Scopus* expanded its AHSS journal coverage to 4,000 peer-reviewed journals. At that time, 20% of these AHSS titles were not indexed before 2002 (Elsevier, 2010, 2012). Disparities in both subject/discipline coverage and the pre-2002 indexing coverage contribute to our sample's heavy Health sciences orientation. Future reviews will expand to include additional discipline specific citation databases.

Country Of Author

Forty three countries from all continents (excluding Antarctica) are represented in the sample. The top five countries are United States (48%), United Kingdom (16%), Netherlands (7%), Canada (5%), and Italy (4%). Our review of only English language article contributes to a heavy distribution among English speaking countries.

Data Types

Interview and focus group data were the most common type of data used (see Table 1). Over 69% used interview data. Over 31% used focus groups. Some articles detailed the use of more than one data source. 34% (108) of the review articles used two data types. 8% (27) used three data types. Forty three articles were coded "Other", accounting for 13.4% of the data types. This highlights the need for review of our Data Type categories.

Data Type*	First Data Type	Second Data Type	Third Data Type	Total Articles	% using Data Type
Interview data	187	30	7	224	69.78%
Focus groups	77	23	1	101	31.46%
Other	18	19	6	43	13.40%
Observational field notes	10	20	4	34	10.59%
Documents	14	9	7	30	9.35%
Various kinds of video data	6	4	1	11	3.43%
Naturally-occurring conversation/inter- actional data	5	2	1	8	2.49%
Online conversational data/discus- sions/social media	3	1	0	4	1.25%
Websites	1	0	0	1	0.31%
Totals	321	108	27		

Table 3: Types of data used

Degree Of Detail Provided On CAQDAS Use

Most articles (88%), if they mentioned at all how ATLAS.ti was used, only did so minimally (n=293). Often times the authors, in one sentence, simply stated that data was coded in ATLAS.ti or that ATLAS.ti was used in data analysis. Authors provided no additional explanations. Eleven percent provided a moderate level of explanation. Five percent provided substantial information on how the program was used. Moderate articles discussed topics such as how specific features were used for analysis, such as creating and applying codes and network views. Substantial articles provided in-depth explanations and methodologies regarding coding, detailed lists of ATLAS.ti uses, and even comparisons of ATLAS.ti with other CAQDAS products.

Methodologies And Methods

Twenty four different qualitative methodologies were identified by the authors across the articles, though authors of nearly half (147) of the articles we analyzed did not specify a particular methodology beyond "qualitative design." The top methodologies and methods named by the authors included grounded theory (31), qualitative focus group method (27), in-depth qualitative interviews (19), ethnography (18), phenomenology (14), and case study (14).

Reported Uses Across The Research Process

Out of our five categories, we identified data analysis as the most common use of the software program, with 97.5% (321) of the total. Data presentation/display was second with 12.9% (39). Data/project management appeared in 7.19% (23). Only two articles used ATLAS.ti for data collection/creation. No articles were found using the program for literature review. Some article did use ATLAS.ti in more than one of these applications.

Degree Of Detail In Reported Use

Of the articles reviewed, 88% (n=293) provided minimal to no detail about how the program was used. In these types of papers, authors would, for example, provide a one-sentence statement such as: "coding was entered into ATLAS.ti software for further analysis" (Cilenti, Brownson, Umble, Erwin & Summers 2012, p 571); "The data were analyzed using ATLAS.ti, a qualitative data analysis software package" (Lin, Wu, Rou, Pang, Cao, Shoptaw & Detels 2010, p 175); or, "All interviews were recorded onto minidisk and transcribed into an ATLAS.ti database" (McBride, Pates, Arnold, & Ball 2001, p 1051). Similarly, without any specific detail authors would state in general terms that they used ATLAS.ti to "manage and retrieve information" (e.g., Tierney & Fox 2011 p 32), manage data (e.g., O'Callaghan 2001), "organist the data" (e.g., Robert, Zhukovsky, Mauricio, Gilmore, Morrison & Palos 2012 p 321) and code data (e.g., Allotey & Reidpath 2013).

Papers that provided a moderate level of detail about ATLAS.ti usage generally did so in relation to using ATLAS.ti to support coding of data. De Villiers, Koko-Mhlahlo, and Senekal (2005), for example, wrote that they used ATLAS.ti "to analyst the data in the following steps: preparation and importing of the data, getting to know and coding the data, retrieval and examination of codes and quotations, creation of families and creation of networks" (p. 520). The sequence of steps was detailed, and explained using ATLAS.ti terminology (codes, quotations, families and networks). The higher level of detail provided in such papers provided more insights into the overall methods and techniques that ATLAS.ti was used to support. However, some background knowledge of ATLAS.ti was required to understand how, specifically, the analysis was conducted using the software.

Substantive reporting of ATLAS.ti use was rare, but included details on how program features had been used to achieve analytical objectives, including *why* program features were used (e.g., Laditka, Corwin, Laditka, Liu, Friedman, Mathews, & Wilcox 2009). Some authors referred specifically to using ATLAS.ti to extract quotations to which coding had been applied (O'Halloran 2011), to determine findings (eg. Johnson, Sharkey, Dean, McIntosh & Kubena 2011), to check coding validity, and to examine 'links to other codes' (Laditka et al 2009 p s20). Others referred to using the query tool in ATLAS.ti to "generate quantitative data"² on code distributions (O'Halloran 2011p. 182), explore co-occurrences of codes

² EDITORS' COMMENT: The query tool cannot be used to generate quantitative output, even if this has been stated in published studies (e.g. O'Halloran, 2011). The type of output that is described by O'Halloran can be generated by the Codes-Primary Documents table. The query tool always yields quotations, thus qualitative data.

(e.g., O'Halloran 2011) and to explore "associations between major theme areas, codes and sub-codes" (Pradhan & Ram, 2010, p. 545). Such explanations, though uncommon, stood out because they clarified how the program features of ATLAS.ti had been used, and how using those features advanced the analytical process and research outcomes.

Additional examples of substantive reporting of ATLAS.ti use was illustrating the codes, concepts and themes identified through the analysis (cf. Puschel, Thompson, Coronado, Gonzalez, Rain, & Rivera 2010); reporting samples of data (such as illustrative quotes), which illustrated the evidence for specific concepts (cf. Neustadt, Holmquist, Davis & Gilliam 2011); using tables to report distributions of codes across participant groups, such as distributions by gender (cf. Guiller & Durndell 2007); and using networks to illustrate research findings (Passonneau & Coffey, 2011; Xiao, Li & Lin 2011; Hannes, Janssens & Wets 2009; Patrizi 2005) as seen in Figure 2.

Including screen shots of program outputs stood out as another way to report use of ATLAS.ti in a substantive way. This gave the reader the clearest indication of precisely how the program had been used and what had been produced by doing so. For instance, Svederberg's (2002) screen shot of the code manager and primary document data (see Figure 2) illustrated both the codes which were applied to the data (listed under 'codes') and examples of the kinds of data (listed under 'Quotations') to which that code was applied.

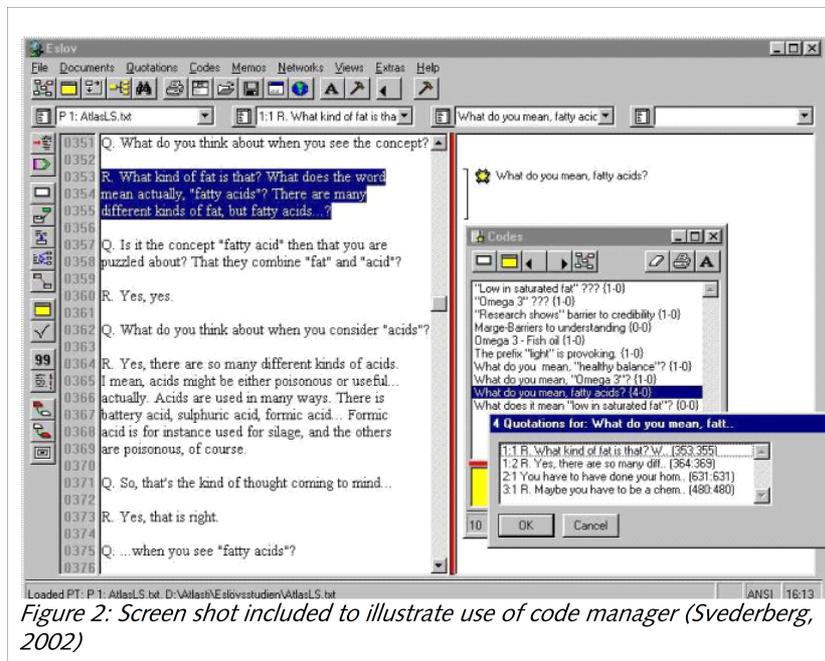
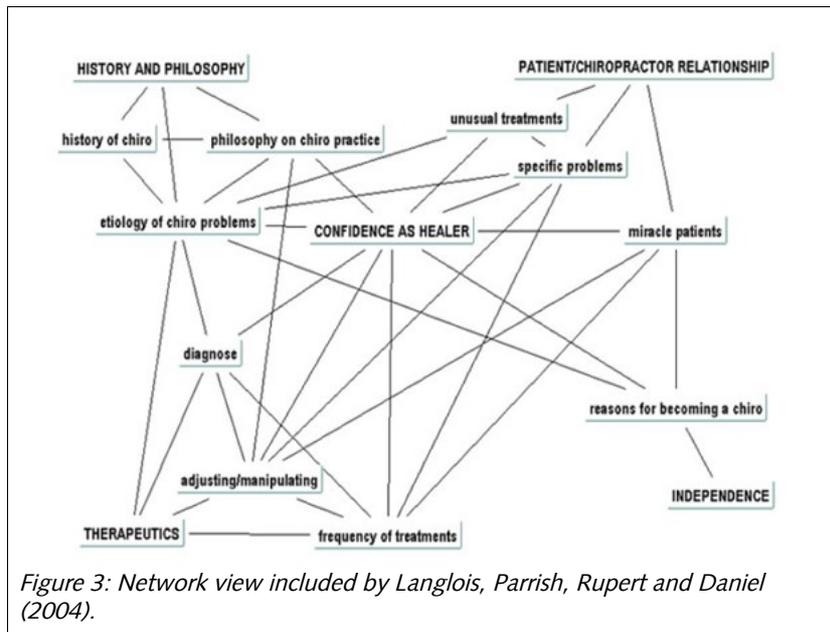


Figure 2: Screen shot included to illustrate use of code manager (Svederberg, 2002)

Similarly, the inclusion of network views (network diagrams) generated with ATLAS.ti, provided the clearest illustration of how researchers had used the program to explore relationships between codes, categories and concepts, and to theorize conceptual relationships. Figure 3 is an example from Langlois, Parrish, Rupert and Daniel (2004).



Discussion And Next Steps

Persistent misconceptions exist that using CAQDAS tools imposes a methodological 'straightjacket' and takes control of the analysis away from the researcher (c.f. Holbrook and Butcher, 1996; Garcia-Horta and Guerra-Ramos, 2009). As Lewins and Silver (2007) have pointed out, however, far from imposing a particular analytic structure or approach to the

data, CAQDAS tools *afford* a variety of functions and features which can be intentionally used (or ignored) by the researcher based on their analytic needs. No matter what technologies are used, the researcher remains in charge of decisions around how to handle, analyze, and interpret the data. However, researchers may be forgiven for thinking that the tool *does* take away this control, as few users are reporting their use of the tool in ways that makes their decision making process clear.

The most recent versions of the major CAQDAS programs have developed far beyond a simple data analysis tool. Scholars such as Di Gregorio and Davidson (2008) noted that these tools can now serve as a comprehensive "container" for documenting the entire study, as well as supporting literature reviews, data collection, transcription, and providing new ways of representing findings (Paulus, Lester & Dempster, forthcoming). Yet few researchers are reporting their use of the tool for tasks beyond data analysis. As Lewins and Silver (2007) and Friese (2012) have illustrated, there are many features of ATLAS.ti and other CAQDAS tools that might comprise data analysis—from memoing to commenting to coding to hyperlinking and network views. Without more detailed reporting on which features and functions of the tool are being used, researchers may continue to be unaware of the potential of CAQDAS to support their work.

We will continue our analysis by retrieving articles that report on the use of other CAQDAS tools such as NVivo, MAXQDA and Ethnograph. We will compare these initial findings with the reporting practices of users of other software programs. We will also search discipline-specific databases to counter any possible health sciences bias in *Scopus*. Finally, we will compare our findings with best practices recommendations from qualitative methodology literature (e.g. Anfara & Brown, 2003; Tracy, 2010) to help researchers report their software uses in the most transparent way possible.

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