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Using Computer-Assisted Qualitative Data Analysis Software to Develop a Grounded Theory Project

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The promise of theory and model development makes grounded theory an attractive methodology to follow. However, it has been argued that many researchers fall short and provide a detailed description of only the research area or simply a quantitative content analysis rather than an explanatory model. This article illustrates how the researchers used a computer-assisted qualitative data analysis software program (CAQDAS) as a tool for moving beyond a thick description of swimming coaches' perceptions of sexual relationships in sport to an explanatory model grounded in the data. Grounded theory is an iterative process whereby the researchers move between data collection and analysis, writing memos, coding, and creating models. The nonlinear design of the selected CAQDAS program, NVIVO, facilitates such iterative approaches. Although the examples provided in this project focus on NVIVO, the concepts presented here could be applied to the use of other CAQDAS programs. Examples are provided of how the grounded theory techniques of open coding, writing memos, axial coding, and creating models were conducted within the program.

Keywords: *grounded theory; qualitative; QSR NVIVO; child protection; sport*

$\mathbf{T}$he constructivist revision of grounded theory (Strauss and Corbin 1990, 1998; Charmaz 2000) is a process designed for systematic theoretical

245

development in which a theory relevant to the specific topic and population of study does not exist. Theory, in grounded theory, is not intended as an all-encompassing grand theory; rather, it is a methodology to assist in the development of an explanatory model grounded in empirical data (Glaser and Strauss 1967).

There was much debate in the 1990s about how to achieve grounded theory (Glaser 1992; Becker 1993; Charmaz 1995; Annells 1996; Melia 1996; Wilson and Hutchinson 1996), including comments by Glaser (1992) vehemently disagreeing with Strauss and Corbin (1990). Glaser and Strauss's (1967) first text explaining grounded theory provided guidelines for conducting qualitative research, a task that had previously been generally passed down orally from supervisor to student (Charmaz 1995). However, this first text has been criticized as being too abstract (Charmaz 2000). Strauss and Corbin's (1990) introductory text for novice users of grounded theory was written with this critique in mind. Glaser's (1992) greatest objection to Strauss and Corbin's (1990) book was that it was too prescriptive and thus forced theory to emerge (for a summary of Glaser's objections, see Fielding and Lee 1998). This concern echoed a broader concern in the research community that the introduction of computer analysis programs (for both quantitative and qualitative data) allowed users to do complex analyses without understanding the principles of the analysis (Lee and Fielding 1991; Kelle 1995; T. Richards and Richards 1995; Seidel and Kelle 1995; L. Richards 1998; Weitzman 2000; Bringer, Johnston, and Brackenridge 2004).

Clearly stating methodological assumptions and evaluative criteria helps address concerns about the potential misuse of computer-assisted qualitative data analysis software programs (CAQDAS). Specific criteria for evaluating research based on grounded theory can be divided into two elements: the research process and the research product. Issues of credibility, plausibility, and trustworthiness are evident in both evaluations. The criteria presented by Strauss and Corbin (1990, 1998) for evaluating process are detail about sampling, events leading to emerging categories, identification of major categories, relationships between categories, theoretical sampling, negative cases, and the emergence of the core category. In terms of product, concepts should be generated from the data, be systematically related to create categories, and have conceptual depth.

I followed the constructivist revision of grounded theory because I was studying an area that had received little research attention: the attitudes of coaches toward sexual relationships in sport. I used CAQDAS to help with the organizational aspects of managing qualitative data. I was also aware of the possibility that the tools in CAQDAS might help me move beyond description to theorizing while meeting the evaluative criteria of grounded theory. Another

benefit of consistent use of CAQDAS is that it doubles as an audit trail. (Qualitative researchers kept audit trails long before CAQDAS, but because the software includes features designed to assist with record keeping, it is easier to consistently maintain this process.) Excerpts from the program can be included in written reports to demonstrate rigor and allow others to more accurately evaluate the research (Bringer, Johnston, and Brackenridge 2004).

Interestingly, in a review of the QUAL software e-mail list, MacMillan and Koenig (2004) concluded that CAQDAS was predominantly used by those claiming to follow the grounded theory methodology. Fielding and Lee (1998) also reviewed a set of studies using CAQDAS and found that 30% claimed to be using grounded theory. However, the remaining 70% referred to a range of other methodologies, suggesting that CAQDAS use is not dominated by grounded theorists. It is imperative to understand that although a program may facilitate the user's development of theory, this does not suggest that the program can guarantee theory development nor coherence with a particular methodology. Program users are ultimately responsible for analyzing the data and developing theory (Fielding and Lee 1998; MacMillan and Koenig 2004).

My aim was to find a program that could help with organization and offer flexibility that would complement the analysis methods within grounded theory. A number of computer programs are available as shareware[1] and commercially that may have been suitable (for a comparison of programs, see Lewins and Silver 2004). I selected QSR NVIVO (QSR 2000; hereafter referred to as NVIVO) because it met my requirements.

Several books discuss the use of NVIVO (Bazeley and Richards 2000; Bazeley 2002; Gibbs 2002; Morse and Richards 2002; L. Richards 2005) but not specifically within a grounded theory methodology. Therefore, the main purpose of this article is to explain how and why CAQDAS can be used to facilitate a grounded theory analysis. Although the examples focus specifically on the tools I used in NVIVO, the principles could be applied to other CAQDAS programs. Details about the methods for data collection and the overall rationale for the research topic are explained in detail elsewhere (Bringer 2002; Bringer, Brackenridge, and Johnston 2002a).

Nineteen swimming coaches participated in either an elite-, national-, or county-level focus group to examine their constructions of appropriateness about coach/swimmer sexual relationships. Coaches discussed the appropriateness of relationships presented in vignettes. After completing the initial analysis, the emergent themes were further explored in individual unstructured interviews with three purposively selected coaches. This additional data collection and analysis revealed that the themes about appropriateness relate to the broader issue of coaches' attempts to resolve perceived

role conflict and ambiguity that have arisen from increased awareness of child protection.

THE ITERATIVE PROCESS OF GROUNDED THEORY AND NVIVO

The software program NVIVO facilitated the iterative process of grounded theory in a number of ways. I started my project in NVIVO before collecting any data by recording initial thoughts in memos and in my research journal. As the data were integrated into the project, memos were attached to focus group documents and coding categories. The program allows for open coding, axial coding (making links between codes), hyperlinks to nontextual data such as audio clips or photographs, coding according to demographic information, and the exploring of ideas visually with a modeler. Rather than requiring that all the data be collected before analysis can start, the program has been intentionally designed to encourage researchers to analyze data as they are collected. The program facilitates and allows text searches, ideas to be linked, data coded and searched, and models to be drawn while always being able to instantly access the original data behind the concepts. However, this does not imply that the computer is doing the analysis. The researcher still must ask the questions, interpret the data, decide what to code, and use the computer program to maximize efficiency in these processes.

DATA DOCUMENTS IN GROUNDED THEORY AND NVIVO

The initial inductive nature of grounded theory usually leads researchers to select qualitative sources of data. Grounded theory does not, however, preclude the use of quantitative data such as survey data that can be used at the later stages of a project to support or further explore the initial analysis (Glaser and Strauss 1967). In this project, focus groups and interviews were the main sources of data and were saved as individual documents in NVIVO. Newspaper reports and policy documents also influenced the analysis and were saved in NVIVO as document memos. Classifying the media reports as memos allowed them to be easily distinguished from the coaches' comments in interviews and focus groups, which were the main focus of my analysis. Separating out the media reports made it easier to examine coding specific to what participants said about abuse in swimming, as compared to journalists who wrote about abuse more generally. It is possible to achieve the same

result by creating sets of documents (e.g., a set of media reports, a set of interviews).

An advantage of using a program such as NVIVO is the ability to transform the way data are viewed (from static to dynamic) in a way that makes relationships between categories more visible by using text formatting and hyperlinks to other documents and categories (Weaver and Atkinson 1994). Internal annotations and external files can be attached to any piece of text in a document to record referential information that may be important for context but that would interrupt the flow if placed as text in a transcript. Internal annotations are brief and conceptually similar to footnotes. For example, when a coach referred to a celebrity, an internal annotation was used to note why he or she was significant to the conversation. External files can be attached in a similar manner but are intended for larger files. These might include pictures, audio files, video clips, or Web pages. Audio clips from the focus groups were inserted as external files when it was unclear what was being said. Often, after rereading the transcript several times and listening to the clip, the section was deciphered. Textual contextual information can also be linked to the document text in the form of a NVIVO document or memo. Unlike internal annotations and external files, linked documents and memos can be coded directly.[2] Compound interlinking documents were created using color, formatting, and linking annotations, memos, documents, and nodes. This helped me think about the conceptual links and associations in my data, a key element in grounded theory (Weaver and Atkinson 1994; Fielding and Lee 1998).

Strauss and Corbin (1990, 1998) asserted the value of researchers' using their experiences to inform the development of a grounded theory project. The research journal is an important tool for reflection on the research process as it includes the reciprocal influence of the research on the researcher. This is especially important when researching sensitive topics such as sexual abuse (Brackenridge 1999). Writing the research journal within NVIVO had many benefits over a hardbound copy, including being able to code thoughts within the journal and creating live links to specific documents, nodes, and media reports (Bringer, Johnston, and Brackenridge 2004).

Prior Knowledge in a Grounded Theory Project

One of the main tenets of grounded theory is that coding should emerge from the data. That is, any concept in the analysis should be supported from the data rather than from preconceived models, theories, or hypotheses. Depending on which thread of grounded theory is followed, the use of prior knowledge has different applications. Strauss and Corbin (1990, 1998) encouraged the use of

discipline-based knowledge as long as the knowledge fits the data and is not inappropriately applied to it. Glaser (1992) specified that "the analyst's assumptions, experiences and knowledge are not necessarily bad in and of themselves. They are helpful in developing alertness or sensitivity to what is going on in the observational-interview data, but they are not the subject's perspective" (p. 49). He further advised, "These sources of theoretical sensitivity must be put aside. Indeed, the analyst should just not know as he approaches the data, so he does not even have to waste time correcting his preconceptions" (p. 50). Whereas Glaser accused Strauss and Corbin (1990) of forcing data, Charmaz (1995) acknowledged that with the constructivist revision of grounded theory, she "*generates* data by investigating aspects of life that the research participant takes for granted" (p. 36). This is the perspective that I followed.

Glaser (1992) and Strauss and Corbin (1990, 1998) agreed that writing the literature review too early in a grounded theory study might unduly influence the data collection and analysis and might be a waste of time if the data lead the analyst in a different direction. However, Strauss and Corbin (1990, 1998) are more pragmatic with their admission that it might be impossible to delay the literature review completely. As was the case in this study, researchers are often required to present research proposals to funding boards, supervisors, and ethics committees before any data are collected. Strauss and Corbin (1990, 1998) advised that although some literature review is necessary, an exhaustive literature review might be inhibiting. Ultimately, it is a balance between reading enough to be aware of and understand possible factors that could influence the area of study while still remaining open-minded to what the participants have to say.

I imported the literature review notes into NVIVO to facilitate access to them. A search could be conducted for all of the articles containing a particular method, such as focus groups. The "reading notes" document was automatically coded into different nodes by using a coding function called "Code by Section." The reading notes here contained two headers. The top-level header referred to the cited reference, and the remaining reading subheads (e.g., method, findings) were second-level headers. Reference management software programs (e.g., Reference Manager, EndNote) also include searchable categories and are useful for inserting references when writing journal articles. The benefit of importing the literature review notes into CAQDAS was that, in addition to searching, I could also code them or link them to other documents (e.g., memos, research journal) integrating the literature more closely with the research process (di Gregorio 2000).

Recording the Social Milieu

Grounded theory is aimed at creating theory based in reality, not a social vacuum. It is, therefore, important to note the social milieu at the time of a focus group, interview, or analysis. Media reports are one reflection of the social context. When child abuse or sexual harassment cases were reported in the media, these were imported into NVIVO as memos. These news reports contributed to a description of the overall contextual background to understanding sexual abuse in sport. Recording these notes allowed me to reflect on the situation at the time of the data collection, thus keeping the information in perspective rather than allowing the reports to dominate my interpretation of the participants' comments. A key tenet of grounded theory is that by focusing on the participant's view, the developing theory will be relevant to the participants. Context is still important, and having my reflections easily accessible reminded me of the social context at the time of the interviews and focus groups.

GROUNDED THEORY DATA ANALYSIS IN NVIVO

The analyst following grounded theory is encouraged to oscillate between open coding, writing memos, axial coding, and modeling. Just as CAQDAS can facilitate the overall iterative process of data collection, analysis, and theorizing, CAQDAS programs are generally designed to facilitate iterations within data coding and analysis (see also Seidel 1998). I was able to move quickly from open coding to focusing more specifically on coding for distinctions within a category and back again to open coding as necessary, all the while writing conceptual and theoretical memos. Creating links between nodes, memos, and documents facilitated this iterative process as I developed the analysis interwoven from data and ideas (Weaver and Atkinson 1994; L. Richards 1999).

Coding in NVIVO

Bazeley and Richards (2000) emphasized the analytical and organizational functions of coding as they described the process of coding in NVIVO. The organizational step is the systematic process of coding that Glaser and Strauss (1967) referred to as a necessary process in reaching the more abstract goal of theorizing. Tools within NVIVO also facilitated the continual oscillation between the open coding phase of analysis (e.g., labeling

age of consent as a category) and deeper analysis (looking at how age of consent related to the overall concept of appropriateness). These tools included nonhierarchical listing of categories (free nodes), hierarchical organization of categories (tree nodes), memos, models, and search tools.

The coding processes in grounded theory start with open coding or dissecting the data into discrete parts, examining the data for similarities and differences, and grouping together conceptually similar data to form categories. Strauss and Corbin (1998) described conceptualizing, or giving a conceptual name to categories (represented in NVIVO by nodes), as the first step in theorizing. When possible, node names were active to encourage me to think about processes rather than mere description (Glaser 1978). For example, the node name *developing rapport* was selected over *rapport*, and *socializing* was used instead of *social contact*. Using participants' own words in category names, known as in vivo coding, is also encouraged as a method of staying true to the data (Glaser 1978).

Monitoring consistent use of codes can be achieved through two functions in NVIVO: one that records the researcher-defined description of a node and one that allows the researcher to attach a memo directly to the node. Both functions were used in this project. CAQDAS programs generally have a feature to create a list of nodes and their descriptions, similar to a codebook (Bazeley and Richards 2000), that can be printed at any stage in the analysis. These descriptions, along with the node memos, enabled (but, of course, did not guarantee) consistent use of the nodes.

The Importance of Writing Memos

In grounded theory, memos are essential to the development of theory. Through writing memos, I moved from a descriptive mode of placing conceptually similar passages together to thinking analytically about the emerging concepts. Following recommendations by Strauss and Corbin (1990, 1998), different types of memos were created to facilitate thinking at different levels. The memo name began with the memo-type prefix so that the memos were automatically sorted in NVIVO's document browser. In addition to being alphabetically sorted, they could be sorted by size, the number of linked nodes, and creation or modification date. NVIVO also allows documents, such as memos, to be color coded and stored in sets. The seven memo types, their prefix, number written, and their purposes are described in Table 1. Memos corresponding to each focus group were named after the transcript name and linked directly to the transcript.

Memos serve multiple purposes within a grounded theory project, including clarification, category saturation, theoretical development, and

TABLE 1
Memo Types Used in This Project

Prefix	Type and Number	Purpose
Mcn	Code note memos ($n = 110$)	Define the node and record analytical thinking about the node; include links to other nodes and memos
MTH	Theoretical memos ($n = 5$)	Higher order memos for evolving theory at a more abstract level; summary memos and thoughts about selective sampling
MOP	Operational memos ($n = 4$)	Notes about procedures, what questions to ask in the next interview
No prefix; electronic drawings are stored in NVIVO's modeler, hand drawings are in a folder	Diagrams ($n = 40$)	Visual representations of relationships among categories
nCm	News, contextual memos ($n = 15$)	News articles (or memos on reports) that influence, or illustrate, the context of child abuse and sexual harassment
nVa	NVIVO memos ($n = 3$)	Technical notes about using NVIVO
mEM	Executive meetings ($n = 2$)	Notes from meetings with governing body officials to discuss thesis results

transparency. A memo was attached to each node in this project to justify the selection of passages and the naming of a node. Thus, the category name was clarified, passages compared, and categories renamed, merged, or dropped accordingly. Strauss (1987) encouraged researchers to discuss ideas conceptually in memos, rather than the actions of individual participants, hence pushing the researcher to think more broadly about possible properties and dimensions.

As writing within memos is less structured than for a formal document, there is space for ideas to develop freely without the constraints of rigid conformity to sentence structure (Glaser 1978). To develop higher order categories and investigate links between categories, memos were physically sorted into similar categories (Strauss and Corbin 1998). In NVIVO, sets of

memos can be created for this purpose. Memos also provided a record of how the project developed. Without memos, a project is likely to "lack conceptual density and integration," and transparency is minimized (Strauss and Corbin 1998:218). In addition to the organizational benefit of writing the memos within the computer program, there is the added benefit of being able to code within a memo and make links to other memos, documents, and nodes.

More than Just Categorizing

Analytical techniques, such as questioning, detailed word-by-word or line-by-line analysis, comparing extreme examples or examples from outside the area of focus, and being aware of implicit assumptions, are a few tools suggested by Strauss and Corbin (1998) that can be used to move the analyst from mere description to developing theory. Focused coding can take place after codes start to continually reappear in the coding (Charmaz 1995). This inaccurately suggests that the frequency of emerging codes is related to relevance. Analytic techniques in grounded theory are designed to avoid the false assumption that frequency implies importance. CAQDAS can be used for frequency counts, but the programs also have design features that assist the researcher in recognizing gaps in coding and bringing recognition to the salient but perhaps less voiced viewpoint.

Coding can also be automated through the use of sections, as was done to code each participant's text into a single node (or category; see the Attributes section). For example, coaches who had received child protection training could be compared with those who had not. Or, I could compare all of one coach's comments to another coach in the same focus group. This process helped me expand on the concept of age difference by examining the different responses to how age difference influenced acceptability. I could also further code directly from a node and immediately link back to the original context, if necessary. This is important because many qualitative methods emphasize the importance of context.

Most CAQDAS programs include a variety of search operations to assist the researcher in examining the data. In NVIVO, these include the ability to search for text and combinations of text or refine a search to a node, a document, an attribute, or even proximally coded items. In later stages of the project, the search tool was used to run matrix searches to examine potential links between categories. (A matrix search allows one set of items to be searched with another set, resulting in a table of paired results such as A and B; A and C; B and C.)

In the early stages of coding, the text search tool was used to search previously coded documents for instances of a newly developed category. This

allowed me to ascertain quickly if there were instances of the concept that I had missed in the early transcripts that could add to my understanding of the node. Although participants do not always use the same words to speak about a concept, the text search tool can be used to search for sets of synonyms. For example, 9 months after creating the node *law* to record instances in which the coaches referred to the law or legal aspects of sexual relationships, I used the search tool to create an assay report on the node law to examine if this concept occurred in all of the focus groups. (The assay report is a table that illustrates in which documents, or nodes, the selected item occurs.) This revealed that only three of the four focus groups had references in this node, so I then ran a text search for "law or legal or court" and found that these concepts did exist in all the focus groups, but I had not coded it throughout.

In addition to focused coding, I "coded-on" (Bazeley and Richards 2000) from a category as a method of developing dense categories and exploring links to other categories. This is achieved by viewing all of the text in a category (by opening a browser for the corresponding node) and coding it into additional categories. Search results can also be saved as nodes, allowing the researcher to continue to code-on from the results of a search.

Not surprisingly, the coaches in this study agreed that sexual relationships with athletes younger than the age of consent were completely inappropriate. What I was interested in was what contributed to the variations in opinions about appropriateness of relationships with athletes older the age of consent. Therefore, I opened a browser for the node law, allowing me to see all the text coded into that category, and looked for anything that might explain coaches' differences in perceptions about legal relationships. Several new nodes (and associated memos) were created to capture the influence of legal standards, instances in which coaches wanted more guidance than what the law offered and where coaches disapproved despite a relationship being legal. The results of such coding can be viewed or searched at any time to examine links between categories. Thus, I was able to recognize when an incident did not fit with the rest of the category. In such cases, the text was recoded. In a few cases, categories were merged when I discovered that the categories were essentially the same.

A node can be viewed separately, but what is more interesting is to view nodes in comparison with each other. "Coding stripes" facilitate the task of comparing categories. This is illustrated in Figure 1, where all the text, from the interviews and focus groups, coded at the node "degrees of appropriateness" is displayed in the "node browser." Directing the program to "show coding stripes" (as seen in the right-hand side of Figure 1) allows the researcher to see which text coded at degrees of appropriateness is also coded at other nodes.

FIGURE 1
Coding Stripes Illustrate Where Text Coded
at One Node Co-occurs with Other Coding

/Degrees of appropriateness - Node Browser

Browser Node Document Edit View Tools

/Actor Characteristics/Age

Section 3.51, Paragraph 213, 224 characters.

But in general, I think if swimmer is old enough, whatever that is I mean certainly it has to be over 18, and is not in sport anymore, then there is um, nothing that could be done about it, and I don't think it's illegal.

Section 3.52, Paragraph 216, 393 characters.

But, I know of uh, instances within sport, where somebody has coached somebody for years and years. Coached them since they were a kid, alright There's probably over a 20 year age gap and got married, and still stayed within the sport. And, nobody, **nobody**, has ever stood up and said that's wrong. And nobody would dare stand up and say that's wrong. And it has not gone down as being wrong.

Section 3.62, Paragraph 246, 336 characters.

Well, it doesn't become an issue at the end, because, it is, with the uh, the best (men ??? T7 10:46) in the world, nothing untoward had happened between these two people (not sure if he is talking Chris and Max or the people he referred to that he knows) before the age of 16. Uh, and probably not for a long time after the age of 16.

Section 3.66, Paragraph 258, 653 characters.

o, I could have, I could have easily met her when she was 10 and asked her to (get her marbles ??? T7 11:33) or whatever. But I didn't. But the thing is, that just because, the fact was, obviously, I didn't know her when she was 10, from that age. But the fact was, feasible that I could have known her from that age, and because I had known her from that age, does that make it a no-no compared to the girl across the road whom I had never met before? That's ok. It's a very grey area, you know. The thing is that you behave in an ethical manner, up until the legal age, or whatever it is, and if you do that, and if you do that, what's, what's wrong?

In-Vivo /Degrees of appropriateness Code UnCode Coder

Age of Consent, Nothing Wrong, law, Degrees of appropriateness,
outside of swimming, ethic code, coach's personal decision, age differe

Inside swimming, Some OK, Nothing Wrong, Degrees of appropriatee
fear of judging

Age of Consent, age difference, Degrees of appropriateness, All OK, phy

law, morality, Nothing Wrong, physical act, Some OK, Degrees
minimum legal standard, Power,
Age of Consent
age difference

Filtered for - Analysis Nodes 10 April 02

Glaser and Strauss (1967) described the analysis within grounded theory as the constant comparative method. This included comparing incidents within each category, comparing categories to each other, clarifying the developing theory, and writing a coherent theory. Comparing the incidences allowed me to notice subtle differences that resulted in developing the properties and dimensions of the categories. The analysis does not actually occur in discrete stages; it is an iterative process whereby the researcher returns to various methods of coding throughout the project.

Making comparisons between nodes is made easier when the nodes are organized in a hierarchical structure (T. Richards and Richards 1995). The tree structure is an infrastructure designed to help interrogate, not represent, the data. This structure evolved throughout the analysis process from the initial free nodes into a more ordered structure of nodes. Hierarchical structures are designed to make finding nodes easier, to assist in viewing categories in relation to other categories, to run complex matrix searches, and to facilitate generic higher order coding (T. Richards and Richards 1995; T. Richards 2004).

Some CAQDAS programs have a model feature so that the user can explore ideas in a visual format without changing the database of the project. The modeler was one tool used in the early conceptual development of the hierarchical structure. In an attempt to make sense of the sixty-two free nodes that were created in the early stage of the project, with one click of the mouse, I imported all sixty-two nodes into the modeler. The nodes were moved around the screen into related clusters. When it was necessary to review the node, the node could be browsed simply by right-clicking on the relevant node icon. I could thus oscillate between being close to the data and gaining distance for analytical purposes. In addition to viewing nodes, links to documents and memos can also be added to models. In this project, the modeler was used to design a conceptual model for the core category and to explore the overall structure for the research report.

Making comparisons at the category and subcategory level is what Strauss and Corbin (1990, 1998) referred to as axial coding. This is where the analysis moved from thick description to explaining the phenomenon of interest. Coding stripes, as seen in the right side of Figure 1, were instrumental in developing links between categories. The researcher can quickly ascertain similarities and gaps in coding. This is where the hierarchal system of coding can facilitate making comparisons. The term *parent node* is used to denote a higher order storage category, whereas *child node* refers to a mutually exclusive subcategory of the parent node.

The node browser for the node degrees of appropriateness is shown in Figure 1 with coding stripes illustrated on the right side of the figure. To systematically explore the peculiarities and subtle differences between the

subcategories (children) of this node (all wrong, some wrong, high morals, some OK, all OK), all the text from each child node was gathered up and stored at the parent node for cross comparison.

The next step involved mapping coding stripes, representing each of the child nodes, onto the parent nodes (in the document browser). This allowed a visual display of co-occurrences. Viewing the coding in this manner can highlight discrepancies in coding that might indicate the need to refine coding. Alternatively, the co-occurrences and differences might suggest meaningful relationships between categories.

Examining the coding stripes throughout the category made it apparent that age (especially age of consent) co-occurred frequently with all OK (which represented instances in which all the coaches agreed the scenario was appropriate). In contrast, fear of judging co-occurred in instances of some OK (indicating that only some of the coaches thought that the particular relationship was appropriate). Examining coding stripes was one way that I started to explore the links between categories that would lead to the development of an explanatory model.

In the above example, age has the properties age of consent and age difference, where age difference ranges from no difference to many years difference. As might be expected, age difference is one category that emerged in relation to perceptions of appropriateness. I was able to further expand categories by comparing responses from someone who did not feel constricted by professional standards to those who did. Such comparisons led to new categories, confirmed in the data, that influenced perceptions of appropriateness including "what is the priority" (the coaching relationship vs. developing a romantic relationship), "relationship boundaries," and "sacrifices" (sacrificing the possibility of a romantic relationship to maintain the coaching relationship). These became subcategories of "professional manner" when I performed what Glaser and Strauss (1967) labeled the second stage of comparisons, "integrating categories and their properties" (p. 105).

Attributes

Exploring demographic information might lead to a preliminary explanatory understanding of the relationship between categories. The aim is not to provide statistically relevant predictions but rather to explore preliminary relationships. Demographic information is stored as "attributes" and can be used to search data and compare responses. Attributes are essentially variables, or fields, worked within a spreadsheet-like view. The attribute data can be designated as text, numeric, or date information.

Attributes can be attached to documents or nodes, depending on the structure of the project. Demographic information for interview participants was

recorded as document attributes, thus attaching the participant's information to his entire interview. This strategy does not make sense for focus group transcripts, however, because there are multiple participants in each document. If all of what John said is coded in a node called John, and all of what Elliot said is coded to his own node, then it is possible to attach the attributes to the nodes. The researcher can search, for example, for all references to civil liberties (as tracked by coding) by coaches with no child protection training (as indicated by the attributes attached to speaker-name nodes). During transcription, each speaker's pseudonym was set at heading level 1, and the speaker's words remained as normal text. This divided the documents into sections by speaker and allowed the text to be autocoded by section into the respective nodes.

Figure 2 illustrates in three windows how cases and their attributes are displayed in NVIVO. The tree structure of the case nodes is seen in the left pane. Clicking on each individual case will reveal all of the text for that particular coach. The middle window is a partial view of the node attribute explorer with attributes for child protection training, level of education, and ethnicity, among other variables, viewed as column headers. Each row is a case and represents one participant. The third window, in the lower-right pane, illustrates how attributes are selected for use in searches. In this instance, the attribute for child protection training was selected with the values "yes" and "no." This type of tool can assist in developing categories and exploring relationships between categories.

Moving from Describing to Theorizing

The conditional/consequential matrix was one of several grounded theory tools (Strauss and Corbin 1998) used during axial coding to explore the relationships between categories. The matrix is simply a heuristic diagram to assist the researcher in identifying conditions and consequences of the core category. The core category is the central theme or problem of interest that emerges from the data (Strauss and Corbin 1998). In this study, it was "role conflict and role ambiguity." Conditions are the contextual and predisposing factors in which the core category occurs (e.g., the extent to which coaches experienced, or did not experience, role conflict and role ambiguity, was influenced by a coach's acceptance and awareness of child protection issues, his own coaching behaviors, and whether there was congruence between his coaching behaviors and the child protection guidelines). Consequences are the result of the actions/interactions with the core category (e.g., coaches' attempts at managing the ambiguity).

The conditional/consequential matrix was used to explore "relationships between macro and micro conditions/consequences both to each other and to process" (Strauss and Corbin 1998:181). This tool was first used to explain

FIGURE 2
Viewing and Searching Participant Attributes in NVIVO
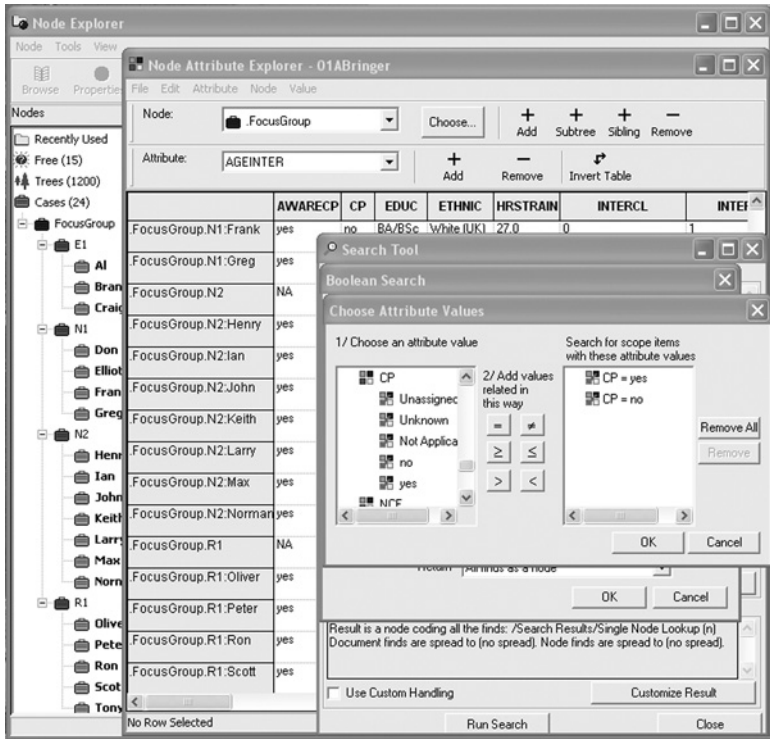
NOTE: Participant names are pseudonyms.

differences in perceptions of appropriateness as I struggled to make sense of the data. I chose to work away from the computer and sketched fifteen different models and conditional/consequential matrices before any coherent results were evident. I identified concepts on the micro (or individual) level that seemed to influence perceptions. These included age and personal experiences of being in a coach-athlete intimate relationship. Moving away from micro issues, the club environment, and scrutiny from others (e.g., parents or other club members) also appeared to influence perceptions of appropriateness. On a more macro (or societal) level, new sport guidelines and changes in public awareness about abuse seemed to influence perceptions. Although I

explored these concepts on paper, I returned to the computer frequently to memo my thoughts and to explore the emerging concepts in the data.

A second grounded theory heuristic tool called the paradigm model (which builds on the conditions and consequences by considering the structure and process of actions and interactions) was also used to structure the data in a more systematic manner. Where the conditional/consequential matrix focuses attention on conditions that need to be present for the core category to exist and consequences of the core category, the paradigm model has a broader focus that includes actions/interactions (what the coaches did to manage the role conflict and ambiguity). Actions/interactions are the responses that are taken to the core problem (e.g., a coach might change his definition of effective coaching or he might assess the risks of not changing). Actions/interactions are not static; rather, they "evolve over time as persons define or give meanings to situations" (Strauss and Corbin 1998:134).

The paradigm model was used to help guide my understanding of the main issues for the coaches. Initially, my research was focused on perceptions of appropriateness. But, as I analyzed the data and used the elements of the paradigm model to try to figure out how the concepts were related to each other, I kept noticing that the child protection policies appeared to be forcing coaches to reevaluate their coaching and perceptions of "good coaching." I noted in a memo that the coaches' perceptions of appropriateness are a reflection of their attempt to resolve the conflict between child protection policies and good coaching. The main issue for concern for the coaches seemed to be how to resolve the role conflict and ambiguity brought about by child protection issues. Once I had identified role conflict and role ambiguity as the core category, I further examined the links between the conditions leading to role ambiguity and role conflict, how coaches managed the ambiguity and conflict (through actions and interactions), and the consequences of those actions and interactions (see Bringer 2002; Bringer, Brackenridge, and Johnston 2002b). CAQDAS was useful in this stage because it provided easy access to the memos and nodes of interest as well as the original transcripts.

The modeler within NVIVO could have facilitated this stage by allowing me direct access to the data. However, the size of my computer screen limited how much of the model I could see at once (see the Limitations section). The layer function can help overcome the limitation of screen size by allowing the user to expand or collapse the model.

In addition to the contextual/consequential matrix and the paradigm model, I used the idea of writing a descriptive storyline (Strauss and Corbin 1998) to further understand how the concepts in the data fit together. The purpose of this is to help verbalize the main concepts and their relationships to each other. Working through these grounded theory tools, I developed a

preliminary model of concepts influencing perceptions of appropriateness and how these differed according to whether the coach was evaluating his own beliefs and actions or that of other coaches. Public scrutiny and avoiding false accusations were concepts that influenced coaches' own beliefs and actions. When commenting about other coaches, the concepts of power imbalance (between coach and athlete), evaluating consequences (of the relationship), and a reluctance to interfere were the main concepts influencing their perceptions of appropriateness (for a more detailed discussion, see Bringer, Brackenridge, and Johnston 2002a).

In grounded theory, it is important to examine how each case fits with the emerging theory, to see whether it is an extreme dimension of a concept or a contradictory case. For example, there were a few coaches who represented negative cases in that they did not seem to be experiencing role conflict and ambiguity. I returned to the data to look at what conditions were present and how the coaches varied on these conditions compared with those who did experience role conflict and ambiguity. These negative cases helped me further develop my emerging theory by forcing me to examine how they differed from the other coaches.

LIMITATIONS

Like any approach to processing data, CAQDAS has limitations. Researchers who are not confident using computers and new programs might take longer to learn how to use CAQDAS than learning a particular strategy of managing the data by hand (Fielding and Lee 1998). Weitzman (2000) advised CAQDAS users to answer questions about their own computer literacy, the type of project, the type of data, and the anticipated type of analysis before selecting a software program. Users might also be tempted to use all of the program's functions (Mangabeira, Lee, and Fielding 2004) rather than just the ones that would be beneficial in answering their research question from their particular methodological standpoint. Equally, users could be enticed into thinking that they must use the computer for every stage of the analysis. Agar (1991) asserted that analysis involves thinking, which for him is facilitated by space to see more data and concepts than fit on a computer screen. In a similar manner, I found myself drawing diagrams by hand, printing memos, and using a whiteboard to discuss concepts with colleagues. Creating the time and space to think about ideas, as well having discussions with fellow researchers, is advocated as a necessity in grounded theory. Use of a computer program need not change these valuable activities.

Over the years, much has been written about the pros and cons of CAQ-DAS as well as speculation about how the research might have been different if CAQDAS had or had not been used. Some research supervisors and examiners are skeptical of CAQDAS, perhaps because they do not understand the software (Delamont, Aitkinson, and Parry 2004) or they believe in a false dichotomy between research tool and process (Johnston 2004). Inherent in questioning how the research might have been different is the implication that the tool (manual vs. computer) is the main determinant in the research outcome. Arguably, how well the researcher follows the chosen research methodology and applies the selected research methods will have a greater impact than whether CAQDAS is used. In answering questions about the impact of the use of CAQDAS on a research project, the researcher's knowledge of qualitative research and qualitative computing must be taken into account (Fielding and Lee 2002; Mangabeira, Lee, and Fielding 2004).

NOTES

1. Shareware is software that is available on a trial basis at no cost. The user is generally expected to pay a fee for use beyond the trial period.

2. Internal annotations and external files can still be coded, but this is by coding the anchored text.

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