Building research-capacity is an important element in the contemporary political economy of social science research. For example, the principal funding body, the ESRC, continues to invest substantially in the development of research-capacity through, for example, its Research Methods Programme and its recently announced National Centre for Research Methods, to be located at Southampton University. In a more specific context, the TLRP maintains its commitment to the development of capacity in teaching and learning research; and this too reflects the current priorities of the ESRC, as well as the government agencies and departments which are ultimately responsible for the Programme’s funding.

Given the significance of these developments, it is remarkable that the notion of research-capacity building has been subjected to relatively little systematic scrutiny. Certainly, it is not difficult to see that current efforts at building research-capacity embody a particular conception of what this involves. Research-capacity is defined essentially in terms of technical considerations relating to the conduct of empirical research. Hence, building research-capacity is a matter of (further) developing the capabilities of researchers in respect of issues such as the design of studies, the collection and analysis of data and so forth. Moreover, devising the practical means by which such capabilities can be developed is seen as being unproblematic: researchers will wish to acquire new expertise and the processes of teaching and learning will be straightforward.

The TLRP experience of research-capacity building shows that things are much more complicated than this model allows. Developing the technical repertoires available to researchers may well be necessary to producing better quality research. However, the relationships between the methods adopted for the conduct of research and the philosophical and theoretical perspectives within which research is conceptualised cannot sensibly be ignored. Of course, these relationships are complex. It is important to distinguish between different types of theoretical perspective: the implications of those perspectives which specify how our knowledge of the social world is constituted (for example, interpretivist, realist, positivist perspectives) are different from those which specify the substantive nature of social relations (for example, feminism, Marxism, functionalism). A particular perspective (of any kind) does not provide a ‘recipe’ from which the design and conduct of a research study can be ‘read off’. Equally, developing strategies for combining different types of data, generated by different research methods, need to take account of the extent to which the perspectives within which research is framed are commensurable.

Taking account of these kinds of issue makes the practical activity of research-capacity building much more difficult. Clearly, one of the attractions of the ‘technical model’ of capacity-building is that it allows a programme of activities (seminars, workshops, etc.) to be devised fairly readily (and this is reflected, for example, in the work of the RCBN). However, there are equally practical reasons for moving beyond it. Most crucially, researchers themselves are not comfortable with research-capacity building which attempts to disengage the technical conduct of research from the theoretical perspectives through which it is framed.

These issues will be debated at a TLRP RCBN Conference to be held in Cardiff on 24 February 2004. Papers from the conference will be available on the RCBN web-site after the event.

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Qualitative data analysis: the call for transparency

Jane Ritchie* and Liz Spencer+

Qualitative data analysis is a challenging part of the research process. It involves both creativity and systematic exploration. The researcher needs patience, paying careful attention to the data, but must also have a clear and insightful mind, able to find themes and patterns amongst seemingly endless detail. The analytical process is consequently difficult to describe and, perhaps unsurprisingly, appears to have been shrouded in mystery until the latter half of the twentieth century. It was often hard to know how people had dealt with the rich, voluminous and often tangled data they had collected. Fortunately there is now much better documentation of the analytical process, particularly tasks concerned with early stages of sorting and sifting data, and this may well have come about as a result of the increasing use of computers in qualitative analysis and the development of many different software packages.

The importance of giving a clear account of the analytical process is a recurrent theme in the literature (for example, Miles and Huberman, 1994; Seale, 1999; Silverman, 2000; Strauss and Corbin, 1998). In a recent project reviewing quality in qualitative research and evaluation, the authors develop a series of appraisal questions to help assess such quality, and five of these questions relate to the clarity and rigour of analysis (Spencer, Ritchie, Lewis and Dillon, 2003). In particular they suggest that readers of research evidence need to know which analytical approach was adopted and why, and how analytical concepts were derived and applied. Readers will also want to see that data are placed in context and that the complexity of the data and the diversity of perspectives have been explored. Finally, readers will need to see how data become ‘findings’ with clear links between the analytical commentary and the evidence presented.

Giving a transparent account of the analytical process involves being clear about its different stages. Essentially, analysis begins as soon as data are gathered and the researcher starts forming and synthesising ideas, but there will usually be a time when more systematic analysis is carried out. Qualitative data do not come neatly sorted and labelled and, at the beginning of this more formal analytical stage, the researcher is faced by an unwieldy and discursive mass of material. This may take the form of extensive fieldnotes, hours of tape, hundreds of thousands of pages of interview or focus group transcripts, documents, photographs or videos, and the researcher must find a way of getting a handle on the data. The first key task in the analytical process, therefore, is data management. This stage involves a careful review of the data, and then a rigorous process of sorting, sifting and reduction so that the researcher can move on to a more creative stage of interpretation, making sense of the findings and producing descriptive and explanatory accounts.

There are many different approaches to data management. In some cases the researcher treats the data themselves as the phenomena under study rather than indicative of beliefs and experiences which exist outside the research setting. In such cases, he or she might be interested in the structure of an account and approach data management by identifying particular linguistic structures in the data (as in conversation, discourse or narrative analysis). Alternatively, the researcher treats the data as a window on people’s social worlds and is more concerned with substantive meanings. In this case, the analyst might pare down phrases to their essential meaning (as in phenomenological approaches), alternatively he or she might sort, synthesise and compare data under a common set of concepts or themes. It is this latter approach which underpins ‘Framework’, the analytical tool we briefly describe in this paper.

‘Framework’ was developed at the National Centre for Social Research in the 1980s for the conduct of qualitative studies within social policy enquiry (Ritchie and Spencer, 1994). It is essentially a data management tool, but it can also be used to aid later more interpretative stages of analysis. When designing ‘Framework’, there was concern to incorporate some important features that would aid a systematic interrogation of data. In particular, a tool was wanted that would:

• allow emergent ideas and concepts to be captured so that analysis remained grounded and data were not ‘bullied’ to fit pre-conceived categories
• be flexible so that new ideas and insights could be accommodated
• record and display reduced and synthesised data in such a way that they could be traced back to their original form
• permit within and between case searches and comparisons
• ensure that the entire data set was systematically and comprehensively reviewed to discourage anecdotal ‘cherry picking’
• allow transparency to others so that research colleagues, collaborators and funders could review analytical procedures and building blocks

Framework is a matrix based method which uses a thematic framework to classify and organise data according to key themes, concepts and emergent categories. Individual studies each have their own thematic framework, comprising a series of main themes, sub-divided by a succession of related subtopics. These evolve and are refined through familiarisation with the raw data and through tagging or labelling it in some way.
Once the framework is judged to be comprehensive, each main theme is displayed or 'charted' in its own matrix such that every ‘case’ or unit of data collection is allocated a row and each column denotes a separate subtopic. Data from each case are then synthesised within the appropriate part(s) of the thematic framework until all the raw material has been allocated.

It is not possible here to describe the individual steps involved in Framework in any detail (a full illustrated account is given in Ritchie, Spencer and O’Connor, 2003). But essentially they take the analyst through all the key processes involved in qualitative data management, namely:

**Identifying initial themes or concepts**

After an initial review of the collected data and the themes and concepts it has generated, an index is constructed to provide an initial conceptual structure for organising the data. The content of the index will vary depending on the type of qualitative analysis being undertaken. For example, it may be very semantically based concerned primarily with the use of language, involve descriptive categories that remain close to the data or contain more abstract classifications. Categories within the index are numbered or named for ease of reference.

**Labelling or tagging the data**

The next step is to label or tag the textual data using the index categories. In common with some other analysts (Richards and Richards, 1994) we refer to this process as 'indexing' rather than 'coding' because this more accurately portrays the status of the categories and the way in which they 'fit' the data. When applying an index, it simply shows which theme or concept is being mentioned or referred to within a particular section of the data, in much the same way that a subject index at the back of a book works. The term coding, on the other hand, often refers to a process of more precise definition that is neither intended, nor often appropriate, for qualitative data in the early stages of thematic allocation.

With textual data, indexing involves reading each phrase, sentence and paragraph in fine detail and deciding 'what is this about?' in order to determine which part or parts of the index apply. Indexing can be a manual operation, where references are noted in the margins of transcripts, field notes or documents or can be carried out electronically.

The process of indexing may well lead to a refinement of categories. It will certainly display how intertwined issues, concepts and elements are in single passages of text through the allocation of multiple index categories.

**Creating thematic charts to sorting and order the data**

The next step within Framework is to use the index, and the learning gained through indexing, to construct a set of thematic matrices or charts. Each main theme and its associated subtopics are identified in separate thematic charts. The number of charts is dictated by the number of main themes a study generates.

Once the main themes to be used are decided, each is allocated a column on the chart. Each column is assigned a number to enable easy referencing between columns. If it is useful, the index numbers that relate to particular columns can also be shown. Each participant or unit of data collection is then assigned a particular row on the chart and will stay in this same location on every chart.

The first column of each thematic chart is usually reserved for case identification. Generally, the main demographic or other characteristics used in selecting the sample are included here but as the analysis develops, more conceptual constructs could also be inserted. It is also useful practice to reserve a blank column at the end of a thematic chart to pick up further emergent themes and as a place where the analyst can make a note of hunches to be investigated at a later time (a process similar to memoing).

**Summarising or synthesising the data**

At some stage in qualitative data management, a summary or synthesis of the raw material will be needed. In Framework, this process is referred to as 'charting' whereby the key elements of passages of data are placed in the thematic matrix. The analyst will usually use the already indexed material for ease of reference, but it is also possible to work directly from un-indexed transcripts or tape recordings.

The key question in charting is how to summarise the content to best retain the context and essence of the point, without losing the language or voice of the originator. In general, the process requires extreme care and finely tuned judgement about the amount and content of material to chart. The general principle should be to include enough data and context so that the analyst is not continually returning to the transcribed data to understand the point being made, but not include so much that the charts become full of undisgested material – getting the right balance is essential.

When Framework was first developed, it was usual for charts to be drawn up manually on large A3 sheets of paper. However, most spreadsheet 'worksheets' can be adapted in a matter of minutes to accommodate a thematic chart. Extra worksheets can be created within a spreadsheet file to store additional thematic charts, so that one file can host synthesised data for an entire study. There are also now plans to develop Framework into a stand alone CAQDAS package.

It was emphasised earlier that data management is only a preliminary stage in the analysis of qualitative data after which the ‘real’ task of analysis begins. Framework, like other tools, is primarily for data management but it was designed
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with an eye to the various analytic processes that follow. It therefore facilitates a range of activities that analysts will undertake as they move backwards and forwards through the various stages of conceptual identification, refinement, classification and interpretation that qualitative data analysis requires. For example, at the simplest level, Framework provides data which are thematically ordered so that dimensions, features, categories and classes contained within single topics can be identified and defined. Alternatively, the lateral dimension of the matrix makes it possible to do both within and across case analyses so that patterns of association and linkages within the data can be identified and explored. Similarly, factors or dimensions on which the study population divides can be detected and tested across the whole data set to aid in the development of typologies. Explanatory accounts, which often require the detection of explicit or implicit linkages within the data, can be aided by the ability to look across a series of concepts and a range of cases, more or less simultaneously.

Analysts will vary in the requirements they have of data management tools, depending on the nature of the qualitative research being undertaken and its purpose. Framework is just one method and there are many other useful tools from which to choose. But whatever approach is chosen, it is vital that it helps the analyst in the central function of qualitative data analysis – the quest for understanding the phenomena under investigation and the meanings assigned to them by study participants.

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Using computers in qualitative research: A review of software packages

Matthew Williams, Bruce Mason and Emma Renold

Background
To adequately manage and analyse the burgeoning amounts of data that qualitative researchers collect, including interview transcripts, fieldnotes, and increasingly audio and visual data, a computer based data management and analysis system is often required. As in the quantitative tradition, computers are being used to manage, store and help analyse all sorts of qualitative data. Currently there are over 20 packages available which help researchers manage their data in different ways. This article covers the most popular of these and is intended as a helpful and critical guide to differentiate between software packages.

Choosing What Package Suits You and Your Data
There are several considerations which may dictate what package is more suited to you and your data. The best way to distinguish which package to choose is to consider how you wish to analyse your data. Tesch (1990) distinguishes between three broad methods of analysis:

- Language Based Analysis
- Descriptive/Interpretive Analysis
- Theory Building

Language Based Analysis - This approach would be adopted if you decided to conduct a discourse or narrative analysis of text. The kinds of packages used include text retrievers, indexers and text-based managers. Text retrievers recover data pertaining to a category of keywords. Search patterns can be run to identify how often a word or phrase appears in the data set. Packages suited to this type of analysis include C-I-SAID and Diction.

Descriptive/Interpretive Analysis – Descriptive or interpretive approaches usually involve the code and retrieve method and the identification and analysis of themes. The kinds of packages that allow for this kind of thematic

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The report ‘Quality in Qualitative Evaluation: a framework for assessing research evidence’ was the basis for the first in a series of RCBN seminars to discuss quality, innovation and future directions of qualitative research in teaching and learning. For feedback and further information about that seminar and future seminars in the series please visit the RCBN website.
analysis include MAXQDA, winMAX, HyperRESEARCH, Ethnograph and the more popular NUD*IST, NVivo and Atlas.ti (although the latter two packages also provide additional theory building tools).

Theory Building – In terms of procedure, theory building would comprise of generating complex category systems, or the complex organisation and linking of codes, and the analysis of the linkages between codes. In terms of CAQDAS, theory building is aided via the use of semantic networks, complex searches and hypertext. Packages such as Atlas.ti and NVivo allow for the linking of theoretical statements. Usually descriptive/interpretive analysis and theory building go hand in hand, so the majority of new CAQDAS programs cater for both.

The following sections outline the features of some of the more popular CAQDAS packages on the market while introducing the more progressive work being done with hypertext and qualitative data analysis pioneered at the School of Social Sciences at Cardiff University (Weaver & Atkinson 1994, Coffey, Atkinson & Holbrook 1996, Dicks & Mason 1998).

Atlas.ti

The impetus behind the development of Atlas.ti was to provide computational support for grounded theory methodology. Proximity to the data was a key consideration for the developers. In line with grounded theory methodology the package was designed so researchers could remain close to the original data. This has resulted in a non-hierarchical structure of objects which are located within a Hermeneutic unit. Objects include data such as text documents, audio files, video, quotations, codes, memos and semantic networks. Each object can be examined at various levels of abstraction.

Atlas.ti, like NVivo, might be considered the 'next generation' of CAQDAS packages. This title is warranted for two reasons. Firstly Atlas.ti builds upon the established code and retrieve technique found in the majority of CAQDAS packages. Secondly, the package expands upon the text-based restrictions of older packages by allowing for the analysis of various forms of data. In relation to the advancements in code and retrieve techniques and tools Atlas.ti not only allows for the traditional execution of the technique but also introduces additional features. The use of hypertext linkages within the textual data enable a complimentary approach to analysis. Sets of links can be embedded within the data which help the researcher follow a conceptual argument or narrative. In relation to data types, Atlas.ti can be considered a multi-media CAQDAS package. Audio files, scanned graphics and video can be included as objects and analysed in various ways (NUD*IST and NVivo have much more limited support for multi-media data).

Instead of just being a text-base manager or an exclusive code and retrieve package Atlas.ti also boasts several more advanced features such as code based theory building and conceptual network construction. Atlas.ti extends code and retrieve procedures in the direction of theoretical development. Codes can be treated as building blocks for the generation of a set of interrelated conceptual categories. These codes then become theoretical categories, emerging out of the data (hence the grounded theory approach), which are associated in theoretically relevant ways. Atlas.ti provides two tools for theory building; these include complex Boolean searches and visual representation through semantic networks. The Query Tool allows the researcher to retrieve data via multiple and complex searches. For example, data can be identified and retrieved by the conventional Boolean associations of AND/OR/NON, and by its proximity and co-occurrence to other data, codes or memos. The package also provides a visual map of the objects within the hermeneutic unit which can be linked together via specified relationships. The result is a graph made up of interconnected nodes and relationships between nodes such as ‘is associated with’, ‘is a’, ‘casual’ etc. This feature allows for the elucidation of underlying structures and narratives in multi-media data sets.

Atlas.ti was designed for more exploratory qualitative research and as such focuses upon non-hierarchical coding and theory building via hypertext, complex searches and visual semantic networks. The package also allows users to output data to SPSS files for further analysis.

Website: http://www.atlasti.de

NUD*IST and NVivo

NUD*IST (versions N1 to N6), and more recently NVivo, have become the most popular and widely supported CAQDAS packages (see Renold 2001). Like Atlas.ti, they have been developed with an inductive grounded-theory approach in mind and support the coding, editing and retrieval of textual data, automated coding, writing memos, searching for words/phrases and exploration of relationships between codes to facilitate theory building. Also, like Atlas.ti, they can (although differently) link to statistical data in basic ways.

NVivo is best suited to support a more fine-grained, in-depth and organic approach to analysis and enables a more fluid and visual ‘thinking aloud’ type of coding. It also has a number of ways of recording links between data such as graphic modelling and hyper-linking to external data, including multi-media data. N6 still keeps you close to your data and emerging theoretical ideas, but supports larger data sets. QSR describes N6 as a pragmatic and ‘reliable workhorse’ that manages your documents, data, coding and theory-building in rigorous yet swift and speedy ways.

Distinguishing features of NVivo

In NVivo, documents and nodes (where data is stored) have more

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flexibility and can be ‘freely’ organised or managed (but not necessarily hierarchically) in ‘tree-mode’. Data can be imported in rich text (.rtf) files with flexibility in choice of font, colour, formatting and a mix of languages. An attractive feature of NVivo is its ability to hyperlink not just to anywhere within the package but to external documents. It is thus possible to create compound documents that link to video and sound. NVivo also has an in-built multi-layered graphics modeller that can link to ‘live’ data.

**Distinguishing features of N6**

Restricting documents to plain text enables rapid data import of data and an ability to handle large data sets. An invaluable feature of N6 is its ability to facilitate both quantitative data and qualitative data by, for example, incorporating a table from SPSS. It thus becomes possible to analyse ‘tick-box’ questionnaires with unstructured interviews. The fixed text units allow for very fast select-and-click coding and rapid node creation. While both packages support cross-tabulation of coding to explore patterns of the data in complex ways, N6 can also export these searches to a table and provide a rapid response to questions and emerging theories. Finally, N6 is available in a Student version and is the lowest price of any QDA package.

**NUDIST** is a reliable package for those working on large data sets and working within a team. NVivo is useful for those interested in a more flexible and fine-grained approach to analysis, including the use of various data types and methods of data exploration.


**Hypertext for Qualitative Data Analysis**

Hypertext is probably most familiar through its implementation via The World Wide Web. The web, as with any hypertext, consists of a set of ‘nodes’ (web pages) that contain information and associative links (hyperlinks) between nodes. The hypertext is then ‘read’ through means of a web browser.

The rationale behind the use of hypertext for complex databases is that a qualitative researcher faced with a complex set of ‘raw’ data gathered through fieldwork may find that it facilitates a more intuitive approach to data management and analysis.

The newer CAQDAS packages – most notably NVivo and Atlas.ti – feature some elementary hypertext functions. The use of hypertext in these packages is promising but is unlikely to provide adequate support for a full analysis based on hypertext. Because of these restrictions alternative programmes designed to facilitate literary hypertext authoring can be used. While not strictly a CAQDAS package StorySpace proves useful for qualitative data analysis.

Before giving some examples of how one could conduct a hypertextual analysis of qualitative data it is necessary to give a brief overview of the relationship between hypertext and the most commonly used qualitative data analysis (QDA) technique – data coding. Unlike conventional coding hypertext creates relations directly between data elements, not between data and codes, thus encouraging the user to stay ‘closer’ to the data. The crucial requirement for hypertextual QDA is the ability to “name” links so that the relationships between data elements can be invested with meaning. In so doing, a semantic web can be created. The progressive refinement and re-reading of this web is what can facilitate data analysis. StorySpace enables this approach through use of a tool called The Path Browser. A path is the set of all nodes in a hypertext that are connected by links of the same name. The researcher can inspect paths and decide whether the relationships between nodes are meaningful or not.

In addition to path browsing, StorySpace provides very powerful ways to graphically inspect the data. It also allows the user to add keywords to nodes so that, for example, demographic information can be attached to an interview transcript. Finally it has a number of hypertext navigation tools such as a “back arrow,” “history list”, “bookmarks list”, ability to attach “margin notes” to nodes, and to save readings so that different researchers can work on the same hypertext and save their histories separately.

Although the package is an excellent means for creating complex hypertexts it is not focused on qualitative data analysis. While the leading CAQDAS packages feature very powerful code and keyword analysis options, StorySpace has only the most basic means of analysing links and keywords. In addition, along with the majority of CAQDAS packages, it lacks any significantly useful means of dealing with audio-video data. As of this time, although there is great potential for hypertextual QDA, any researcher wishing to take this option is likely to find a lack of support.

Website: [http://www.eastgate.com/Storyspace.html](http://www.eastgate.com/Storyspace.html)

[http://www.cf.ac.uk/socsi/hyper/](http://www.cf.ac.uk/socsi/hyper/)

**So what package?**

Here are some key points to consider:

- **The chosen package must be suitable for your data type – for example, will you be conducting a fine grain analysis or a more general thematic analysis?**
- **The chosen package should be suitable to your level of computer literacy – for example winMAX and MAXqda rely far less on specific computer skills compared to Atlas.ti or NUDIST**
- **Familiarity with qualitative methods is important for example, it would be futile to choose a package that was designed for the discursive analysis of texts if you were not**
familiar with discourse analysis – CAQDAS does not teach you how to analyse data, you have to be familiar with the procedures before hand.

- What level of support is available for the package – if you are new to CAQDAS it is useful to draw online support forums and mailing lists etc. In this respect NUD*IST has the largest support base.
- Continuity – Will you be using one package or several? This depends upon your analysis – will you employ both discursive and interpretive analysis? How about incorporating quantitative elements? Some CAQDAS packages allow for the incorporation and handling of SPSS data (Atlas.ti, NUD*IST and NVivo). Similarly will you need to analyse multi-media such as audio, video and still images?

A Final Note
There is a romanticised qualitative tradition which views the method as non-systematic. This means most researchers, more often than not, have to ‘rediscover the wheel’. The idea here is that researchers only become aware of how to analyse data when they actually get down to ‘doing it’. However it is the nature of technology to systematise procedures. Bearing this in mind, some qualitative researchers reject CAQDAS while others welcome the change. The main argument is that the more standardised analysis becomes via CAQDAS the less analysts can be innovative with their data. However, there are undeniable advantages to using CAQDAS that have already been mentioned. More so, technology can aid in the creative and innovative analysis of qualitative data, through avenues such as hypertext and other nascent innovations that are yet to be fully released or explored.

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What is ‘triangulation’?
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Triangulation between the evidence produced by different research methods is the simplest common form of combining methods. Various reasons have been advanced for the use of combined methods triangulation, including increasing concurrent, convergent and construct validity, the ability to enhance the trustworthiness of an analysis by a fuller more-rounded account, reducing bias, compensating for the weakness of one method through the strength of another, and in testing hypotheses (Perlesz and Lindsay 2003).

This brief paper considers the metaphor/analogy of triangulation in social science research. In particular we are concerned with triangulation in mixed methods approaches, such as those involving both traditionally quantitative and qualitative techniques. We use a very simple definition of the two types of methods, such as that in Gray and Densten (1998). ‘Quantitative’ work, here, refers to counts and measures of things, but not only work based on traditional statistical theory or the standard ‘frequentist’ approach. ‘Qualitative’ work predominantly uses words (and increasingly visual images) as data, but is not necessarily ‘interpretable’ or social constructivist (or any other kind of ‘ist). As the types of data involved differ between the two approaches, so the appropriate kinds of analysis often differ as well. Note that this is very far from saying that they have a different underlying logic, or refer to different realities. We do not, therefore, consider here the notion of research ‘paradigms’, as a barrier either to mixed methods work or to the triangulation of results.

The concept of triangulation between datasets is explained in introductory textbooks, and will be familiar to most readers. Even research designs using both quantitative and qualitative methods tend to split them into two exclusive parts, often conducted by different individuals, and then try to relate the results to each other at the end of the research (Erzberger and Prein 1997). The two or more different methods involved could both have been generated within one study, this is triangulation at its simplest, or they could be combined across two or more different studies. However, the term ‘triangulation’ is also generally the source of considerable confusion. For example, we have heard one respected source explain that triangulation involves the collection of data from three vantage points, or the collection of three different kinds of data, in order to determine something about a fourth phenomenon lying within the notional triangle formed by these three points (or perhaps where the

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triangle is itself the metaphorical phenomenon to be investigated by multiple methods. Other sources explain, rather, that triangulation involves only a minimum of two vantage points or datasets to tell us something about a third phenomenon. It is also typically explained using the metaphor derived from an analogous trigonometric process during land-surveying. But according to Kelle (2001) the use of this metaphor can be confused and confusing.

In land surveying, we could determine the position of a third point C if we know the positions of points A and B, and we also know the interior angles (X and Y) at any two points of the triangle thus formed by A, B, and C (Figure 1). In this case, C is the phenomenon we are trying to investigate (the unknown), while A and B are our two observations (or two different methods if we are combining both qualitative and quantitative evidence).

Alternatively, we can imagine the metaphor in terms of perspectives (Figure 2). C is still the phenomenon to be investigated. A and B are our two perspectives (observation points or methods). Each isolated view of C may produce a two-dimensional picture (such as a circle or a rectangle), but when put together with ‘binocular’ (triangulated) vision they produce a three-dimensional image (such as a cylinder, with the ‘circle’ as its face and the ‘rectangle’ as its side).

If either of these are close to the analogy for social science triangulation, then several important conclusions can be drawn. First: the whole process assumes that there is a relatively stable genuine observable phenomenon to be investigated. Therefore, the process explicitly rules out both positivism (the belief that the existence of objects stems solely from their measurement, Cook and Payne 2002) and relativism (the belief that objects do not have an external reality, and that there can, therefore, be genuine multiple ‘realities’, Sale et al. 2002).

Second, and again using the metaphor as it is usually constructed, and against popular practice (at least in writing about it), triangulation cannot be used as a form of mutual confirmation or validation of the two observations (or methods). In trigonometry, in surveying, and in the differing perspectives model of triangulation, the whole process depends on all of the observations taken being accurate. If, for example, we are trying to find a position for point C from the positions of, and interior angles at, points A and B, then any error in our information about A or B will lead to an error for C. Similarly, then, in social science two different sets of observations (whether collected by the same or different methods) cannot be used both to check up on each other and for triangulation. We can, of course, replicate our previous research, and even attempt near-replication with different methods (what Erzberger and Prein 1997 refer to as convergence). But if the two components of the replication lead us to an identical result, then triangulation is impossible by definition since there is no third point. And if the two components lead to substantially different results (such that we would conclude that we have not produced replication), then we cannot use the two components to fix a third because we do not know which of the two is in error. And even if we did, we would then end up with only one set of valid measurements for the position of a point, and the analogy of ‘trigonometry’ cannot help us.

Third, therefore, if triangulation means anything in social science terms it is about complementarity, and nothing at all to do with mutual validation. The two observations or methods must be directed at different aspects of the wider phenomenon to be investigated. One of the methods might be indirect or reductionist in nature (a very valuable approach in science, Verschuren 2001), and the other direct or holistic. In this case, we will obviously expect that the results of the two observations will differ from each other (and will not be used for mutual confirmation). If we are using two different methods then the results have to be genuinely combined if anything new is to result. Perhaps, therefore, the explanation of perspectives is easier to follow. When we view an object from two perspectives, or study a social phenomenon using two methods, then we expect to find something new as a result — whether that is point C, the binocular vision of a cylinder, a ‘gestalt’, or simply a more well-rounded theory of the wider phenomenon being investigated.

This kind of combination reverts back to the true meaning of the
Meta-analysis and qualitative data: Insights from the history of probability

Ray Godfrey

In the interests of considering all the evidence it would be useful to extend the scope of meta-analysis. I see quantitative thought (and statistical analysis) as concerned with truth in the sense of correspondence with the way the world is. Qualitative thought (including philosophical speculation) is concerned with insight and understanding. Neither of these is ever redundant in any research or review process. To avoid pointless number crunching statisticians need always to think about meaning and insight. To avoid pointless rambling philosophers need to think about the way the world is.

When reviewing research evidence, ostensibly quantitative and ostensibly qualitative evidence can both be subject to qualitative and to quantitative thought. Meta-analysis is a statistical approach to reviewing evidence it would be useful to extend the scope of meta-analysis.

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quantitative evidence.

There are two approaches to meta-analysis. To answer questions the hard-line approach seeks to use only evidence meeting the highest standards, to extract quantitative statistical information relevant to the question and to aggregate this statistically to show “what is known” about the question.

Unfortunately, for some important questions no existing evidence meets these standards. The Cochrane Library of medical reviews uses this approach and many reviews, having laid out carefully the search and analysis strategies, conclude that there is no evidence relevant to the topic. The rational thing to do then is to turn to second-rate evidence rather than claim total ignorance.

A soft-line approach seeks to aggregate all the evidence there is relevant to the question. Quality is taken into account. Ten undergraduate “research” assignments carry less weight than a single study by an acknowledged expert in the field, using the best current understanding of methodology.

The soft-line approach is attractive partly because any cut-off point for evidence quality is arbitrary. The Cochrane approach provides an established standard. Readers of a Cochrane review understand the quality of the evidence included and excluded. Cochrane reviewers do not necessarily live up to such a standard. However, the idea is good, as long as we remember that some, perhaps most or all the evidence, has been omitted.

A further consideration is the excessive respect for randomised controlled trials as the best form of evidence in all circumstances. For some questions RCTs would be unethical or impracticable or would provide no evidence of use beyond the controlled context of the trial itself. An ingenious experimental designer can push the limits of RCTs, but there are limits.

Qualitative researchers make qualified claims to generalisability in ways very similar to quantitative researchers.

It is always tempting to push the soft-line approach further, encompassing ever weaker sources of quantitative evidence. Can this be extended to ostensibly qualitative research?

Many qualitative researchers deny any interest in discovering generalisable facts. Actually, except for speculative thinkers with ideas so lacking in content that they can be generalised universally without fear of refutation, researchers generally do claim to be telling us about the way the world is. Whereas quantitative researchers qualify their conclusions (or should do so) with confidence intervals, significance levels or other statistical devices, qualitative researchers use turns of phrase to distance themselves from their own conclusions. The style is different, the effect much the same. Different authors show differing degrees of awareness of what they are doing in this respect. The following examples were casually selected.

Silcock and Duncan (2001) write largely in philosophical analytical terms but draw very practical conclusions including that optimal conditions for the integration of values into school-students’ lives will include students’ voluntary commitments. This is a factual claim, though its expression is value laden and it is prefaced by the phrase “It is believed…”

Coldron and Boulton (1998), an in-depth case study of one initiative to deal with one problem in one school, concludes with:

“This initiative is an example of how this might happen. Through this initiative people sought to act on established structures and processes. They engaged with issues of power and sought to be democratic and reflexive. Key players were tentative, aware of complexities, unsure and careful.”

This characterisation of what made the initiative successful and what might be a recipe for successful efforts elsewhere is a very tentative generalisability claim and one which is quite probably justified.

The historical debate on probability and the credibility of testimony parallels what would have to occur before incorporating “qualitative” results into meta-analysis.

Any future claim to have incorporated qualitative findings into meta-analysis will probably involve attaching probabilities to qualitative findings. Those who say probability applies only to things that can be counted or measured are probably unaware of the history of probability theory between the 17th and 19th Centuries (see Daston 1996 for most of what follows).

In the early 17th Century modern approaches to probability emerged from thinking about games of chance, situations far more artificial than a physics experiment. In parallel with this, the same mathematical theory was being applied to the complexities of human mortality, often related to the business of buying and selling annuities. However, there were other strands to the development of probability theory. Many early probabilists had a legal background and were as much concerned with the probability of guilt and credibility of testimony as with maximising winnings with dice. What can be learnt from the debate of two to four hundred years ago in considering the trust that can be placed in the factual claims of qualitative researchers?

In those days the hard edge of mathematics was seen as a way of cutting through muddled and misguided thinking. Leibniz, lawyer, philosopher and mathematician, contrasted “genuine” probabilities of matters of fact with the “probability” of the moralists judged by the weight of support given to an opinion by authority - a muddled
medieval notion.

Pierre Bayle recommended judging probability not by the number of people testifying to a claim but by the judgement of the few people of integrity and intelligence who had diligently examined the issue [suggesting the quality of the researcher needs to be taken into account].

Jakob Bernoulli, a very eminent mathematician, made the basic distinction between an event’s “intrinsic probability” and the “extrinsic probability” given it by the testimony supporting it [suggesting a need to distinguish clearly between on the one hand the prior credibility of statements made and conclusions reached in qualitative research and on the other the credibility of the evidence for the statements and conclusions].

Nicholas Bernoulli proposed judging a witness’s degree of trustworthiness by dividing the number of times a witnesses testimony have been substantiated by the total number of testimonies the witness has given. [There is scope here for a large scale research project, one which would upset a lot of people and probably lead to very vague conclusions, if any at all.]

An anonymous author recommended looking at both the integrity and the ability of the witness. [Possibly we would need some measure of how far an author was out to make a name for himself or how far she had an axe to grind.]

Diderot’s encyclopedia gives more space to the credibility of witnesses than to any other single topic of probability. It was deeply concerned with establishing the competence and integrity of a witness. Nicholas Bernoulli’s approach was abandoned in favour of traditional legal criteria: education, personal interest, ulterior motive, familiarity with the question in hand etc.

Condorcet set the mathematics straight and tried to add substance to the idea of quantifying the ability of a witness. Each person, he claimed, could grasp simultaneously only a certain small number of simple facts. When the person gives testimony, the reliability of their evidence is diminished according to the extent to which number of simple facts involved in the complex fact to which they testify exceeds the number to which they are capable of attending.

Laplace and others gave more complex versions of Condorcet’s mathematics, showing in more detail what was involved in his calculations. [Between them these authors give us an apparently sound set of formulae for manipulating probabilities generated from the credibility of a researcher, once these probabilities have been generated.]

Finally a few mathematical results from Laplace:

When a less than perfectly reliable witness testifies to an event which is one of a number of equiprobable possibilities, the probability that the event has occurred is equal to the credibility of the witness and does not depend on the intrinsic probability of the event.

Laplace was overmuch concerned with equiprobable events. This result would need to be loosened up a little.

If the witness has an interest in the event to which he testifies, this will diminish the probability that it has occurred.

It is really best if research is done by someone with no axe to grind. In this respect qualitative research is best done by someone who has not previously published in the same area.

If the event is extraordinary, the probability that the testimony is false increases. That is, our final probabilities should take into account the prior probabilities of the claims made.

Totally independent witnesses (but only totally independent witnesses) testifying to the same event give it a (much) higher probability than any single witness would. Two studies are much better than one only if the researchers involved are unconnected. With the proliferation of journals, international conferences and websites, this would be difficult to achieve. It might also be bad practice. Qualitative researchers might have to accept that the way they network makes their factual claims weaker.

This last result is especially true if the event has a very low intrinsic probability. Two studies which independently find the same very surprising result are very strong evidence even if, in quantitative terms, they each have rather low reliability.

Conclusion
The work of bringing together qualitative and quantitative research results, if undertaken at all, would be long and arduous. It would probably involve making many enemies amongst those who regard one or the other form of research with suspicion. It might well be defeated throughout lack of interest as in the case of the historical debate on legal probabilities. However, it seems to me that the difficulties involved in transferring this debate into the realms of educational research are no greater than many other hurdles that have been jumped by statisticians in the past two hundred years.

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Change of staff within the RCBN
Since the last issue of Building Research Capacity there have been a number of key changes in personnel. We are pleased to welcome Dr Ruth Boyask to the RCBN team. Ruth joins us from the Education Department of the University of Canterbury in Aotearoa New Zealand. Ruth’s experience in educational research is underscored by her background in art and art education, and consequently is interested in teaching and learning as cultural phenomena. Since joining the RCBN office in November 2003 Ruth has already enjoyed meeting a diverse range of researchers, projects and research practices and looks forward to fostering this diversity through her role as the co-ordinator of the RCBN programme of events.

Also, Dr Patrick White has left Cardiff to join the University of Leicester as a lecturer in sociology. Dr Emma Smith is also no longer involved in the day-to-day running of the RCBN since she now has a lectureship in the Cardiff School of Social Sciences. We are pleased, however, that Emma will continue to work with the RCBN as a member of the Executive Group.

Forthcoming RCBN events
Qualitative Research in Teaching and Learning: Quality, Innovation and Future Directions, seminar series, various dates and locations
This seminar series provides a forum for debate and discussion about the present use of, and future directions for qualitative research within teaching and learning, and educational research more generally. The series addresses the ways in which qualitative research is conducted within teaching and learning arenas and, how qualitative data are used to inform scholars, practitioners and policy makers. In particular the series considers issues of quality within qualitative research, in a context of methodological consolidation, development and innovation. The series is jointly organised by the TLRP Research Capacity Building Network (RCBN) at Cardiff University and Manchester Metropolitan University.

Qualrus™ The Intelligent Qualitative Analysis Program, one-day workshop, 13 February 2004, University of Gloucestershire
The workshop will be led by Ed Brent, the author of Qualrus, and will begin with an introduction to the software package. Ed will then attempt to cover a range of features unique to Qualrus, including the use of multimedia such as audio and video files and how Qualrus can be used as a web browser to navigate among web pages, selectively coding and saving copies of HTML sources as desired.

RCBN 2004 Annual Conference: Research Capacity Building in Teaching and Learning, one-day conference, 24 February 2004, Cardiff
This conference will explore some of the key issues which arise in the development of research capacity in the field of teaching and learning. It will do so through the exploration of the experiences of the Economic and Social Research Council’s Teaching and Learning Research Programme (TLRP); and it is intended primarily for the researchers who are involved in the TLRP. The 2004 RCBN Annual Conference has been organised alongside a conference by DYSG, the National operation in Wales of the Learning and Skills Development Agency (LSDA). Both events will be followed by a Teaching and Learning Research Programme (TLRP) Showcase of its whole project portfolio.

Other forthcoming events to look out for:
• Introduction to multi-level modelling, March 19th, University of Leicester
• The role of inter-disciplinary research in teaching and learning
• Workshop on use of randomised control trials (RCTs) in teaching and learning research

Building Research Capacity
ISSN 1475-4193, Issue 7

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