Triangulation and Mixed Methods Designs: Data Integration with New Research Technologies

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Abstract

Data integration is a crucial element in mixed methods analysis and conceptualization. It has three principal purposes: illustration, convergent validation (triangulation), and the development of analytic density or ''richness.'' This article discusses such applications in relation to new technologies for social research, looking at three innovative forms of data integration that rely on computational support: (a) the integration of geo-referencing technologies with qualitative software, (b) the integration of multistream visual data in mixed methods research, and (c) the integration of data from qualitative and quantitative methods.

Combining different methods and kinds of data in the empirical study of social phenomena goes back to the beginnings of social science (see Hesse-Biber, 2010a, for the historical lineage of the triangulation concept and Plano Clark, 2010, for an account of the rise of mixed methods in U.S. government–funded research). Mixed methods potentially offer depth of qualitative understanding with the reach of quantitative techniques. Initially, it was the more quantitative researchers such as Paul Lazarsfeld who practiced mixed methods (Jahoda, Lazarsfeld, & Zeisl, 1976), but following Campbell's papers on ''triangulation'' as a means of convergent validation (Campbell & Fiske, 1959) and the emergence of grounded theory (Glaser & Strauss, 1967), whose ''constant comparative method'' involves comparing data from different sources, the triangulation metaphor also became established in qualitative research. Ivankova and Kawamura (2010) offer a comprehensive and extensive bibliometric survey of contemporary mixed methods practice. On the basis of searches of five databases (PubMed, ERIC, PsychInfo, Academic OneFile, Academic Search Premier) and two journals (Journal of Mixed Methods Research, International Journal of Multiple Research Approaches), Ivankova and Kawamura found a consistent growth in mixed methods research since 2000. Numbers rose increasingly sharply from the year 2000 (N = 10) to 2008 (N = 243). Some 689 studies were classed as full mixed methods research designs after applying the restrictive requirement that each must have both quantitative and qualitative elements (there is no logical reason why a study combining purely qualitative or purely quantitative methods could not be regarded as ''mixed methods''; see Denzin, 1970).

An interesting (and appealing) view is that the use of mixed methods ''provides a rationale for hypotheses/theories/guiding assumptions to compete and provide alternatives'' (Niaz, 2008, p. 64). This perspective stands in tension with the more formulaic renderings of mixed methods. Declining emphasis on creativity, inventiveness, and risk taking is often a mark of methodological innovations as they move to the mainstream. Although Ivankova and Kawamura (2010) cite a stream of ''how to'' literature on the application of mixed methods research designs, the actual integration of data was generally neglected in this work—a problem that Plano Clark, Huddleston-Casas, Churchill, Green, and Garrett (2008) declare is a general one. Since the presumable point of mixing methods is to see the analytic implications of linking data derived from different methods rather than have findings from different methods ''talk past each other,'' the neglect of data integration is a troubling matter on which the present article focuses.

Against the context of mushrooming growth, it is timely to remind ourselves that effective data integration requires a well-considered approach that knows when to synthesize some findings (because they are equivalent and commensurate) and when to respect and investigate contradictory findings (because the contradiction reflects epistemologically based differences that cannot be resolved empirically, only conceptually). Bandwagons bring their own rationale;Christ (2009) is among

several sources arguing that the quantitative elements of a design may be prominent less for reasons of fitness-for-purpose than to address the expectations of those who review grants and commission policy research.

Such work tends toward a postpositivist frame that warrants mixing methods as a means to discover social "facts." Its search for the single valid "finding" acts against the truly radical potential that mixed methods research has to build prismatic understandings of social phenomena and to promote the analytic density from which iterative social knowledge can be built (Fielding, 2009). In case this seems starry-eyed or a recipe for theoretical waffle, consider Hesse-Biber's (2010b) summary of reasons for giving the qualitative element prominence in the qualitative–quantitative mixed methods design. She cites the resulting ability to test representativeness/ generalization, to better locate target populations or define them for in-depth study, to achieve demonstrable reliability and validity, to address inconsistent results, and to deepen our understanding of the research problem.

In recent years, arguments have been put forward advocating mixed methods as a means of beneficial social transformation and of promoting greater social justice (Mertens, 2010). As an element of a mixed method design, qualitative methods are particularly open to such applications because these are methods that rely on sustained fieldwork engagement and get close to participants in a way that one-shot surveys or the secondary analysis of administrative data sets do not.

However, the really compelling argument for mixed methods designs remains their benefits for sophisticated analytical conceptualization. As Maxwell (2010) argues, the real quantitative/qualitative distinction is not between number and text but between understanding the world by a theory of variance featuring variables and correlations and understanding the world by a theory of process in terms of events and interactions. Put that way, it is clear that both are essential. Rather than mixing because there is something intrinsic or distinctive about quantitative data or qualitative data, we mix so as to integrate the two fundamental ways of thinking about social phenomena. We quantify qualitative data for integration with quantitative data to "answer research questions or test hypotheses addressing relationships between independent (or explanatory or predictor) variable(s) and dependent (or response or outcome) variables" (Sandelowski, Voils, & Knafl, 2009, p. 211), and we quantify recurrent patterns in qualitative data to "allow analysts to discern and to show regularities or peculiarities in qualitative data they might not otherwise see . . . or to determine that a pattern or idiosyncrasy they thought was there is not" (Sandelowski et al., p. 210).

This considered synthesizing approach runs parallel to King, Keohane, and Verba's (1994) attempt to develop a unified approach to valid descriptive and causal inference by applying the standards of quantitative methods to qualitative methods, but mixed methods ambitiously transcends their approach by combination and conversion at the analytic stage. King et al. (1994) concede a limited role for qualitative methods in situations where numerical measurement is either impossible or epistemologically dubious, shifting attention to research design and data collection rather than analysis. They seek to make qualitative work a better partner for quantitative work by tightening its attention to measurement error, incomplete information, omitted variables, estimating the certainty of conclusions, and so on.

Both King et al.'s (1994) efforts and the much larger mixed methods field are instances of the synthesizing project that periodically surfaces in social science. Synthesis is certainly worthwhile in the context of the seemingly banal findings of much social research, but more is needed than simply strapping together every available source of information. The point is that some combinations can illuminate some kinds of research questions in some empirical cases better than can mono methods.

Mixing methods effectively requires a profound appreciation of the threats to validity inherent in the methods being combined. For instance, Denzin (2010) pursues one of the inherent problems of convergent validation highlighted in Fielding and Fielding (1986), which is that the triangulation logic must negotiate the fact that one cannot measure precisely the same thing twice. The social world is dynamic, and validating an analysis by replication is misguided because social phenomena do not "keep still" and are, furthermore, recursive—some phenomena change because what previous research has made of them enters the awareness of their human subjects. It is possible to construct mixed methods research designs that address such problems, but the broader point is that responding to complexity by using mixed methods always requires epistemological clarity and sophistication. Taking a purely pragmatic "toolkit" approach is vulnerable to the same failings of

untutored use as the ethnographer who approaches statistical analysis as a matter of pushing buttons to execute commands in SPSS.

Purposes of Data Integration

I have so far argued that data integration is at the heart of the mixed methods enterprise ,that attention must be paid to the epistemological precepts underpinning different methods, and that following textbook prescriptions laying down approved research designs may be a necessary rite of passage but that the benefits of mixing methods flow from creative innovation and a conceptualizing rather than pragmatic approach. One of the field's touchstones, Creswell's (2003) account of mixed methods research designs, is based on the four criteria shown in Box 1 and includes data integration (see also Creswell & Plano Clark, 2011).

Box 1. Creswell's Criteria for Mixed Methods Research Designs

Implementation: What sequence of (qualitative and quantitative) methods is used in the overall research design?

Priority: Which methods are most important in data analysis, particularly in influencing decisions when findings from different methods do not agree?

Integration: At what stage of the research design are the data from the different methods put into relation with each other?

Theoretical perspective: Is the theory informing the analysis explicit from the beginning or emergent during the research process?

Source: Adapted from Creswell, J. (2003). *Research design: Qualitative, quantitative and mixed methods approaches* (2nd ed.). Thousand Oaks CA: SAGE.

While Creswell clearly acknowledges the importance of integration, I would go further in arguing that the issues relating to it are bigger than simply when it happens. Integration is really the heart of the whole mixed methods exercise because the purpose of mixing methods is to get information from multiple sources and so the issues in bringing together the information are crucial. It is not so much the stage when integration occurs but additionally what types of data are being integrated and how we integrate them. Decisions about these things depend on our reasons for using mixed methods. I see three broad reasons for mixing methods: illustration, convergent validation, and analytic density.

Illustration is about showing the reality of the research topic in presentations or publications. Statistical data can be dry, and a clip from an interview can bring the issue alive. It can be particularly useful in work for policy sponsors, where qualitative material can give policymakers a sense of the effects of policies in the real world beyond government. Equally, qualitative data can be dense, and a statistic can provide focus. Illustration is not very profound, but it has its uses.

Convergent validation is about whether findings from different methods agree. If they do, it is assumed that the findings are more likely to be valid since different methods display different kinds of error (Webb, Campbell, Schwartz, & Sechrest, 1966). If they had the same biases, combining them would just multiply the error. The main criticism of this classic approach is that triangulation cannot be a validation strategy where different epistemological assumptions underpin the methods being combined (Blaikie, 1991). A quality that functions as a ''threat to validity'' in the epistemology associated with a given method may reflect an assumption that contradicts the epistemology of another method. Equally, what is ''undermining'' in one may be irrelevant or even analytically illuminating in another. It is quite common for mixed methods researchers to deal with this criticism by a somewhat forced appeal to pragmatism, but the more compelling response is to know the pressure points in different methods and employ design combinations that satisfy the different epistemological warrants in play. For instance, if the contribution of a set of unstructured interviews is vital to an analysis that will also draw on a survey, we might design in a panel procedure so the data are interpreted ''blind'' by several research team members before comparing and agreeing on

interpretations (see Fielding & Cisneros, 2009 for an example in a survey/interview/community mapping research design).

Another criticism relates to "bogus triangulation." In Ronald Burt's (2005) "echo hypothesis," opinions expressed by different sources are often not independent validation but rather individuals echoing one opinion, such as that of a high-status person or an expert, and therefore highly redundant rather than a sign of convergence between independent sources.

These criticisms have challenged the original doctrine of convergent validation. Many now argue that combining different methodologies and interpretive approaches does not necessarily enhance validity but can extend the scope and depth of understanding (Denzin & Lincoln, 2000; Fielding & Fielding, 1986; Fielding & Schreier, 2001). The "analytic density" rationale does not mix methods to get more reliable and valid findings but to get a wider and deeper picture from all angles (Shih, 1998, p. 633). This is related to the idea that behind every mixed methods research strategy there must be a theory animating the inquiry (Kelle, 2001).

A good example of a classic data integration research design is Adler's (2003) work on administrative tribunals. In the United Kingdom, tribunals deal with disputes such as cases of unfair dismissal from employment, refusal of welfare benefits by the state, and so on. Tribunal hearings are akin to court cases, and the panel chair is legally trained. There are several types of tribunals, but for many years their common factor was that applicants who were represented by a lawyer at the tribunal hearing were far more likely to receive a judgment in their favour. This "representation premium" was apparent in research from the 1980s onward. What appeared to be going on was that the hearings were conducted like a criminal trial. This inquisitorial model required the applicant to have a lot of confidence to deal with hostile questioning and be comfortable with the formal style of the proceedings.

Arguing that litigants were increasingly capable of representing themselves, the U.K. government tried to reduce and ultimately eliminate representation before tribunals. It costs a lot in legal fees, and in many cases, it is the government that has to pay. Researchers thought the applicants would lose out. Among them was Michael Adler (2003), who combined a quantitative survey of success rates by applicants in 900 different cases along with interviews with applicants who had and had not been represented, observation of 64 tribunal hearings, and interviews with tribunal chairs and other officials. The survey found, to Adler's great surprise that the representation premium had virtually disappeared. Indeed, in some kinds of tribunals, the applicants who were not represented actually did better. This was certainly interesting, but it gave no explanation of why the position had changed so much since the 1980s.

For this, Adler turned to the observations in tribunals and the interviews with officials. For the observations, he designed an "activism indicator" that rated how actively the tribunal chair and other members guided applicants through the process and an "enabling score" that measured how facilitative and supportive the tribunal members were to the applicant. The resulting typology of tribunal members was then linked to observational data about their case hearings.

Comparing this with earlier studies, Adler showed that there had been a large decline in the inquisitorial approach. With this in mind, he interviewed the tribunal members. He put the survey findings to them and asked for their views on why there had been a change. In this research, the survey data provided evidence that there was a statistically significant difference in how successful unrepresented applicants were, the observational data pointed toward an explanation of the survey findings, and the interviews confirmed the apparent explanation. The result of this classic form of triangulation was a finding that saved taxpayers money and gave applicants better ownership of the process.

Mixing methods *systematically* is very important to data integration. It can reveal weaknesses in sampling strategies, methods, and analysis and prompt us to make assumptions explicit and be precise about limits on generalization. So mixing methods puts the findings from different methods into dialogue. I want to keep that sense of dialogue in what follows, where I look at innovative data integration helped by technology. The innovations include (a) the integration of geo-referencing

technologies and methodologies, (b) the integration of multistream visual data, and (c) the integration of qualitative and quantitative data.

Integration of Spatial Data: Geo-Referencing and Qualitative Software

Methodologies and technologies are emerging to link spatially referenced data to qualitative and quantitative data through geographical information systems (GIS; Craig, Harris, & Weiner,2002) or geo-referenced qualitative software (or CAQDAS). On the GIS side, programs such as ArcGIS (www.gis.com) offer a stable platform for representing geographic and social science data. Meanwhile CAQDAS packages have added geo-referencing features. Atlas.ti version 6 (software versions cited in this article may have been superseded by the time of publication) enables referencing to Google Earth and Google Maps. KML digital image files, like a dynamic chart of AIDS infection rates, can be run while looking at a Google Earth image of the location and listening to an interview about availability of contraceptive services in the area. Another package, MAXQDA 2007, has a hyperlink in its main screen that users can click on and be taken to ArcGIS. This provides map images, which can be more up-to-date than the aerial photographs of Google Earth.

Being able to code, annotate, and analytically manipulate visual representations of physical space helps researchers integrate visual images, words, and numbers not just for context but for analytic reasons (Kwan, 2002, p. 272). An example of data integration transforming an analysis is Nightingale's (2003) study of community forests in Nepal, forests turned over by the government to villagers to manage. Nightingale's core data were aerial photos of the forest area and interviews with villagers. By mapping the boundaries of the different land cover types in the photos and then layering the maps on top of each other, Nightingale could calculate the percent change in each cover type over time. But the photos produced an image of land cover change that was "flat, remote and static" (p. 81). So she compared them with interviews with villagers on whether the forest was more productive when it was under government or village management. This was helpful, but the interview data varied in richness and detail according to how well the respondent knew Nightingale. The point is that both data sources were needed. The photos showed that the areas that had improved most were closest to the villages but that the overall forest cover changed very little. The interviews emphasized improvements. Integrating the data sources showed that the villagers valued the accessible areas the most (p. 85), making the analysis truer to the lived experience of the community. Because remote sensing data like aerial photos are taken as factual, it is important that the interviews challenged the photos and that combining the two data sources led to a new analysis, because government policy was to re-annex the forests if community management was shown to reduce forest area.

In Knigge's work on community gardens in a deprived area of Buffalo, New York, a web based multimedia environment was created with a map at the centre showing community resources and facilities (Knigge & Cope, 2006). This was surrounded by boxes with ethnicity charts, land attributes, photos of neighbourhoods, descriptions of local features, and text and audio comments by residents. When planners held a community meeting, residents who felt they were part of the area but whose properties were not included in the planning map confronted them with the alternative representation captured by the multimedia environment. Planners agreed to redraw their map to better reflect the reality revealed by the multimedia representation.

Apart from conducting interviews and observation, Knigge bicycled around the area to get a better sense of peoples' associations with it. This made her realize that community gardens created by residents were an indicator of community integration and social capital. The fieldwork also prompted questions about the local economy that led Knigge to add labour market statistics to the GIS and use the original map's counts of vacant land parcels to show the association of community gardens with adjacent house values.

Like Nightingale's work, multiple methods were needed because each main method gave a partial picture. Knigge realized that by solely looking at published quantitative data, she "may have missed the existence of community gardens, and a wholly ethnographic study might have missed potential correlations and clusters that were best analysed through GIS" (Knigge & Cope, 2006, p. 2934). This is work that is important to communities. In this case, Buffalo had adopted an aggressive demolition strategy for run-down housing stock. This opened space for the community gardens, but the resource it created was invisible to the planners. Recognizing that residents valued their community gardens

introduced a new factor into the planning debate, whereas before Knigge's study, the planners did not even know the gardens existed.

Although both the Nightingale and the Knigge project mixed qualitative and quantitative methods with geographical techniques, at a technological level they stop short of functional integration. However, Jin-Kyu Jung (2009) has used a Visual Basic application to integrate GIS with CAQDAS in a technique he calls "computer-aided qualitative GIS (CAQ-GIS).". CAQGIS encodes qualitative data directly into the GIS database. This opens the door to fully integrating spatial and qualitative analysis. Jung makes a further important step by enabling multiple code assignment to single locations, using hot-linked qualitative codes in the cells forming the map grid. As well as codes, other metadata can be linked, such as deprivation scores and Output Area Classifications.

Geo-referenced applications have special value in fields linking space, place, and inequality, such as health. The convergence of geographical and social science enables data integration to link outcome-based spatially defined inequalities with process-based investigations of their origins.

Integration of Multistream Visual Data

There is a growing social science interest in visual data, and emergent technologies offer significant enhancements to visual resources. A current innovation involves the increasing range of technologies that capture visual data so that recordings of meetings or fieldwork activities at locations remote from the researcher can be integrated with textual and statistical data. One of these is Access Grid (AG). Access Grid Nodes (AGN) enable projected images and sound to be exchanged in real time between computers over networks, such as the Internet. Multiple cameras and microphones at each AGN site relay images and speech to other sites, or any other material that can be shown on a computer screen, such as graphical or tabular output. Visual output is projected onto a wall or screen. AG software can also be installed on a standard personal computer. AGNs do not have the lag of video-teleconferencing, and because participants can be displayed life size, behavioral cues enable more natural interaction (Fielding, 2008; Fielding & MacIntyre, 2006).

AGNs were first used for virtual meetings in scientific communities and then for joint teaching between universities separated by distance. Research reported in Fielding (2010b) used the AG for virtual fieldwork. Interviews and group discussions were conducted via AG with graduate students, and then group discussions were conducted between judges at British and U.S. courts to demonstrate that AG could be used for fieldwork outside academic settings, bringing an international dimension to research without the cost or carbon footprint of travel. The interview and group discussion data were integrated with courtroom observation and data from surveys of crime victims and witnesses to demonstrate that the established concept of "judicial activism" (Galanter, Palen, & Thomas, 1979) extends not only to progressive judicial radicalism but to a conservative variant that elevates judicial discretion at the expense of victim interests (Fielding, 2011).

Qualitative software, like the Open Source application Transana, supports visual data analysis and can handle AG output, Video Skype, Video MSN, and web-based video-teleconferencing applications. There are also applications just for AG output. Qualitative software encourages data integration by offering support for quasi-numerical operations that can be applied to nontextual data such as audiovisual recordings. Such operations include selective data retrievals based on set theory and Boolean algebra. Applied to visual data, researchers can annotate visual images and form collections as in code-based analysis of text, tabulate the occurrence of given categories, or construct specified Boolean retrievals using AND, OR, NOT relations, such as all video clips where females report back pain AND recurrent headaches. Transana was used to analyze the student and judge data mentioned above, looking at communication behaviors, but there are also software applications, such as Memetic, that can handle multistream video output. Memetic is designed to track interaction in discussions involving people at different sites with multistream digital video feeds from each (see Figure 1).

Memetic's multiple screens show the core digital video, a dynamic transcript of speech, other relevant text (here the agenda of a meeting), and biosocial information (here heartbeat and respiration rates). Such software facilitates conjoint interpretation of coincident data referents tracking different dimensions of the same interaction, encouraging closely integrated data analysis, of particular value

in studies of workplace interaction. Such techniques have been applied in studies of communication issues in air traffic control centers and police computer aided dispatch centers (Hindmarsh, 2008).
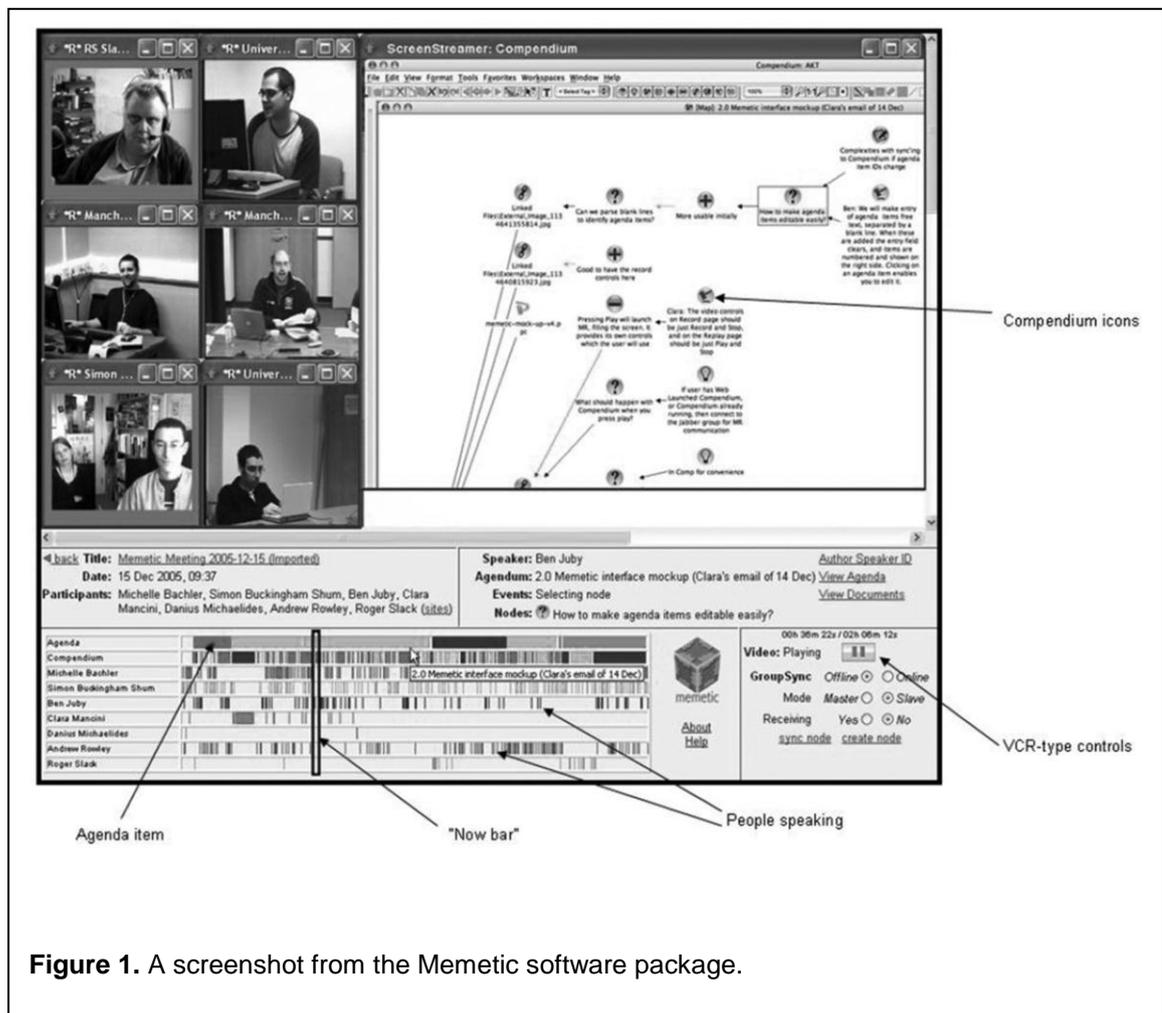

Figure 1. A screenshot from the Memetic software package.

Integration of Quantitative and Qualitative data

The most common mixed methods design combines survey and interview data. Bryman (2006) found that 57% of social science studies employing multiple methods combined a survey instrument with qualitative interviews, and for a further 27%, co-analyzing results from closed- and open-response questionnaire items was the extent of methodological integration. These forms of combination stop short of full data integration. Results are analyzed independently, and the findings are then compared. But some want to convert coded qualitative data into variables for statistical analysis. Bazeley (2006) suggests two main ways: (a) combination of data types within an analysis, for example, using categorical or continuous variables both for statistical analysis and to compare coded qualitative data and (b) conversion of data, such as converting qualitative codes to codes used in a statistical analysis. There must be a clear rationale for using such analytic techniques, for example, demonstrating data convergence (triangulation).

Software such as N.Vivo 7 and MAXQDA 2007 provide support for importing quantitative data and linking it with qualitative data sets. This enables integration of interview and observation data by systematically matching it to respondent socio-demographics or information from rating scales or survey responses. However, while any database can sort text responses by predefined response variables, conceptualization requires abstraction or the coding of data into emergent categories. The

flexible coding systems in qualitative software help here. Bazeley (2006) offers an example of combining responses to closed and open questions. Factors affecting relatives' decisions whether to permit organs to be donated after the death of a loved one were coded into categories representing "altruism,""pragmatism," and "anxiety about bodily integrity." Categorized responses were then related to variables such as "grief resolution."

Where users want to move beyond the sorting of qualitative comments by categorical or scaled criteria to incorporate the results of qualitative coding in multivariate techniques, they must transform qualitative data into variables. If codes derived from qualitative data are recorded as the presence/absence of the code in each case or as a frequency of the code's occurrence, a case-by-variable matrix can be derived. Statistical techniques such as cluster analysis, correspondence analysis, and multidimensional scaling can then be applied. Such techniques are especially valuable when conducting confirmatory research and when seeking to support or refute the results from one strand of data by reference to data from another strand.

QDA Miner 3 is a hybrid of CAQDAS software and content analysis software with a "CASES by VARIABLES" structure like statistical software (see Figure 2). QDA Miner 3 can handle the high data volumes often associated with policy research or analysis of Internet and e-mail data. With its add-on modules WordStat and SimStat, QDA Miner has strong capacities for linking to discursive data, as well as text mining and quantification features. This is useful in analyzing discourse using quantitative techniques such as word counts, word co-occurrences, and "Keywords in Context," and in other kinds of content analysisthat require the handling of very high data volumes, such as those derived from listserv discussions. QDA Miner supports multidimensional scaling, heat maps (which display variations in a quality or characteristic by different shades of color), dendrograms (which express structure and organization by "tree diagrams" with nodes, branches, and stems), and proximity plots.

QDA Miner enables a form of data integration—content analysis—where the conversion of text into numbers is well accepted by researchers in the field. It is acknowledged, though, that qualitative researchers often have large reservations about converting qualitative data into numerical form. In the course of another example, which discusses using regression in a study of compliance with vaccination programs, in which parents described their thinking about immunization of their children, Bazeley (1999) makes some important points about what is needed to legitimately perform data integration based on the conversion of qualitative data into numerical values. To use such procedures, several conditions must be satisfied. There have to be enough cases to give a sample of the size required by the chosen statistical method, researchers must decide whether to use simple absence/presence of the code or to measure the amount of data for each case to which given codes were assigned, further coding may be needed to accommodate nondirectional codes that do not include an outcome, and the underlying data must be robust and commensurate.

In the immunization example, a model of decision making was developed, and coding reflecting features in parents' narratives could then be used in a logistic regression, with immunization compliance as the dependent variable, giving the (log) odds of compliance for each feature the parent considered, controlling for the effect of other features.

In accord with Bazeley's careful justification of specific procedures for what we might call full data integration, where one form of data is converted into the other, the most important point is that there must be a rationale for data integration and it must be in accord with the fundamental epistemological assumptions of the methods being integrated. Without this, there can be serious distortions that undermine validity. One case was a proposed study of risk factors for mumps, measles, and rubella (MMR) that intended to collate all available information from survey and epidemiological data in a meta-analysis. Parental resistance was a known factor. Health policy researchers proposed including qualitative studies in the meta-analysis because most of the information about parents who did not want their children vaccinated against MMR came from such studies. The researchers wanted to simply sum together the findings from a set of small-sample-size qualitative studies exploring parental resistance to vaccination of their children until the sample size was sufficient to support statistical inferences. But the studies employed different methods to collect and analyze parental views. It was not a straightforward question of summing samples and pooling results (Fielding, 2010a).

Figure 2. Cases by Variable structure in QDA Miner 3.

Conclusion

Data integration, and mixing methods more generally, requires a clear rationale and a considered research design. Bryman (2006) found that published studies claiming use of mixed methods sometimes lacked a rationale for why this was necessary or why it was better than a monomethod approach. Others that did offer a rationale did not actually use mixed methods in the study itself, and a third group offered a rationale and did administer mixed methods but relied on one method for their analysis. If a research design is used because it is fashionable, it is less likely to elicit the kind of thoughtfulness about data integration that inspires confidence in findings so the research makes a difference in the real world.

The most telling consideration for many is whether a given exercise in mixed methods data integration shows inferential validity (Tashakkori & Teddlie, 2003, pp. 38-39). For Teddlie and Tashakkori, inference quality requires both "design quality" and "interpretive vigour." Inferential quality is marked by "consistency within the design of the study, consistency of multiple conclusions with each other, consistency of interpretations across people, and distinctiveness of the interpretations from other plausible ones" (Tashakkori & Teddlie, 2003, p. 40). This is essentially a rendering of the field's

customary mainstream standards for validity, but in terms that accommodate a research design that not only mixes methods but expects the fact that methods were mixed to be a feature of the analysis itself. Things will be known not only directly from the application of given methods but from putting together particular methods. Methods move from being solely a resource to also being a topic in their own right. Such an approach has a dynamic and demanding view of what makes for an adequate understanding of social phenomena. That is why data integration is always a matter of innovation.

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