Mixing Qualitative and Quantitative Methods: Triangulation in Action•

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There is a distinct tradition in the literature on social science research methods that advocates the use of multiple methods. This form of research strategy is usually described as one of convergent methodology, multimethod/multitrait (Campbell and Fiske, 1959), convergent validation or, what has been called "triangulation" (Webb et al., 1966). These various notions share the conception that qualitative and quantitative methods should be viewed as complementary rather than as rival camps. In fact, most textbooks underscore the desirability of mixing methods given the strengths and weaknesses found in single method designs.

Yet those who most strongly advocate triangulation (e.g., Webb et al., 1966; Smith, 1975; Denzin, 1978) fail to indicate how this prescribed triangulation is actually performed and accomplished. Graduate training usually prepares us to use one method or another as appropriate and preferred, but not to combine methods effectively. And even those who use multiple methods do not generally explain their "technique" in sufficient detail to indicate exactly how convergent data are collected and interpreted.

WHAT IS TRIANGULATION?

Triangulation is broadly defined by Denzin (1978: 291) as "the combination of methodologies in the study of the same phenomenon." The triangulation metaphor is from navigation and military strategy that use multiple reference points to locate an object's exact position (Smith, 1975: 273). Given basic principles of geometry, multiple viewpoints allow for greater accuracy. Similarly, organizational researchers can improve the accuracy of their judgments by collecting different kinds of data bearing on the same phenomenon.

In the social sciences, the use of triangulation can be traced back to Campbell and Fiske[1] (1959) who developed the idea of "multiple operationism." They argued that more than one method should be used in the validation process to ensure that the variance reflected that of the trait and not of the method. Thus, the convergence or agreement between two methods ". . . enhances our belief that the results are valid and not a methodological artifact" (Bouchard, 1976: 268).

This kind of triangulation is labeled by Denzin (1978: 302) as the "between (or across) methods" type, and represents the most popular use of triangulation. It is largely a vehicle for cross validation when two or more distinct methods are found to be congruent and yield comparable data. For organizational researchers, this would involve the use of multiple methods to examine the same dimension of a research problem. For example, the effectiveness of a leader may be studied by interviewing the leader, observing his or her behavior, and evaluating performance records. The focus always remains that of the leader's effectiveness but the mode of data collection varies. Multiple and independent measures, if they reach the same conclusions, provide a more certain portrayal of the leadership phenomenon.

Triangulation can have other meanings and uses as well. There is the "within-method" kind (Denzin, 1978: 301) which uses multiple techniques within a given method to

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Webb et al. (1963: 3) list other sources from the 1950s, but Campbell and Fiske's article is most often cited elsewhere in the literature.

collect and interpret data. For quantitative methods such as survey research, this can take the form of multiple scales or indices focused on the same construct. For qualitative methods such as participant observation, this can be reflected in "multiple comparison groups" (Glaser and Strauss, 1965: 7) to develop more confidence in the emergent theory. In short, "within-method" triangulation essentially involves cross-checking for internal consistency or reliability while "between-method" triangulation tests the degree of external validity.

Blending and integrating a variety of data and methods, as triangulation demands, may be seen on a continuum that ranges from simple to complex designs (Figure). Scaling, that is, the quantification of qualitative measures, would be at the simple end. Smith (1975: 273) concluded that scaling is only a "primitive triangulatory device." It does not effectively force a mix of independent methods, neither does it reflect fundamentally diverse observations nor varieties of triangulated data. Another primitive form of triangulation often found in organizational research is the parenthetical, even somewhat patronizing, use of field observations to strengthen statistical results. For example, a hypothetical study of job satisfaction among employees might revolve around a significant chi-square result demonstrating deep discontent. To support the results, it might be noted that a strike occurred earlier that year. But, we are likely not informed about the intensity, dynamics, meaning, and aftermath of the strike. Thus, important qualitative data had been insufficiently integrated with quantitative findings.

Scaling	Reliability	Convergent Validation	Holistic (or Contextual) Description
Simple Design			Complex Design

Figure. A continuum of triangulation design.

A somewhat more sophisticated triangulation design, already discussed, would be the "within-methods" strategy for testing reliability. The limitations of this approach lie in the use of only one method. As Denzin noted (1978: 301–302), "observers delude themselves into believing that five different variations of the same method generate five distinct varieties of triangulated data. But the flaws that arise using one method remain . . . ." Next in the continuum is the conventional form, the "between methods" approach designed for convergent validation. The use of complementary methods is generally thought to lead to more valid results, as noted. It is currently the archetype of triangulation strategies.

Triangulation, however, can be something other than scaling, reliability, and convergent validation. It can also capture a more complete, *holistic,* and contextual portrayal of the unit(s) under study. That is, beyond the analysis of overlapping variance, the use of multiple measures may also uncover some unique variance which otherwise may have been neglected by single methods. It is here that qualitative methods, in particular, can play an especially prominent role by eliciting data and suggesting conclusions to which other methods would be blind. Elements of the context are illuminated. In this sense, triangulation may be used not only to examine the same phenomenon from multiple perspectives

but also to enrich our understanding by allowing for new or deeper dimensions to emerge.

In all the various triangulation designs one basic assumption is buried. The effectiveness of triangulation rests on the premise that the weaknesses in each single method will be compensated by the counter-balancing strengths of another. That is, it is assumed that multiple and independent measures do not share the same weaknesses or potential for bias (Rohner, 1977: 134). Although it has always been observed that each method has assets and liabilities, triangulation purports to exploit the assets and neutralize, rather than compound, the liabilities.

Perhaps the most prevalent attempts to use triangulation have been reflected in efforts to integrate fieldwork and survey methods. The viability and necessity of such linkages have been advocated by various social scientists (e.g., Vidich and Shapiro, 1955; Reiss, 1968; McCall and Simmons, 1969; Spindler, 1970; Diesing, 1971; Sieber, 1973). They all argue that quantitative methods can make important contributions to fieldwork, and vice versa.

Thus, researchers using qualitative methodology are encouraged to systematize observations, to utilize sampling techniques, and to develop quantifiable schemes for coding complex data sets. As Vidich and Shapiro (1955: 31) wrote, "Without the survey data, the observer could only make reasonable guesses about his area of ignorance in the effort to reduce bias." Survey research may also contribute to greater confidence in the generalizability of results.

Conversely, quantitative-oriented researchers are encouraged to exploit "the potentialities of social observation" (Reiss, 1968: 360). Among other assets, field methods can contribute to survey analysis with respect to the validation of results, the interpretation of statistical relationships, and the clarification of puzzling findings (Sieber, 1973: 1345). Thus, informants can be utilized during the course of quantitative research (Campbell, 1955) and "holistic interpretation" (i.e., context variables) can be used to shed light on quantitative data (Diesing, 1971: 171). More implicitly, the very selection of a research site is typically a function of qualitative data as is the process of building and pretesting a survey instrument.

Diesing (1971: 5) boldly concluded that the variety of combinations is so great that survey research and fieldwork are better viewed as two ends of a continuum rather than as two distinct kinds of methods. Yet, research designs that extensively integrate both fieldwork (e.g., participant observation) and survey research are rare. Moreover, journals tend to specialize by methodology thus encouraging purity of method.

Fortunately, there are some exceptions to be found. Some particularly good examples of combining methods include LaPiere's (1934) seminal investigation of the relationship between attitudes and behavior, Reiss' study of police and citizen transactions (1968: 355), Sales' (1973) study of authoritarianism, Van Maanen's (1975) data on police socialization, and the studies described in, or modeled after, Webb

et al. (1966). Furthermore, it is probable that the triangulation approach is embedded in many doctoral theses that, when packaged into articles, tend to highlight only the quantitative methods. Thus the triangulation model is not new. However, this model of research and its advantages have not been appreciated. In this respect, it would be helpful to articulate and describe its usage.

AN ILLUSTRATION OF HOW TRIANGULATION WORKS

The triangulation strategy was used in a study I conducted on the effects of a merger on employees (Jick, 1979). Early interviews suggested that employees were intensely anxious in this state of flux, especially concerning their job security. One focus of the research was to document and examine the sources and symptoms of anxiety, the individuals experiencing it and its impact on the functioning of the newly merging organization.

How have anxiety and its dynamics in an organization been measured? Marshall and Cooper (1979: 86) noted, for example, that there is no one generally agreed way of measuring stress manifestations. On the basis of past research, there are several alternative techniques one could use: (a) Ask the person directly, (b) Ask the person indirectly (e.g., projective tests), (c) Ask someone who interacts with the person, and (d) Observe systematically the person's behavior or (e) Measure physiological symptoms. Predictably, each of these strategies has both strengths and weaknesses. Most of the limitations revolve around the likelihood of high demand characteristics and considerable obstacles in the measurement process.

Given high demand characteristics in the study of anxiety and the potential pitfalls in each method, the most appropriate research strategy was deemed to be triangulation. No single method was sufficient and thus a design evolved that utilized a combination of methods. Data were collected over a period of 14 months which incorporated multiple viewpoints and approaches: both feelings and behaviors, direct and indirect reports, obtrusive and unobtrusive observation. Methods were wide-ranging enough to tap a variety of anxiety dimensions.

The research "package" used in the investigation of the dynamics of anxiety and job insecurity included many standard features. Surveys were distributed to a random sample of employees. They contained a combination of standard and new indices related to stresses and strains. To complement these data, a subsample was selected for the purposes of semistructured, probing interviews. The survey also contained items related to the symptoms of anxiety as well as projective measures. These were developed to be indirect, nonthreatening techniques. In addition to self-reports, interviews were conducted with supervisors and coworkers to record their observations of employees' anxiety.

Another set of methods, somewhat less conventional, proved to be especially fruitful. Predominantly qualitative in nature, they were based on unobtrusive and nonparticipant observation as well as archival materials. For example, one of the merging organizations housed an archives library, which contained a variety of files, books, and organization

memorabilia from its 100-year history. It also contained a comprehensive set of newspaper clippings that cited the organization and the merger, as well as a broad variety of internal memos to employees. This was indeed a rich data source.

The development of unobtrusive measures tends to be far more unorthodox and innovative than most research methods. Perhaps the most instructive unobtrusive measure in this case was a kind of anxiety "thermometer." The idea emerged because of certain fortuitous circumstances in that a further research opportunity was found in the archives. The archivist mentioned that employees were frequently using the files. When asked why, he said that they came to compare recent news reports and memos (regarding the organization's future) with past pronouncements. Since recent information tended to be ambiguous, if not contradictory, the files provided an opportunity to review materials systematically. Most employees were apparently seeking information to relieve their anxiety about the uncertain shape of things to come.

Hence these visits to the archives were treated as expressions of employee anxiety, a thermometer of anxiety level in the organization. The search for information seemed to represent an attempt to reduce uncertainty. It was hypothesized that the more people who visited the archives to use the files, the higher the anxiety level. Thus emerged an effort to track the pattern of visits. The archivist consented to record the number of archive users along with some supplementary data on the visitors such as age, work location, and the amount of time spent at the files.

The pattern of archive usage was then compared with data culled from ongoing interviews, the cross-sectional survey, and other unobtrusive techniques. These other measures also tracked anxiety-related behavior, as for example, (a) archival data on turnover and absenteeism trends and (b) a content analysis of rumors, news stories, and hospital events reflecting to the flow of "shocks" to which employees were subjected.

It should be underscored that the quantitative results were used largely to supplement the qualitative data, rather than the reverse which is far more common in organizational research. The surveys became more meaningful when interpreted in light of critical qualitative information just as other statistics were most useful when compared with content analyses or interview results. Triangulation, in this respect, can lead to a prominent role for qualitative evidence (just as it also should assure a continuing role for quantitative data).

PUTTING IT ALL TOGETHER: IS THERE CONVERGENCE?

These various techniques and instruments generated a rather rich and comprehensive picture of anxiety and job insecurity (Greenhalgh and Jick, 1979; Jick, 1979). Self-reports, interviews, and coworker observations reflected a range of perceptions — some qualitatively described while others quantitatively represented. In turn, behavioral and objective data collected through archival sources and unobtrusive measures complemented the other data.

It is a delicate exercise to decide whether or not results have converged. In theory, a multiple confirmation of findings may appear routine. If there is congruence, it presumably is apparent. In practice, though, there are few guidelines for systematically ordering eclectic data in order to determine congruence or validity. For example, should all components of a multimethod approach be weighted equally, that is, is all the evidence equally useful? If not, then it is not clear on what basis the data should be weighted, aside from personal preference. Given the differing nature of multimethod results, the determination is likely to be subjective. While statistical tests can be applied to a particular method, there are no formal tests to discriminate between methods to judge their applicability. The concept of "significant differences" when applied to qualitatively judged differences does not readily compare with the statistical tests which also demonstrate "significant differences."

The various methods together produced largely consistent and convergent results. Archival and interview data indicated a strong relation between high turnover rates and job insecurity/anxiety while survey data showed a parallel relation between expressed propensity to leave and job insecurity.[2] These findings were formed on the basis of telephone interviews with employees who quit, personal interviews with their former supervisors, significant correlations found in survey data with a large random sample of employees, and the clear pattern seen between lay-off rumors reported in news stories and turnover statistics. Not only were the within-methods comparisons consistent, but there was also consistency in between-methods comparisons. Thus, the sociometric charting results of archive visits were congruent with the expressed anxiety reported in surveys and interviews. Both sets of results confirmed which events tended to be most anxiety producing and under what conditions anxiety was reduced. Thus, different measures of the same construct were shown to yield similar results (Phillips, 1971: 19).

There were also some surprises and discrepancies in the multimethod results which led to unexpected findings. When different measures yield dissimilar results, they demand that the researcher reconcile the differences somehow. In fact, divergence can often turn out to be an opportunity for enriching the explanation.

For example, in my study, those most stressed (according to surveys of self-reports) were least likely to visit the archive's news files (according to sociometric data), contrary to what was hypothesized. That is, while the survey showed that the group reporting the most anxiety were the least educated and least professionally mobile in terms of job skills, these low-skilled employees were underrepresented at the archive's library. One method produced results which predicted manifestations of anxiety but a second method failed to confirm the prediction. However, further interviews and observations — still other qualitative methods — helped to reconcile the disagreement by suggesting that the poorly educated employees tended to rely more on oral communication (e.g., close informal grapevines) than written docu-

[2] For specific results and data tables, see Jick (1979).

ments. This interpretation resulted then from the divergent findings based on sociometric data, nonparticipant observations at work and outside work, and open-ended interviewing.

In seeking explanations for divergent results, the researcher may uncover unexpected results or unseen contextual factors. In one instance, interview data helped to suggest a relation between job insecurity/anxiety and certain attitudinal symptoms. Survey results, however, indicated that while employees at the site of the central organization were less insecure in their jobs than employees at the satellite site the magnitude of symptoms was the reverse. That is, the "victors" reported more symptoms than the "vanquished." But further interviewing and an analysis of field notes showed that the more severe symptoms reflected unique sources of anxiety at the central organization. Fieldwork and survey results were thus compatible as a variety of previously unconsidered contextual factors were brought to light.

The process of compiling research material based on multimethods is useful whether there is convergence or not. Where there is convergence, confidence in the results grows considerably. Findings are no longer attributable to a method artifact. However, where divergent results emerge, alternative, and likely more complex, explanations are generated. In my investigation of anxiety, triangulation allowed for more confident interpretations, for both testing and developing hypotheses, and for more unpredicted and context-related findings.

Overall, the triangulating investigator is left to search for a logical pattern in mixed-method results. His or her claim to validity rests on a judgment, or as Weiss (1968: 349) calls it, "a capacity to organize materials within a plausible framework." One begins to view the researcher as builder and creator, piecing together many pieces of a complex puzzle into a coherent whole. It is in this respect that the firsthand knowledge drawn from qualitative methods can become critical. While one can rely on certain scientific conventions (e.g., scaling, control groups, etc.) for maximizing the credibility of one's findings, the researcher using triangulation is likely to rely still more on a "feel" of the situation. This intuition and firsthand knowledge drawn from the multiple vantage points is centrally reflected in the interpretation process. Glaser and Strauss' (1965: 8) observation about fieldworkers summarizes this point of how triangulated investigations seem to be crystallized:

The fieldworker knows that he knows, not only because he's been there in the field and because of his careful verifications of hypotheses, but because "in his bones" he feels the worth of his final analysis.

THE "QUALITY" IN TRIANGULATION

Triangulation provides researchers with several important opportunities. First it allows researchers to be more confident of their results. This is the overall strength of the multi-method design. Triangulation can play many other constructive roles as well. It can stimulate the creation of inventive methods, new ways of capturing a problem to balance with conventional data-collection methods. In my study, this was

illustrated by the development of an anxiety "thermometer," which unobtrusively measured changes in anxiety level.

Triangulation may also help to uncover the deviant or off-quadrant dimension of a phenomenon. Different viewpoints are likely to produce some elements which do not fit a theory or model. Thus, old theories are refashioned or new theories developed. Moreover, as was pointed out, divergent results from multimethods can lead to an enriched explanation of the research problem.

The use of multimethods can also lead to a synthesis or integration of theories. In this sense, methodological triangulation closely parallels theoretical triangulation (Denzin, 1978: 295); that is, efforts to bring diverse theories to bear on a common problem (e.g., LeVine and Campbell, 1972; Marris, 1975). Finally, triangulation may also serve as the critical test, by virtue of its comprehensiveness, for competing theories.

A thread linking all of these benefits is the important part played by qualitative methods in triangulation. The researcher is likely to sustain a profitable closeness to the situation which allows greater sensitivity to the multiple sources of data. Qualitative data and analysis function as the glue that cements the interpretation of multimethod results. In one respect, qualitative data are used as the critical counterpoint to quantitative methods. In another respect, the analysis benefits from the perceptions drawn from personal experiences and firsthand observations. Thus enters the artful researcher who uses the qualitative data to enrich and brighten the portrait. Finally, the convergent approach utilizes qualitative methods to illuminate "behavior in context" (Cronbach, 1975) where situational factors play a prominent role. In sum, triangulation, which prominently involves qualitative methods, can potentially generate what anthropologists call "holistic work" or "thick description." As Weiss concluded, "Qualitative data are apt to be superior to quantitative data in density of information, vividness, and clarity of meaning — characteristics more important in holistic work, than precision and reproducibility" (1968: 344–345).

The triangulation strategy is not without some shortcomings. First of all, replication is exceedingly difficult. Replication has been largely absent from most organizational research, but it is usually considered to be a necessary step in scientific progress. Replicating a mixed-methods package, including idiosyncratic techniques, is a nearly impossible task and not likely to become a popular exercise. Qualitative methods, in particular, are problematic to replicate. Second, while it may be rather obvious, multimethods are of no use with the "wrong" question. If the research is not clearly focused theoretically or conceptually, all the methods in the world will not produce a satisfactory outcome. Similarly, triangulation should not be used to legitimate a dominant, personally preferred method. That is, if either quantitative or qualitative methods become mere window dressing for the other, then the design is inadequate or biased. Each method should be represented in a significant way. This does however raise the question of whether the various instruments may be viewed as equally sensitive to the phenomenon being

studied. One method may, in fact, be stronger or more appropriate but this needs to be carefully justified and made explicit. Otherwise, the purpose of triangulation is subverted.

Triangulation is a strategy that may not be suitable for all research purposes. Various constraints (e.g., time costs) may prevent its effective use. Nevertheless, triangulation has vital strengths and encourages productive research. It heightens qualitative methods to their deserved prominence and, at the same time, demonstrates that quantitative methods can and should be utilized in complementary fashion. Above all, triangulation demands creativity from its user — ingenuity in collecting data and insightful interpretation of data. It responds to a foreboding observation suggested by one sociologist (Phillips, 1971: 175):

> We simply cannot afford to continue to engage in the same kinds of sterile, unproductive, unimaginative investigations which have long characterized most . . . research.

In this sense, triangulation is not an end in itself and not simply a fine-tuning of our research instruments. Rather, it can stimulate us to better define and analyze problems in organizational research.

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