A New Foundation for Methodological Triangulation

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There has been surprisingly little progress in twenty years of debate over methodological triangulation in nursing. The debate about whether triangulation is possible and whether it produces benefits has coalesced into two well-defined positions referred to here as the "building block" and "blending" views. With the theoretical issues unresolved, nurse researchers continue to use triangulation and simply cite sources that agree with their preferred perspective. The result has been a profusion of essays on triangulation—and the emergence of new terms such as "mixed methods" and "the syncretic approach"—but little progress on the underlying issues. It is our contention that the logjam in the triangulation debate has arisen because parties to the debate share deep, but mistaken, presuppositions. The aim of this essay is to expose those presuppositions, replace them with sound assumptions, and strengthen nursing's conception of methodological triangulation.

The state of the debate

While some early contributors to the literature argued that triangulation was impossible (e.g. Moccia, 1988; Phillips, 1988) recent theorists regard triangulation as a legitimate research strategy. The disagreement among contemporary theorists is over the purpose and potential benefits of triangulation. Consequently, there is disagreement over the way in which a triangulation strategy

must be implemented. Three rationales are frequently given for using methodological triangulation: completeness, abductive inspiration, and confirmation.

Triangulation yields completeness because quantitative methods can further develop findings derived from qualitative research and vice versa. The methods complement each other, providing richness or detail that would be unavailable from one method alone. Authors and researchers who have taken completeness to be a goal of triangulation include Duffy (1987), Goodwin and Goodwin (1984), Knafl et al (1991; 1988), Mitchell (1986), Morse (1991), and Shih (1998).

While the term "abductive inspiration" is our own, this rationale for triangulation has been widely invoked (Duffy, 1987; Goodwin & Goodwin, 1984; Morse, 1991; Risjord, Moloney, & Dunbar, 2001). "Abduction" is the logical process by which a researcher arrives at a new explanation for a phenomenon (Peirce, 1932: 2.100). Abductive inspiration is the use of one method to generate ideas that are tested by another method. Many nurse researchers use qualitative research when a phenomenon is poorly understood. They orient themselves to the material through methods such as interviews with the subjects, textual analysis, and participant observation. The results suggest hypotheses to be tested by quantitative methods. Conversely, qualitative investigation can help organize quantitative data that have already been gathered, or can suggest new ways of approaching the phenomenon.

Many authors, including Duffy (1987), Goodwin and Goodwin (1984), Haase and Meyers (1988), Knafl et al (1991; 1988), Mitchell (1986), and Shih (1998), suggest that a single hypothesis can be confirmed by both qualitative and quantitative methods. According to these proponents of triangulation, the different methods support each other, strengthening the evidential support for a hypothesis. Triangulation is thus purported to produce a more reliable and highly confirmed result than either method could yield alone.

Only the third rationale for triangulation, confirmation, is controversial. Proponents of the "blending" view contend that methodological triangulation can yield all three benefits: completeness, abductive inspiration, and confirmation. Critics of blending, an approach referred to as the "building block" view, have argued that qualitative and quantitative methods are based on deeply different assumptions about the phenomena studied (Dootson, 1995; Foster, 1997; Morse, 1991; Phillips, 1988). According to the building block theory, different methods and their results must remain independent. Since the methods do not support each other, triangulation cannot yield confirmation. Triangulation is useful, conclude the building block theorists, but only for completeness and abductive inspiration. The fundamental issue in the debate over methodological triangulation, then, is whether the use of different kinds of methods can together confirm the results of a study to a greater degree than either method alone.

Confirmation and Theory Structure

What is "confirmation?" In its broadest sense, confirmation is any use of evidence as a reason for accepting (or rejecting) a hypothesis, proposition, or theoretical claim. For example, the proposition that a patient has an elevated temperature is "confirmed" by the reading on the thermometer. Likewise, the claim that a terminally ill patient is making sense of her situation by finding narrative continuity in her life is "confirmed" by what the patient says and does. These two examples were chosen to show that both quantitative and qualitative research use evidence— things seen, heard, smelled, tasted, or felt—as the grounds for accepting a statement. In this sense, both qualitative and quantitative research involves confirmation. Obviously, there are differences in the kinds of evidence used and the manner for gathering it. In quantitative research, measurement is a primary tool. Therefore, quantitative research values evidence that can be measured and hypotheses that can be confirmed by measurement. Qualitative research is interested in phenomena that are not

confirmable by measurements, such as meaning, belief, intentions, concepts or values. Qualitative research therefore looks to other sources of evidence.

Parties to the triangulation debate agree about the differences between qualitative and quantitative research. In particular, they seem to agree about the character of quantitative theory and the way in which it is confirmed. For example, when contrasting qualitative and quantitative research paradigms, Duffy writes:

> The procedures employed by the quantitative researcher are usually highly structured and designed to verify or disprove predetermined hypotheses. (Duffy, 1987: 131)

According to Haase and Meyers, quantitative theories are distinguished by their use of generalizations that have predictive value (Haase & Myers, 1988: 135). The structure mentioned by these authors is a hierarchy of theoretical propositions, generalizations, and correlations. At the highest level are the most general and abstract laws—the laws of mechanics and biology. In the middle levels are generalizations about human physiology and psychology. At the bottom are the most specific generalizations and correlations identified by nursing theory, such as the responses of patients to noisy environments. Ideally, lower level generalizations can be deduced from more general laws along with limiting conditions. These predictions can be directly tested.

The spatial metaphor of more general principles being "above" less general principles fits neatly with another metaphor for the confirmation of scientific theory: evidence is the foundation of scientific knowledge. Low-level hypotheses rest directly on evidence. Abstract generalizations rest directly on low-level correlations. If a low-level hypothesis is disconfirmed by new evidence, the foundation for that part of the theory is removed. Everything that rested on the hypothesis must be taken out of the theory. The conception of quantitative theory as a hierarchy of theoretical propositions or generalizations thus has important consequences for the way in which quantitative theory is confirmed. Chinn and Kramer write:

> [Research to validate a theory] is usually thought of as a deductive approach. The research starts with an abstract relational statement derived from theory. From the theoretic statement, hypotheses or research questions are created for a specific research situation. (Chinn & Kramer, 1999: 125)

From the body of generalizations that constitute a theory, the researcher deduces predictions. If the prediction is found to be true, the hypothesis is confirmed. If the prediction is false, then the hypothesis must be rejected, along with whatever theoretical statement was used to derive it.

A second aspect of this view of quantitative research is that the propositions of a theory are tested singularly. Chinn and Kramer express this idea explicitly:

> A single study is usually based on one or two relational statements from among several that might possibly be extracted from a theory. No one study can test the entirety of a theory. (Chinn & Kramer, 1999: 124)

A theory is not tested as a whole. The evidence shows that a specific hypothesis, derived from a specific theoretical proposition, is true or false. The confirmation (or disconfirmation) of a hypothesis therefore confirms (or disconfirms) at most a small number of theoretical statements. On this view of confirmation and theory structure, then, different parts of the theory rest on different parts of the evidential foundation. Metaphorically, removing one brick from the foundation of a wall weakens the wall immediately above that brick. Other parts of the wall remain standing.

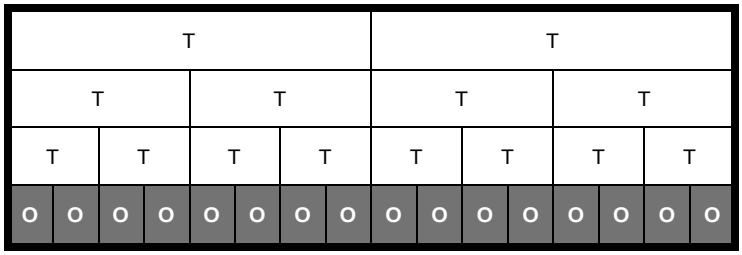

Figure 1
The Wall Metaphor
Theoretical propositions (T), including laws, empirical generalizations, and causal correlations rest on a foundation of observation (O).

Presuppositions of the triangulation debate

The foregoing section has shown that there are three presuppositions concerning the structure and confirmation of quantitative theory found in writing about nursing methodology. (1) Quantitative theories are structured as deductive hierarchies of propositions. (2) Quantitative theories are confirmed by deriving hypotheses from statements of the theory and testing them against evidence. And (3), quantitative methods confirm theoretical statements one-by-one. These presuppositions are a central part of the building block theorists' argument that triangulation cannot yield confirmation. They argue that there is a difference in the way that theory and data are related within qualitative and quantitative paradigms. Morse writes:

> Thus, in methodological triangulation, the key issue is whether the theory that drives the research … is developed inductively from the research per se or used deductively as in quantitative inquiry. (Morse, 1991: 121)

Deductive research begins with a theory, ideally articulated as a body of laws or universal generalizations (cf. 1, above). A hypothesis is derived from this theory, and it is tested against observation (cf. 2, above). By contrast, qualitative inductive research begins with observations alone, without prior theory. It proceeds to distill descriptive claims from the observations. Building block theorists like Morse take this difference in method to entail a difference in theory. Quantitative methods are necessary to support explanatory theories that are hierarchically structured. Qualitative interpretations are not tested hypothesis by hypothesis (cf. 3, above). They are variously said to be "holistic," "dynamic," or "subjective" (Dootson, 1995; Duffy, 1987; Haase & Myers, 1988). Finally, the building block theorists argue that the standards of evaluation in each paradigm yield nonsense when applied to the other. Interpretations are not appropriately evaluated in terms of statistical significance, and it makes no sense to ask whether the analysis of a blood sample coheres with the blood's point of view.

The building block theorists take these differences to mean that failure to keep qualitative and quantitative methods distinct will result in incoherence or outright inconsistency (Dootson, 1995; Foster, 1997; Morse, 1991). In a triangulation study, the qualitative and quantitative components must support theories with different logical structures. Moreover, an individual research method should be expected to withstand scrutiny on its own merits. It follows that confirmation cannot be an appropriate goal of triangulation. No theory could be supported by both methods. Triangulation can be used only for abductive inspiration or completeness.

Proponents of the blending approach have responded by contending that the argument against confirmation by triangulation ignores ways in which multiple methods can increase the reliability, validity, or accuracy of the study (Duffy, 1987; Haase & Myers, 1988; Knafl & Breitmayer, 1991; Knafl et al., 1988; Mitchell, 1986). Blending theorists have two arguments in support of their view. First, qualitative and quantitative methods are complementary. Because qualitative research tends to focus on a small group of people it is difficult, sometimes impossible, to apply the results to other populations. Triangulation with a quantitative methodology can increase the researcher's confidence that her conclusions are transferable to a larger population. Quantitative methods emphasize standardization and generalizability, and this means that the questions are often narrow. A survey may not capture what is significant to the patient. Correlation with qualitative data can increase the researcher's confidence that a survey has uncovered a meaningful result. Blending theorists conclude that quantitative and qualitative methods are complementary, and therefore increase the researcher's confidence in the whole study.

A second reason for thinking that triangulation enhances confirmation is that it helps eliminate bias. Both qualitative and quantitative research is subject to bias. Since the biases occur in slightly different ways, the use of both methods enhances the researcher's confidence that the biases have been identified. Social desirability bias provides an example, since it arises for both qualitative

and quantitative research. In a face-to-face interview, the researcher may inadvertently express a particular attitude to the patient through tone, posture, or facial expression. At the same time, the researcher is able to identify questions that make the subject uncomfortable or evasive. The researcher's presence does not influence the answers in a pencil-and-paper questionnaire, but it is sometimes difficult to determine whether the answers were authentic. Quantitative and qualitative methods are thus subject to the same bias in complementary ways. Where the quantitative and qualitative results diverge, the results of one can be used to refine the methods of the other. If the results converge, then the researcher can be more confident that social desirability bias is not present. Blending theorists conclude that, as this example shows, triangulation increases confidence in results to a higher degree than the use of either method alone.

It is important to notice that these two arguments for a blending view do not challenge any of the three presuppositions, above. Blending theorists accept that quantitative research is different from qualitative research in just the way that the three assumptions suggest. The arguments for blending point to additional ways in which a theory can be supported. While these points are good ones, the arguments do not get to the heart of the matter.

Challenging the presuppositions

The three presuppositions about quantitative research embedded in discussions of nursing methodology were commonplace in philosophical thought about science during the nineteenth and early twentieth century. During the latter half of the twentieth century, all three were subjected to powerful criticism. Philosophers like Duhem, Kuhn, Hanson, Toulmin, Putnam, Sellars, and Quine argued that these presuppositions about confirmation and theory structure were simply not true. The echoes of their arguments have been heard in nursing, and readers may find the points below familiar. Nonetheless, as the continuing debate over methodological triangulation illustrates, the import of this post-positivist work in the philosophy of science has not been fully appreciated.

The first argument concerns the role of what are sometimes called "auxiliary hypotheses" in confirmation. According to presuppositions (1) and (2), a theory is tested by deriving hypotheses from a theoretical statement. If the evidence shows that the hypothesis is false, then the theoretical statement must be rejected or revised. Suppose, for example, a nurse researcher wants to test the theoretical statement that (P) perimenopausal hot flashes are caused by fluctuating estrogen levels. She derives the hypothesis that (Q) changes in estrogen levels will be correlated with hot flashes. Suppose that the evidence counts strongly against the hypothesis. What must the investigator conclude? According to the three assumptions, above, the investigator must reject the theoretical statement that perimenopausal hot flashes are caused by fluctuating estrogen levels. It may even seem as if logic demands this conclusion: where one statement, P, deductively entails another, Q, and Q is false, then P must be false too. Many philosophers of science pointed out the flaw in this picture. All alone, a theoretical statement never entails a testable hypothesis. A number of auxiliary hypotheses are necessary. In the above example, the deduction assumes that there are no other causes of hot flashes, that there are no inhibitors or facilitators of hot flashes, that the methods used to diagnose hot flashes and measure estrogen levels are reliable, and so on. A failed prediction does demand that one of the statements used in the deduction must be rejected, but nothing in logic determines which theoretical statement must be rejected. So, a failed prediction does not necessitate the rejection of the test hypothesis. Some other auxiliary hypothesis may be rejected instead.

This logical point has important ramifications for our understanding of the structure of theory. A falsified hypothesis does not call into question only the theoretical statements that the researcher had in mind when conducting the test. A test result can have far reaching implications. As Quine (1953) pointed out, virtually any theoretical statement can be insulated from empirical evidence if we are willing to make changes elsewhere in the theory. Conversely, virtually any statement is open to change in the light of new evidence. A particular failed prediction may

therefore motivate a wide range of changes to the theory. Therefore, contrary to presumption (3), quantitative methods do not confirm hypotheses one-by-one. When a prediction fails, researchers need to make a judgment about which theoretical statements need to be rejected or modified, and the best resolution may require changing a large part of the theory.

Once we recognize that theories are not like walls, where pulling one brick from the bottom weakens only the section of wall above it, presumptions (1) and (2) no longer look so plausible. Presumption (2) holds that quantitative theories are confirmed by deriving hypotheses and testing them against the evidence. Historians and philosophers of science have pointed out that, to the contrary, theories are often maintained even though they are known to make predictions contrary to the evidence. For example, the predictions of Copernicus' heliocentric theory of the solar system were less accurate than its geocentric competitor. According to the conception of confirmation expressed in presupposition (2), Copernicus' theory should have been rejected on the basis of empirical test. Was it irrational or dogmatic for Galileo to accept it anyway? Not at all: the heliocentric theory was more consistent with the emerging theories of motion. The heliocentric theory of the heavens was thus supported, not by empirical test, but by other theories that were themselves empirically superior to the available alternatives. Many philosophers of science, such as Kuhn (1962), Quine (1953), and Thagard (1999), conclude that a particular hypothesis can be supported, even when known to lead to false predictions if it is part of a larger body of theory that is well supported by the evidence. This conclusion undermines presupposition (2) because it shows that, at the very least, there are other ways to confirm a hypothesis besides direct testing by experience.

These two arguments against presuppositions (2) and (3) motivate a picture of theory structure that is contrary to the hierarchical structure expressed in presupposition (1) and depicted in Figure 1. The first argument showed that theoretical propositions have empirical consequences only

as a part of a larger body of theory. The second argument showed how theoretical propositions support each other directly. The alternative to presupposition (1), then, is to understand theories as interlaced bodies of propositions. Theoretical propositions stand in relationships of mutual support and face confirmation as a whole. Where the traditional model is well suited to the metaphor of a wall, the alternative conception is better suited to the metaphor of theory as a spider's web. (See Figure 2.) The edges of the web are the evidence, where the theory attaches to the world. The center of the web holds the most abstract propositions of the theory.

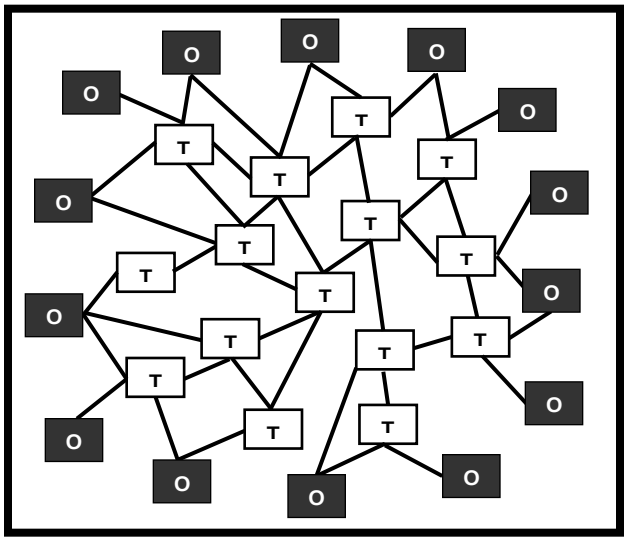

Figure 2
The Web Metaphor
Theoretical propositions (T), including laws, empirical generalizations, and causal correlations stand in relationships of mutual support to each other and to observation (O)

The new understanding of theory structure requires a novel understanding of confirmation. Changes at the edge of the web can be accommodated by a variety of internal adjustments. According to many philosophers, the guiding principle for these changes is coherence (Quine, 1953; Risjord, 2000; Thagard, 1999). When new evidence is acquired, the best changes are those that make the theory more coherent. Theory confirmation is thus a matter of creating a coherent account of

the evidence. Evidence confirms a given theory if it is the most coherent of the alternative accounts; a theory is disconfirmed if there is a more coherent alternative. Clearly, much needs to be said about the concept of "coherence." Coherence means, at least, logical consistency and completeness. Changes to a theory must be logically consistent, and a theory is more coherent as it can account for more of the evidence. Coherence also suggests some kind of systematicity. A coherent theory should not be fragmented or ad hoc. There are various ways of capturing this aspect of coherence. Our favorite appeals to the idea that inquiry is aimed at answering questions. Each theoretical proposition can be conceived as either the topic of a question (what the question asks about) or the answer to a question. The propositions of a theory, including those that constitute the evidence for it, hang together as questions and answers. A theory is thus more coherent as it leaves fewer questions unanswered, and fewer answers unquestioned (Risjord, 2000).

Integrating qualitative and quantitative research

What happens to the triangulation debate if we reject presuppositions (1)-(3) and adopt a coherence understanding of theory structure and confirmation? The first ramification is that there is no structural difference between quantitative and qualitative theory. Qualitative research is supposed to be distinct because it does not derive hypotheses from a body of law-like generalizations. According to the arguments above, this way of contrasting qualitative and quantitative theory depends on a misunderstanding of quantitative theory. Therefore, there is little difference between the two on this score (Risjord, 2000). Similarly, qualitative research is supposed to be "holistic" and "dynamic." A coherence model recognizes that quantitative theorizing is as holistic and dynamic as any interpretive or narrative account. Both blending and building block theorists have erred by accepting the model of quantitative theory expressed by presuppositions (1)-(3). In so doing, they have assumed that qualitative and quantitative research constituted formally different sorts of inquiry. Their arguments both for and against blending have accepted these differences as something

to be accommodated. If the arguments above are correct, then there is nothing in the character of quantitative and qualitative theory to keep them from becoming fully integrated.

The coherence model of theory structure and confirmation thus provides the basis for a new understanding of methodological triangulation. Triangulation, on the traditional definition, occurs when one body of theory is supported by both qualitative and quantitative inquiry. On a coherence understanding of theory structure, this means that the theory contains questions (and their answers) that arise out of qualitative research and out of quantitative research. The theory must be coherent, so the qualitative and quantitative components must be related as question and answer. Answers provided by qualitative methods must give rise to questions that are interesting from a quantitative point of view, and vice versa. If we look at real examples of triangulation in nursing, this is precisely what we find.

Consider first how qualitative research can give rise to questions best answered by quantitative means. One example is from a recently completed pilot study on migraines in perimenopausal women (Moloney & Melby, 2001a, 2001b). It is currently believed that hormonal migraines are due to estrogen shifts during this transitional time, but very little work has addressed this problem. Many perimenopausal women are thus unaware that their headaches are migraines and do not seek appropriate care. Moloney's pilot study began with a qualitative approach that used open-ended interviews and a questionnaire with open-ended questions. She found that while several participants met the screening criteria for migraines, they did not understand themselves as having migraines. Questions then arose about the cause of these headaches and whether they were migraines. To address them, Moloney asked each participant to keep a daily headache and menstrual diary for six months. The diary primarily used quantitative scales and quantifiable questions. The diaries revealed headache patterns that cross-correlated with known migraine triggers such as stress and menses. The quantitative data thus showed that the participants did have migraines, contrary to

their self-understanding and diagnostic history. The initial qualitative interviews and questionnaires thus raised questions that were answered by quantitative means.

The results of quantitative research can similarly provide the topics of questions that must be answered in qualitative ways. Dunbar et al. (1999) examined factors associated with the patients' recovery process within the first three months after they had received an implantable cardioverter defibrillator (ICD). These patients were considered at risk for cardiac arrest from abnormal heart rhythms. Approximately 25% had been successfully resuscitated from sudden cardiac arrest (SCA), while the remainder was considered at high risk for a life-threatening arrhythmia. The internal defibrillator, a device that was surgically implanted beneath the skin of the chest wall like a pacemaker, prevented cardiac arrest by monitoring the heart rhythm and delivering a shock to convert the heart back into a normal rhythm. A variety of standardized questionnaires were used to evaluate the patients' adjustment to this procedure. A standardized instrument for measuring mood revealed, unexpectedly, that patients who had experienced SCA had better mood levels than those who had not. This quantitative result raised questions that were naturally answered by qualitative means. Why did the patients who had experienced SCA have higher mood levels? Because this study had been designed with collection of quantitative and qualitative data at key time point, the question could be answered. Interviews with patients revealed that the presence of the ICD gave SCA survivors a sense of security, while other patients questioned the need for the device and exhibited varied perceptions of their vulnerability. The patients' feelings of security and ambiguity were made explicit in the interviews and explained the difference in mood scores (Dunbar et al., 1999).

Neither of the above two examples is easily understood on a building block model of triangulation, such as Morse's (Morse, 1991). On a building block model, Moloney's use of quantitative methods would be understood as providing only a bit of detail to a qualitative study. Similarly, Dunbar's discovery of the role of security and ambiguity would be a separate inquiry that

adds completeness to the picture. It is clear from the examples, however, that both Moloney and Dunbar use triangulation for confirmation. Moloney's quantitative diaries confirmed the screening criteria and supported the hypothesis that the women misunderstood their own headaches. Dunbar's qualitative data about security and ambiguity helped confirm the finding that there was a systematic difference in mood between SCA survivors and other implant patients. By insisting that the qualitative and quantitative components of research remain independent, a building block theorist cannot account for research like Moloney's and Dunbar's. Both researchers have results that could only have been uncovered by triangulation, as our model of triangulation predicts.

Triangulation, therefore, occurs when qualitative results raise questions that are most naturally answered by quantitative means, and when quantitative results raise questions that are answered in qualitative terms. The result is a single coherent theory insofar as the different parts are related together as question and answer. This conception of triangulation yields all three of the virtues associated with triangulation: completeness, abductive inspiration, and confirmation. A theory that includes both qualitative and quantitative questions and answers will be more complete than a theory that is restricted to one method alone. Moreover, since the result of one method gives rise to questions asked from another perspective, triangulation yields abductive inspiration. Finally, triangulation will yield confirmation insofar as the overall theory is the most coherent of the alternatives. Our view of triangulation is therefore a version of blending theory. It differs from the previous versions because it does not accept the understanding of theory structure, confirmation, and paradigmatic differences that has been presupposed by the debate. Nor are we proposing, as some have (e.g. Knafl et al., 1988), that blending must result in a new kind of method that is somehow both qualitative and quantitative. On our view, qualitative research and quantitative research are distinct ways of answering questions and are appropriately evaluated in different ways.

They are blended together only in the sense that a single theory can be supported by both qualitative and quantitative research.

Our blending approach to triangulation has two important consequences. First, it provides some grounds for addressing the question: What conclusions should be drawn when the qualitative and quantitative components of a study yield inconsistent results? This is perhaps one of the most pressing issues concerning triangulation. A building-block approach to triangulation provides little guidance because it regards the qualitative and quantitative components as independent. A blending approach regards the qualitative and quantitative components as mutually supporting a single theory. Where the qualitative and quantitative components conflict, the whole loses coherence. Hence, conflict between the quantitative and qualitative components can disconfirm the theory. In the face of such conflict, some changes in the theory are therefore necessary. Our model demands that the researchers change the theory so as to maximize coherence. A full account of such change is beyond the scope of this essay. Nonetheless, it is already clear that the adjustments might include finding alternative explanations of the data, changing the questions, rejecting presuppositions, making fine adjustments to the instruments, and so on. A virtue of our version of blending is that it can show how resolving conflict between qualitative and quantitative inquiry can ultimately strengthen the theory.

The second important consequence of our blending approach is that it changes the focus of the triangulation debate. Methodological issues that seemed to need global answers now can be treated with a more local, context-sensitive approach. One issue has been how qualitative and quantitative research should be ordered. When should qualitative research be done first? We suggest there is no universal answer to this question. This is a decision to be made in the light of local constraints on the research— what sort of evidence is available at what time, how the research methods might influence later data gathering, and so on. Another issue is whether and how one

method should dominate the other. Here again, the relative importance of the qualitative and quantitative components depends on the interests of the researchers and the character of the phenomena they are studying. In each of these cases, our new conception of triangulation changes the focus of the problem from a global, methodological issue to a practical matter appropriately answered by the researchers themselves. In our view, this is progress. Questions about methods are often best answered by considering the specifics of the research situation.

Conclusions

This paper has addressed the debate over methodological triangulation in nursing. We have shown that the two main positions in the debate share crucial, but mistaken presuppositions about confirmation and theory structure. These mistaken presuppositions lead the parties to misconceive quantitative research, and thus misunderstand how it is different from qualitative research. Post-positivist work in the philosophy of science provides a picture of theory structure more similar to a web than to the traditional metaphor of a wall. Both quantitative and qualitative theories are interlaced bodies of questions and answers, and both are judged by their overall coherence, including coherence with the evidence. Quantitative and qualitative research programs become integrated when the results of one method raises questions that can be answered by the other. This blending theory of triangulation immediately yields the benefits of completeness, abductive inspiration, and confirmation. The concept of inquiry as aimed at answering questions is an alternative that supports the integration of qualitative and quantitative research into a holistic, dynamic model for nursing inquiry.

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