

# Mixed Methods and the Problem of the Logic of Inquiry

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## Abstract

The idea that "*irreconcilable epistemological differences*" exist between qualitative and quantitative methods places a very serious dampener on any proper debate about mixed methods, as well as upon any real progress that might be made in establishing a mature methodology for human and social inquiry. One possible solution is to take a more radical position, beginning by seeing the distinction between *qualitative* and *quantitative* as little more than a red herring. By focussing upon the type(s) of data we are collecting, we are merely polarizing the contrasts between different methodological approaches and deflecting attention away from what must be the underlying critical issue – which is the *logic of inquiry*. It needs to be understood that it is the issue of the logic of inquiry that lies at the heart of mixed methods. Any broad tradition of research can be seen as involving: assumptions, strategic decisions, methods of data collection, analysis, and critical evaluation, but will differ in the way each of these are implemented. At least three fundamentally different logics of inquiry can be distinguished: (i) *theory-driven*, (ii) *data-driven*, and (iii) *explanation-driven*, each with its own inherent pattern of logical reasoning, i.e. *deductive*, *inductive* and *abductive* inference, respectively. It is here that "mixed methods" faces its foremost challenge. The different logics of inquiry have radical implications for the phrasing of the research question(s), as well as the strategies adopted with respect to design, sampling, data collection, analysis and critical reflection. Combining different logics of inquiry into one research program must consider all of these factors carefully. However, in facing up to these various issues, the pay-off might be a much more authentic picture of what even "the scientific method" might actually entail.

## Introduction

What I want to do in this paper is offer a more radical perspective on what has come to be called "mixed methods", or "mixed methodology," than has been evident in this area so far. It is not my purpose to be over-critical of this strategy of research design, and I hope that what I am about to say is not taken as "heresy" in a symposium such as this. But I do want to argue that mixed methods, as well as the whole field of qualitative research, is being approached from what can be seen as the wrong perspective. There are no "*irreconcilable epistemological differences*" between qualitative and quantitative approaches, as has been claimed. Yes, there are challenges, but what I want to propose is that we have been adopting the wrong perspective for far too long, and it is this that is undermining the progress that so desperately needs to be achieved.

I have three general aims. I will argue that:

- (1) Mixed "methods" has a long history, and is more inherent to the scientific method than is commonly acknowledged;
- (2) The *Qualitative/Quantitative* distinction is a "red herring";
- (3) The current pre-occupations of the "mixed methods debate" need to be challenged.

## The salience of mixed "methods"

In new fields of research, in the "discovery phase" of the scientific method, mixed "methods" are probably the norm. I will give two brief examples.

A few years ago, visiting the Mendel Museum in Brno, Czech Republic, I was struck by the prominence of the "scientific method" in the displays illustrating Gregor Mendel's discovery of the theory of genetics, especially the emphasis on the "quantitative" nature of his methods. However, what struck me was that his research originated from his initial *qualitative* observations of the smooth and wrinkled peas he found growing in the monastery garden. It seemed obvious that Mendel's work depended upon both *qualitative* and quantitative approaches, something that has been largely ignored in the history of science. I am certain that the same could be found to be true about the scientific work of Copernicus, Galileo, Newton, and so on.

My second example comes from my own PhD research, some 40yrs ago. I conducted a series of a half-dozen carefully controlled experiments on visual short-term memory. As a part of these studies, I also interviewed my participants about their strategies of how they did the tasks that I had set them. I found this qualitative data interesting, and useful. But I must admit that I had little idea how I could analyse it, and was advised by my thesis committee to put it to one side and simply ignore it.



Mendel Museum, Brno

## A few brief observations

Varying definitions of "mixed methods", "mixed methodology", "mixed design" and its related terminology abound (Table 1). It is my view that this is the symptom of the underlying problem, i.e. it is a symptom that we are coming from the wrong perspective in dealing with this approach to research.

Tashakkori & Creswell (2007), in their editorial for the first issue of the *Journal of Mixed Methods Research*, report that a quick comparison of published studies reveals that research

**Table 1: The burgeoning terminology**

Convergent design  
Explanatory design  
Exploratory design  
Embedded design  
Transformative design  
Complex- mixed design  
Sequential design  
Simultaneous design  
Emergent design  
Reflexive-emergent design  
Theoretical thrust  
Theoretical drive  
Qualitative drive  
Quantitative drive  
Etc, etc.

**Why not replace these with:**

*Mixed design,  
Mixed measures,  
Logic of inquiry?*

design is considered to be “mixed” when it uses qualitative or quantitative approaches in one or more of these ways:

- two types of research questions
- the manner in which the research questions are developed
- two types of sampling procedures
- two types of data collection procedures
- two types of data
- two types of data analysis
- two types of conclusions.

Tashakkori & Creswell then proceed to broadly define “mixed methods”:

*“ . . . as research in which the investigator collects and analyzes data, integrates the findings, and draws inferences using both qualitative and quantitative approaches or methods in a single study or a program of inquiry” (p. 4).*

While this definition may be a useful position to start from, and is workable enough, it also contains the precise problem that we desperately need to face up to: Why this focus only upon types of *data*? (especially when there are so many other matters at stake in their list). Furthermore, why this simplification to just *two* types of everything!!?

### **The Qualitative/Quantitative distinction as a “red herring”**

This is the heresy bit (for an audience made up largely of members of the *Qualitative Methods in Psychology* section of the BPS!) I want to argue that the *Qualitative/Quantitative* distinction, at least as far as research design is concerned, is a red herring! The point that I am trying to make arises out of a model of *Disciplined Inquiry* that I have developed over the past dozen years or so (Hiles, 1999, 2006a, 2006b, 2011).

Influenced by the work of Guba & Lincoln (1994), this model was an attempt to make sense of the rapidly expanding field of qualitative inquiry within psychology, while at the same time trying to reconcile a wide range of seemingly contrasting methods of inquiry. This model has far too many features to outline here, but it will suffice to say that the model is explicitly pluralistic, emphasising that all research entails paradigm assumptions, strategic design decisions, methods of data collection, data analysis, and critical evaluation. The implied five stages of the research process are overlapping and designed to operate recursively. The model is illustrated in Figure 1.

The model is fundamentally pluralistic in terms of both different *paradigms* of research, as well as different *strategies* of inquiry. By explicitly rejecting the simplistic distinction between qualitative and quantitative inquiry, it instead offers an approach to inquiry that emphasises the five stages that are involved. Too much research overlooks one or more of these stages. Put simply, all research involves: making assumptions, strategic decisions, data collection, analysis, and critical evaluation.

In many respects, the key feature of this model is the explicit inclusion of the notion of *strategies* of inquiry. This provides the essential bridge between paradigm assumptions on the one hand, and methods of data collection, and data analysis on the other. While paradigms do promote different strategies and methods of research, these are by no means exclusive to any particular paradigmatic approach. Strategy in research design is concerned with the different ways in which the research question can be formulated, with the specific logic of inquiry, and with issues arising from choices between the growing range of different traditions of inquiry. The emphasis here is on the decisions, values and perspectives involved, rather than slavishly following recipes for research design laid down by habit, or the need to conform to some historical principles of inquiry. Strategies and design issues must not be simply taken for granted. Additionally, I must stress that strategies cannot be considered in isolation to the other four stages of research, all five stages are overlapping and interdependent.

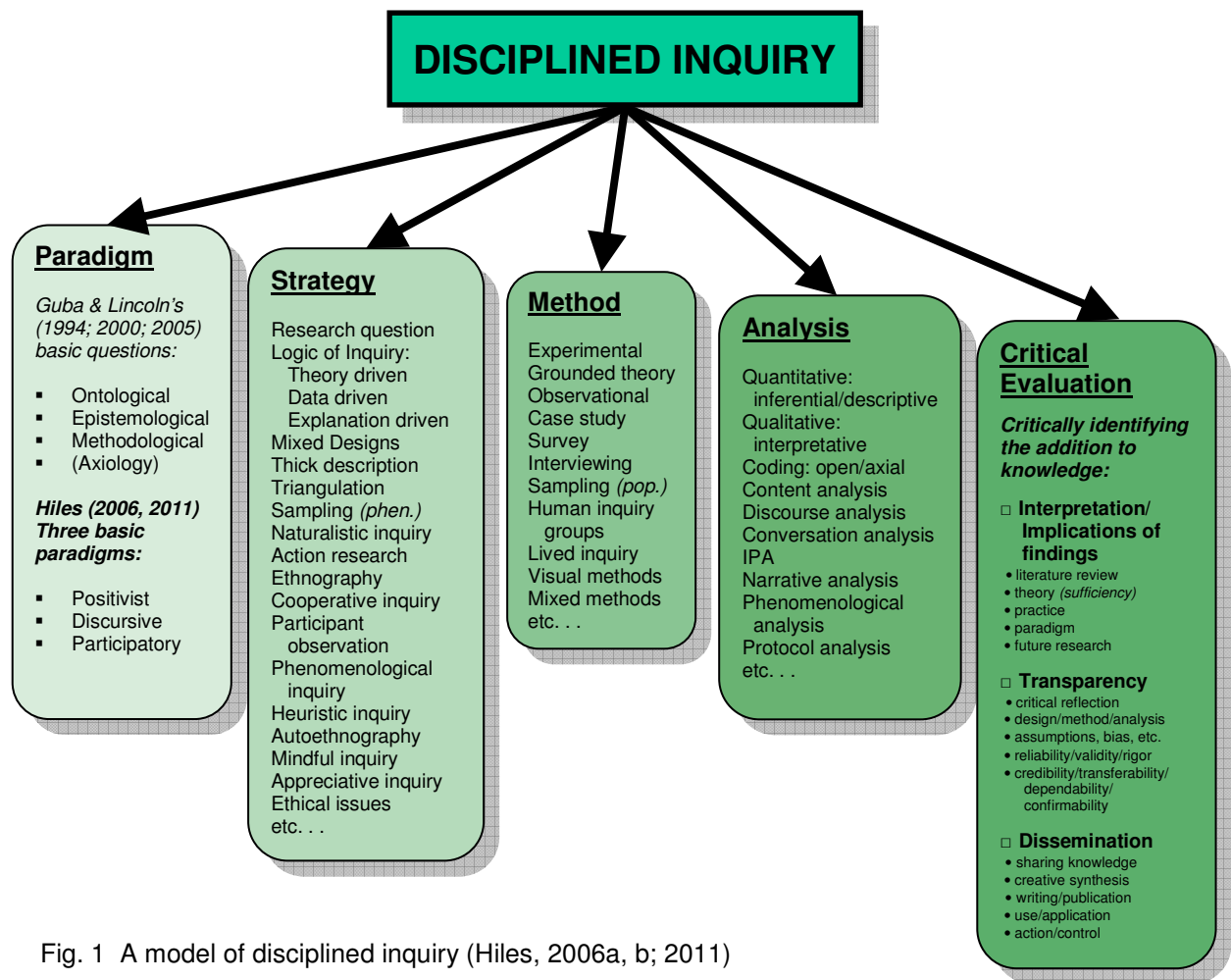


Fig. 1 A model of disciplined inquiry (Hiles, 2006a, b; 2011)

The position that I want to advocate is that I am quite happy to use the terms *qualitative* and *quantitative* as a short-hand for two rather broad traditions of inquiry, but, it needs to be pointed out that there are far more important differences between these two traditions than simply the type of data that is being collected. Indeed, it is crucial to realise that it is the formulation of the research question, and its relation to the logic of inquiry that are really at stake. My point is that the distinction between *qualitative* and *quantitative* is itself the red herring!!!! And in discussing mixed "methods," what we instead need to focus on is the *logic of inquiry*.

Yes, I am saying that the holy grail of much of the current debate in this area is a red herring. And, despite the title of this section of BPS (*QMIP*), I want to claim that the emphasis on "qualitative" is misleading, *it is a red herring*, it is a mistake to put so much emphasis on the data itself. Moreover, it is a mistake that has serious consequences, because it distracts us from the real issues that need to be focussed upon – the nature of *research design*.

## The logic of inquiry

The underlying purpose of the model of *Disciplined Inquiry* is to emphasise the importance of examining the underlying paradigm assumptions, formulating the research question, and understanding the logic of inquiry *before* considering the methods of data collection and analysis.

One key point is that, in the typical "qualitative" approach to inquiry, the research question does not normally test a prediction from a theoretical position, but instead asks a more open research question about the data. While "quantitative" research is more

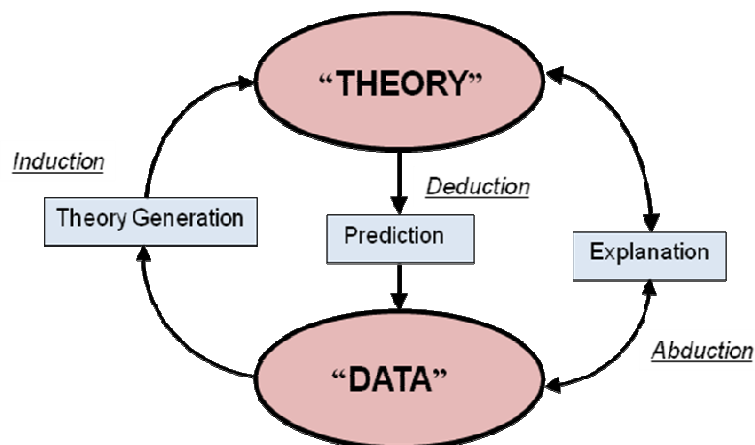
usually to be regarded as *theory driven*, “qualitative” research is more usually *data driven*, although of course there often will be exceptions to this as well.

The position that we have therefore now reached is that we have two rather broad traditions of inquiry, but these do not follow from any issue relating to the type of data, (whether *quantitative vs. qualitative*), but are really the consequence of two different types of *logic of inquiry*. Clearly this will have critical importance for any useful discussion of mixed “methods,” as well as for any ambition in moving towards a mature methodology for the social/human sciences.

However, there is one further issue concerned with the logic of inquiry that needs to be raised. It is an issue emerging from my own involvement in the training of psychotherapists and health science students in qualitative research methods. Both MA and PhD students were clearly attracted to research questions that were of another type. In trying to explain the two basic types of logic of inquiry, I found myself being confronted, time and time again, with another approach to inquiry that did not quite fit with either type of inquiry that we have so far been discussing.

It was clear that there is no specific prediction that was being tested with this third type of logic of inquiry, nor was the aim to generate theory from the data. Instead, the research question was focussed upon an examination of how well theory and data could fit together in some way. This type of question frequently arises in areas of practice, (e.g. clinical, health and educational practice), in action research, ethnography, and in single-case studies, etc., where the emphasis is on trying to *understand* and *explain*. I call this third logic of inquiry – *explanation driven*.

The importance of the need to recognise three fundamental relationships between theory and data is illustrated in Figure 2. Each of these relationships corresponds to a distinct logic of inquiry. *Logic 1* (data-driven) is based upon “deductive inference”, and is concerned with testing the *prediction* of data (findings) from theory, the example par excellence is a hypothethico-deductive study. *Logic 2* (data-driven) is based upon “inductive inference”, and is concerned with *generating theory* from data, the example par excellence is a grounded theory study. While *Logic 3* (explanation-driven) is based upon “abductive inference”, and is concerned with the *explanatory relationship* between theory and data. The notions of *deduction* and *induction* are probably quite familiar to you, but *abduction* is possibly not especially familiar at all, and I will briefly expand on this later.



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Fig. 2 The relation between theory and data, and the logic of inquiry

In my experience, the example par excellence of *Logic 3 inquiry* is the clinical case study, where a single case, or small number of cases, will be studied in considerable depth (i.e. a thick description) and different theories are drawn upon to throw light on the case(s). Such case studies are usually pluralistic in character, because several

theoretical perspectives can be found to be useful in understanding a single-case. They also more often than not will employ mixed measures.

It should be clear that *Logic 3* is quite different from *Logic 1*, because, although theory is *a priori* in both of these types of design, by contrast, theory is not being used to make predictions with *Logic 3*. Also, *Logic 3* is different from *Logic 2* because, although methodology is exploratory in a *Logic 3* design, the theory does not emerge from the data (but exists *a priori*). Once we have begun to examine these ideas carefully, it becomes clear that *Logic 3* is about finding the “best explanation” of the data.

<b>Table 2: Three basic types of Research Question</b>	
<b>Research Question 1</b> (Logic 1)	<p><i>“Is there a significant advantage to patients/clients in using the new intervention as compared to the traditional methods?”</i></p> <p>(i.e. we will test the prediction that there is an advantage).</p>
<b>Research Question 2</b> (Logic 2)	<p><i>“What are the reported advantages in using the new intervention as compared to the traditional methods?”</i></p> <p>(i.e. we can not predict what these will be, the findings will only emerge after we have collected and analysed the data).</p>
<b>Research Question 3</b> (Logic 3)	<p><i>“How useful is such-and-such a theory/construct in understanding/explaining why some patients/clients respond to the new intervention while others do not?”</i></p>

To illustrate the three logics of inquiry in action, consider the three research questions given in Table 2 above, which might plausibly be incorporated into a single mixed design. The point I need to make is that it is the research question that captures the logic of inquiry, and not the type of data being collected or the “methods” of data collection being used. Of course, research questions such as these need to be carefully chosen for their coherence and integration (Mason, 2006), and each research question will be associated with its own specific approach to sampling, data collection, analysis, and critical reflection, etc.

The *first* type of research question will lead to a more positivist, hypothesis-testing approach, using probably “quantitative methods” of inquiry. The *second* type of question will lead to a more social/human science, grounded-theory approach, using probably “qualitative methods.” And, the *third* type of question will lead to an explanation-driven approach, based upon exploring instances/cases to see which of a range of theoretical constructs are found to be helpful in understanding the object of inquiry (i.e. offering the best explanation, a framework, a language, a perspective, a world view that helps).

In considering a study that might incorporate three research questions such as these, it should be clear that what is at stake in such a mixed design is not the problem of the incommensurability of qualitative and quantitative data, but is the inclusion of *different logics of inquiry* in a single study.

There are implications here for both a better understanding of qualitative research methods, as well as the challenges made by mixed designs. The focus that is required needs to be upon the *logic of inquiry*, and not on the type of data that is being collected. Furthermore, it is the *research question* that is critical when discussing design issues with respect to mixed design research, and although this problem has been pointed out before (Onwuegbuzie & Leech, 2006; Robson, 2011), the approach taken here is from an entirely new perspective.

## Abduction

I do need to say a few words about *abduction*, a term which was first introduced by the American pragmatist and philosopher, Charles Peirce (1903), and more recently has been aptly described as: "*inference to the best explanation*" (Harman, 1965; Lipton, 1991). Peirce clearly distinguished between deduction, induction and abduction in human reasoning. Indeed, if we do not take into account the notion of abductive reasoning, then our understanding of deductive reasoning and inductive reasoning will be seriously undermined.

There is currently a growing interest in the importance of abduction in the fields of AI, belief revision, philosophy of science, language processing, narrative thinking, as well as in understanding everyday experience (Josephson & Josephson, 1996; Walton, 2004; Aliseda, 2006). The importance of this process of *explanatory inference* for research methodology is what is being stressed here. It is also worth pointing out that abduction has enormous importance for qualitative data analysis as well, and this is something that seriously needs addressing.



Fig. 3: Three aspects of "the scientific method" that have a bearing on mixed design

Finally, there is a current urgency in the need to be open to a view of the scientific method that will recognise at least three inter-related phases of inquiry: *Discovery*, *Normal science* (Kuhn, 1970) and *Explanation-driven* (see Figure 3). These place emphasis in research design on *inductive*, *deductive* and *abductive* inference, respectively (although these must *not* be seen as mutually exclusive modes of inference).

As I have indicated in my introduction, in new fields of research, or when predictive theories have yet to be developed, it is the "discovery phase" of the scientific method that is probably the norm. In addition, there a growing tradition of research in the fields of professional practice where it is the "explanation-driven phase" of the scientific method that is becoming the norm. It is my position that the current funding-emphasis on what is basically merely "normal science" can only serve to "strangle at birth" new ideas, new thinking, new practice, new areas of inquiry, and new strategies of research design.

## Rethinking "mixed methods"

This paper has not set out to deal with all of the issues raised by mixed methods, but has been concerned more with where we need to be starting from. These are some implications that emerge from my contribution to this symposium:

- 1) We must give priority to understanding the *logic of inquiry* in our research using mixed measures..
- 2) We must recognise at least *three* logics of inquiry.
- 3) I suggest that we replace the term "mixed methods" with the term "*mixed designs*". (If we restrict the term "methods" to ways of collecting data, then, as I have argued, it is no longer a focus for the underlying issues being faced).

- 4) We need to abandon the terms “qualitative” and “quantitative” methods and replace them with *theory/data/explanation-driven* designs.
- 5) We will no longer need the wide variety of “mixed methods” set out in Creswell & Plano Clark (2011).
- 6) We need to *challenge* the idea that there are simply EIGHT types of mixed designs (cf. Morse & Niehaus, 2009, p. 25) – i.e. such a typology is more concerned with methods of data collection.
- 7) We also need to challenge the idea that a mixed “methods” design needs just a single research question. *I do not have the slightest difficulty with a mixed design study that has two, three or more carefully planned RQs!* And, this basic notion would go a long way in resolving many of the critical issues raised with respect to mixed methodology.

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