Basic beliefs

At the heart of Chapter 1 of *Naturalistic Inquiry* is an ambiguity so profound that it has confused the discussion of qualitative methods ever since. Lincoln & Guba (1985) appear not to notice it – though there is a moment when it looks as if they are on the brink – and I am not aware of any analysis, over the last 25 years, which has identified the problem or explained its significance. Even in recent texts, including those which welcome the end of the 'paradigm wars' and endorse a mixed methods strategy (for example, Teddlie & Tashakkori 2009), the ambiguity remains: unrecognised, built into the fabric of the discussion, and warping everything that is said about the relation between research and philosophy. However, once the ambiguity is acknowledged and resolved, it becomes possible to see why many of the disputes about qualitative methods are unnecessary, and why the philosophical paraphernalia which still hampers research practice can be jettisoned.

The ambiguity is the equation of two terms which Lincoln & Guba introduce in the first chapter: 'basic beliefs' and 'axioms'. Both terms refer to the most fundamental constituents of a paradigm, the defining principles from which various methodological strategies can be derived. In comparing positivism and constructivism, Lincoln & Guba begin by contrasting positivist axioms with naturalist axioms, and then describe the 'fourteen characteristics of operational naturalistic inquiry' which, they claim, are logically dependent on the 'axioms that undergird the paradigm'. They explicitly and carefully identify 'axioms' with 'basic beliefs', although the first term is the one they usually prefer. The key statement is:

> 'Axioms may be defined as the set of undemonstrated (and undemonstrable) "basic beliefs" accepted by convention or established by practice as the building blocks of some conceptual or theoretical system.' (Lincoln & Guba 1985, p. 33)

If I suggest that this is wrong – axioms are *not* beliefs, basic or otherwise – I am not just being pedantic. The assumption that *axiom=basic belief* has generated a series of unnecessary problems in qualitative methodology, and promoted ideas which are bewildering, odd, illogical, or contradictory. It has given rise to one of the most extraordinary claims in the literature of qualitative research, a claim which would certainly have been recognised as wildly implausible were it not for the hypnotic hold which the axiom/ basic belief equation (and the thinking about paradigms that goes with it) has over methodologists. In order to understand how this equation can have done so much damage, it is necessary to look closely at what Lincoln & Guba say about axiomatic systems.

A note on postpositivism

Before doing so, however, I need to say something about terminology. The first part of Chapter 1 of *Naturalistic Inquiry* is a damning critique of positivism, setting the stage for what Lincoln & Guba call 'the postpositivist era'. But it must be emphasised that 'postpositivism' in *Naturalistic Inquiry* does not mean what it means now. There has been a little-noticed shift in what 'postpositivism' refers to. In 1985 it designates paradigms which are not positivism, and which are not even related to positivism. In fact, to all intents and purposes, it refers to the naturalistic paradigm itself.

> 'Postpositivism is an entirely new paradigm, not reconcilable with the old. Rapprochements, accommodations, compromises are no more possible here than between the old astronomy and Galileo's new astronomy, between phlogiston and oxygen, between Newtonian and quantum mechanics...its basic tenets are virtually the reverse of those that characterised positivism.' (Lincoln & Guba 1985, pp. 33/29)

This is quite clearly at odds with the accepted meaning of 'postpositivism' now, a sort of watered down, slightly more moderate version of positivism. In the current paradigm contrast tables, postpositivism is basically positivism-plus-qualifications. It is no less realist, but it claims that reality can only be known imperfectly and probabilistically; whereas positivism is naively realist, imagining reality to be fully and objectively 'apprehendable'. Similarly, while positivism is associated with experimental design and the aim of verification, postpositivism goes in for a 'modified' experimental strategy and the falsification of hypotheses. When Lincoln & Guba (2003) consider the extent to which paradigms are compatible with each other, they confirm that it is possible to 'blend elements of one paradigm into another', especially if the paradigms 'share axiomatic elements' (p. 267). Their example is a rather interesting one: 'So, for instance, positivism and postpositivism are clearly commensurable.' They add: 'Commensurability is an issue only when researchers want to "pick and choose" among the axioms of positivist and interpretivist models' (p. 267). There can be no question, then, that for Lincoln & Guba today, postpositivism is just positivism-lite.

In 1985, however, the 'postpositivist era' is something that Lincoln & Guba welcome. It names, not a qualified positivism, but non-positivism or anti-positivism. It is more or less synonymous with what is now called constructivism. Not content with comparing the positivism/postpositivism distinction with that between phlogiston and oxygen, they suggest:

> We are dealing with an entirely new system of ideas based on fundamentally *different* – indeed, sharply contrasting – assumptions... What is needed is a transformation, not an add-on. That the world is round cannot be added to the idea that the world is flat'
> (Lincoln & Guba 1985, p. 33; italics in original).

In *Naturalistic Inquiry*, it is safe to say, postpositivism is *not* the almost acceptable face of positivism. It is a new kind of thing entirely. Precisely when this change in the meaning of 'postpositivism' took place is difficult to say, but Guba (1990) has already shifted, saying that 'postpositivism is best characterised as a modified version of positivism' (p. 20). Interestingly, however, he gives no sign that he is aware of the shift in meaning he has accorded the term. Other authors give no sign of being aware of it, either. Not surprisingly, in 1990 most writers were drawing on the 1985 interpretation (for example, Borland 1990), and nine years later, some of them still were (Greenstreet 2006). Indeed, examples can be found as late as Patomäki & Wight (2000) and O'Leary (2004).[1] For the most part, however, the term 'postpositivism' is understood as Lincoln & Guba (2003) understand it.[2] This usage is now so well established that, when Teddlie & Tashakkori (2009) notice Lincoln & Guba referring to postpositivism in the 1985 book, they assume it is intended in the 2003 sense. 'In their initial formulation... Lincoln & Guba presented two paradigms: *constructivism* (labelled naturalism) and *positivism*. Though they also discussed *postpositivism* they did not include it in their table of contrasts' (p. 85, italics original). The fact that Lincoln & Guba (1985) intend 'postpositivism' to *designate* constructivism eludes them.

At any rate, having introduced the idea of a radically new, transformation-not-add-on, postpositivist era, Lincoln & Guba (1985) continue: 'To make this point crystal clear, it is worth making a brief digression into the nature of axiomatic systems' (p. 33). This is the digression we need to consider carefully.

Axiomatic systems

An axiomatic system is a purely formal array of statements. A small number of these, the 'axioms', are the statements from which all the others, known as 'theorems', are logically derived. Any statement, if it is a theorem of the system, can be proved through the application of logic to the original axioms.[3] In some cases, the theorem will be derivable directly from the axioms; in others, it will be derivable from theorems that have already been proved. The system is not limited in terms of the number of statements it contains: as new theorems are proved, they become part of the array. The whole system is a hierarchy: axioms, theorems derived from axioms, theorems derived from previous theorems, and so on.

In view of the crucial point I want to make in a moment, it will be useful to have a simple example of a formal, axiomatic system.[4] So here are the axioms of something I will call the *Emoticon system*. Think of this system as a game, and think of the axioms as stating the rules by which the game must be played. The *Emoticon* system is about symbols appearing in sequences.

Axioms

[1] Sequences may be formed by a single symbol, or by placing symbols adjacent to each other.
[2] Only the symbols ☺ and ☹ can occur in a sequence.
[3] ☺, but not ☹, can stand alone.
[4] An occurrence of ☺ cannot stand adjacent to another occurrence of ☺.
[5] An occurrence of ☹ cannot stand adjacent to another occurrence of ☹.

This may look trivial, or highly abstract, or daunting, or any combination of the three. But that, a little later, is part of the point. Bear with me. In the meantime consider a theorem which can be derived from these axioms.

Theorem

In any given sequence, occurrences of ☺ must alternate with occurrences of ☹.

And here is the proof.

Proof	A	If ☺ occurs in the sequence, it cannot stand adjacent to another ☺.	[4]
	B	Therefore, if ☺ stands between two symbols, both must be ☹.	
	C	If ☹ occurs in the sequence, it cannot stand adjacent to another ☹.	[5]
	D	Therefore, if ☹ stands between two symbols, both must be ☺.	
	E	Therefore, in any sequence, ☺ must alternate with ☹.	[B, D]

Formal language can sometimes be rather confusing, so I will quickly illustrate how this proof works. Imagine a sequence of four symbols, and suppose that one of the middle two is ☺. What symbols must stand either side of ☺? In other words, given the following sequence:

(i) (ii) ☺ (iii)

what symbols must occur in slots (ii) and (iii)? Well, consider (iii). We know from axiom [4] that ☺ can't be adjacent to another ☺; and since, by axiom [2], there are only two possibilities, ☺ and ☹, (iii) must be occupied by ☹. The same reasoning applies to slot (ii). So now we have:

(i) ☹ ☺ ☹

What symbol must occur in slot (i)? We know from axiom [5] that ☹ cannot be adjacent to another ☹. So, given that there are still only two possibilities, (i) must be ☺. The sequence therefore looks like this:

☺ ☹ ☺ ☹

It's easy to see that this must apply to sequences of any length, so ☺ must alternate with ☹, however long the sequence is.

The *Emoticon* system, like any axiomatic system, is an exercise in pure logic. It is a deductive hierarchy. If the axioms hold, then it follows that all the theorems hold as well, because the theorems are logically deduced from the axioms. The axioms *entail* the theorems, even though in some axiomatic systems it can be difficult to determine what all the theorems are – and to prove that they can be deduced from the axioms – because logic can be a difficult discipline when we get beyond the simplest implementations of it.

The point of this example is simple but enormously important. Axiomatic systems, like this one, do not describe the real world. They are not intended to. The system's axioms, for example, are not an attempt to say what any part of the world is like. Consequently, they are neither true nor false (the same applies to the theorems). As I suggested earlier, the axioms are more akin to the rules of a game, and the system itself is like a game which can be played with those rules. A move in the game is made by generating a theorem, and deriving it logically from the axioms. So the axioms don't describe anything, in the same way that the rules of chess don't describe anything. And the theorems don't describe bits of the world for the same reason that chess moves don't describe bits of the world.

It turns out, however, that some axiomatic systems can be applied to the world. The *Emoticon* system clearly cannot be, but the best known example – Euclidean geometry – can. The difference is that, while there is nothing in the world that corresponds to the *Emoticon* system (or chess, for that matter), there *is* something in the world that corresponds to the Euclidean system. That something is space, the three-dimensional reality in which we live. Euclid's five axioms are:[5]

[1] A straight line can be drawn from any point to any other point.
[2] A straight line can be extended indefinitely.
[3] A circle is a figure drawn around a central point in such a way that the length of a straight line drawn from the centre to any point on the circumference will be the same as the length of any other straight line drawn from the centre to a different point on the circumference.
[4] All right angles are equal to one another.
[5] Given a point, and any straight line which does not run through it, only one line can be drawn through the point in such a way that it is parallel to the first line.

These axioms are obviously more sophisticated than the axioms of the *Emoticon* system, but the principle is the same. Astonishingly, every theorem in geometry can be logically deduced from these five axioms. For example, Pythagoras's Theorem: in any right-angled triangle, if you square the lengths of the two shortest sides and add the results together, the total will be the same as the square of the length of the longest side. How you get, logically, from the five axioms to Pythagoras does not, of course, concern us here. But the fact is that it can be done, even if it is a more complex business than getting from the five axioms of the *Emoticon* system to the one simple theorem proved above.[6]

Unlike the *Emoticon* system, the Euclidean axiomatic system matches the world, because the world contains points, straight lines, angles and circles, even if a real-world straight line is never *perfectly* straight, and even if a real-world circle is not *perfectly* circular. This is what makes it invaluable. We can use Euclid to anticipate what the world will be like, and consequently do useful things like make maps, build roads, and design buildings. If we measure the two short sides of a right-angle triangle occurring in the world, we don't need to measure the longest side because Pythagoras's theorem tells us how long it will be. If two opposite angles of a four-sided figure are right angles, then both of the two remaining angles will be right angles as well. If two straight lines intersect, forming four angles, then each pair of opposite angles will be same size. And so on. All of these (very simple) examples are theorems which can be deduced from the five axioms; but they are true in reality as well, because Euclidean geometry is a good match for the real world. It is parallel to the world, so to speak; and each of its theorems can be read off on to a corresponding part of it.

I have used Euclidean geometry as an example because that is what Lincoln & Guba (1985) do. Unlike Lincoln & Guba, I have compared it to the *Emoticon* system in order to bring out the fact that Euclid is just a logical system which fortuitously can be applied to the world. In effect, it is no more than a happy accident that there is a correspondence between the world and this abstract, formal, logically deductive, axiomatic system. The same happy accident obviously did not occur with the *Emoticon* system.[7]

We now come to an interesting complication. Until the 19th century, it was assumed that the whole of space was Euclidean, that the Euclidean system applied to the entire universe. The angles of a triangle with sides measuring billion of miles would still add up to 180°, exactly the same as the angles of a triangle whose sides are only a few centimetres long. But this turns out not to be correct. When applied on the cosmic scale, Euclidean theorems simply do not work. The correspondence between Euclidean geometry and the world, which is reliable in local space, breaks down completely in cosmic space. The system that works for modestly sized things like tables, buildings, countries, and even planets, does not work for things the size of galaxies and galaxy clusters.

There is, however, a different axiomatic system which *does* work on the cosmic scale. This alternative was originally discovered by accident in the 18th century, when a mathematician named Saccheri tried to determine the consequence of negating Euclid's fifth axiom. In other words, he adopted as Axiom 5 the following postulate:

[5] Given a point, and any straight line which does not run through it, *more than one line* can be drawn through the point in such a way that they are parallel to the first line.

He retained the other four Euclidean axioms just as they were, and experimented to see what theorems he could deduce from the new set of five. His aim was to find a contradiction in the new system, which would show that Euclid's fifth axiom could itself be deduced from the first four. In the event, he failed, although he derived many odd-looking results, none of which fit the local, three-dimensional space we are familiar with (Ryan *et al.* 2010). Subsequently, another mathematician, Gauss, realised that Saccheri had unwittingly invented a new axiom system, and that other geometries, different from the Euclidean, were possible, even if they did not (apparently) correspond to reality. Such geometries were worked out in detail during the 19th century, and eventually Einstein used a non-Euclidean geometry associated with Lobachevsky and Riemann as a basis for the general theory of relativity. This, then, is the alternative which works on the cosmic scale; and, if translated into Euclidean terms, Riemannian geometry implies that space is *itself* curved. (Wolfe 2007 has a good introduction to the history and foundations of non-Euclidean geometry.)

In summary, there are two different axiomatic systems, two distinct geometries: the Euclidean and the Riemannian.[8] Each system is internally consistent, its theorems logically derived from its axioms; but they are incompatible with each other. Thanks to the one axiom they do *not* have in common, Euclidean theorems contradict Riemannian theorems, and vice versa. Euclid is a brilliant fit for local space; where Riemann fails badly; but Riemannian geometry works for cosmic space, where Euclid breaks down. So for local-space jobs, such as map making and carpentry, we use Euclidean geometry. For cosmic space calculations, we use Riemann. It is a good example of horses for courses. The different geometries work on different scales, for different tasks, and in different contexts.

Paradigms as axiomatic systems

Lincoln & Guba discuss axiomatic systems in a 'brief digression' on pp. 33-36 of *Naturalistic Inquiry*. One of their conclusions takes the point I have just made about the application of alternative geometries, and generalises it to axiomatic systems as a whole:

> ‘Different axiom systems have different utilities depending on the phenomena to which they are applied. These utilities are *not* determined by the nature of the axiom system itself but by the interaction between the axioms and the characteristics of the area of application. Thus Euclidean geometry is fine for terrestrial spaces, but Lobachevskian geometry is preferred for interstellar spaces... A decision about which of several alternative axiom systems to use in a given case is best made by testing the “fit” between each system and the case.’
> (Lincoln & Guba 1985, p. 36)

They continue: ‘We are ready now to deal with the axioms of the particular postpositivist paradigm we advocate in this book, which we will term the “naturalistic paradigm”’; and they proceed to specify the five axioms of this paradigm in the following section.

At this point, then, two things are reasonably clear. First, a paradigm, as Lincoln & Guba understand it, is an axiom system akin to Euclidean or Lobachevskian geometry. Second, the unavoidable implication of the brief digression, and the conclusions they draw from it, is that positivism and naturalism, the two paradigms under consideration, will ‘have different utilities depending on the phenomena to which they are applied’. Presumably, it is another case of horses for courses. Positivism will work in some research contexts, naturalism will work in others, just as Euclid works in local space and Lobachevsky works in interstellar space. The decision about which paradigm to use in a given case will be made ‘by testing the fit between’ each paradigm and the case concerned; and it is quite natural, having read the digression, to anticipate that at some stage there will be a discussion of the criteria which should be taken into account when this kind of decision gets made.

But this is not what happens. The remainder of Chapter 1 is taken up with a specification of the axioms of the positivist and naturalist paradigms, and an account of the fourteen ‘characteristics of operational naturalistic inquiry’. While Lincoln & Guba do not confirm this explicitly, these characteristics appear to be the equivalent of theorems. They are justified by two considerations, one of which is ‘their logical dependence on the axioms that undergird the paradigm’ (p. 39), while the other is their ‘coherence and interdependence’. Strictly speaking, the theorems/characteristics are not deduced logically from the five axioms of naturalism, but in most cases a plausible argument is constructed to suggest that they follow from the axioms as specified. Although an equivalent set of positivist theorems is not presented, there is no reason to doubt, just before the chapter closes, that the analogy between paradigms and geometries is still in force, and that the research contexts which best ‘fit’ positivism and naturalism, respectively, will be the topic of a subsequent discussion. However, the final section, ‘An overview’, plants the first seeds of doubt: ‘Chapters 3 through 7... make the case that the naturalistic version of these axioms provides a better fit to sociobehavioural phenomena at least, if not to all phenomena’ (p. 44). There is no mention of ‘different utilities’ here, and this brief comment (it turns out) represents a crucial turning point in the argument. From here on, the carefully constructed analogy between paradigms and axiomatic systems is apparently abandoned.

This is abundantly clear at the very beginning of Chapter 2, where the naturalistic paradigm is referred to as ‘a logical successor to the positivist point of view’, and it is suggested that ‘accepting naturalism... is a ‘*revolutionary* move’ (p. 47). The grounds for this suggestion are presented in the course of Chapter 2, but are summarised like this:

> ‘The paradigm is resonant with vanguard thinking in almost every formal discipline that exists; if one is interested in inquiry that is ongoing at the forefront of disciplines, the naturalistic paradigm is *the* paradigm of choice, the paradigm that provides the best fit to virtually all phenomena.’
> (Lincoln & Guba 1985, p. 50; italics in original)

Throughout the chapter, the naturalistic paradigm is portrayed as 'the paradigm of choice in virtually every scholarly field', with the rhetoric shifting from 'different axiom systems have different utilities, depending on the phenomena concerned' to 'naturalism is preferable to positivism across the board'. The language of alternative axiomatic systems, fit-for-purpose in different contexts (by analogy with Euclidean and Lobachevskian geometry), has been replaced by the language of revolution, and a move from the old, worn out, positivist paradigm to its new, improved, vanguard-thinking, logical successor. Rather than a discussion of the criteria for determining the different contexts in which positivism and naturalism can legitimately be applied, we are offered a set of reasons for preferring naturalism on all occasions, given that it reflects cutting-edge thinking in every discipline, and fulfils the requirements of disciplined enquiry better than positivism does.

In the space of a few pages, then, Lincoln & Guba create an analogy between paradigms and alternative geometries, and then abandon it. In its place, they propose a paradigm revolution, with the old positivist notions being overturned by *arriviste* naturalism, and discredited concepts such as linear causality and mechanism giving way to mutual causality and holographic metaphors. However, if we step back from the focus on the 'brief digression', which introduced the idea of axiomatic systems, it becomes apparent that there is a certain continuity here. After all, the first part of Chapter 1 provides a vigorous critique of positivism, laying bare its inadequacies, and arguing that it has '*at least two consequences that are both repugnant and unfounded*', not to mention '*five assumptions that are increasingly difficult to maintain*' (pp. 27-8, italics in original). The language of this section riffs constantly on the theme of 'what it is no longer possible to believe', and the ways in which the positivist paradigm falls short. Positivism 'leads to inadequate conceptualisations of what science is', and is unable to 'deal adequately' with the problem of induction (p. 25-6).[9] It is inconsistent with 'emergent conceptual/empirical formulations', examples of which are Gödel's Incompleteness Theorem, Heisenberg's Uncertainty principle, and Bell's Theorem (pp. 27-8).[10] Its shortcomings are now so obvious and inescapable that 'a significant number of vanguard scientists have abandoned the paradigm and moved into the postpositivist era' (p. 28).

This is not how one would expect an axiomatic system, with its own context-dependent utilities, to be described. No mathematician, for example, would describe Euclid as 'repugnant and unfounded', or suggest that it had been discredited by nineteenth century writers such as Lobachevsky and Riemann. On the other hand, it *is* the kind of argument that one would expect from an author intent on substituting one paradigm for another. Instead of arguing that positivism works in certain contexts but not in others, as the 'brief digression' implies, the main thrust of the chapter appears to be: positivism has failed.

So, looking at the first two chapters from a wider angle, the overall narrative seems to be: the positivist paradigm is no longer credible, and should be replaced by naturalism, a paradigm which reflects recent intellectual developments in a range of different disciplines. If that is the basic argument, as it appears to be, it is the section on axiomatic systems which suddenly looks anomalous. Why, in the middle of a forceful criticism of positivism – to be followed by an extended account of its proposed replacement – do Lincoln & Guba insert a 'digression', the point of which is to suggest that naturalism and positivism are in fact alternative axiom systems, akin to Euclid and Lobachevsky? What accounts for this curious detour from the principal line of thought?

I will answer this question a bit later. For now, I will summarise by saying that Chapter 1 of *Naturalistic Inquiry* presents two different conceptions of paradigms. One portrays them as axiom systems, and the other portrays them as sets of 'basic beliefs'. Axiomatic systems are *non-competing* alternatives, akin to Euclidean and Lobachevskian geometries: each system is applicable to specifiable contexts. Conversely, sets of basic beliefs are *competing* alternatives: they provide rival theoretical accounts and conflicting methodological prescriptions. I have already examined what Lincoln & Guba have to say about axiom systems in some detail, and in a moment I will take a closer look at the 'basic beliefs' alternative. First, however, I want to comment briefly on Lincoln & Guba's intellectual sources for the 'new paradigm'.

The 'new paradigm' of Schwartz and Ogilvy

According to Lincoln & Guba, the 'most compelling' reason for thinking that the naturalistic paradigm is legitimate is the fact that it 'resonates' with 'the new paradigm of thought and belief' (p. 50); that is, with the 'the major basic beliefs that... now characterise emergent, vanguard thinking in virtually every major discipline' (p. 65). Chapter 2 is largely devoted to an exposition of these major basic beliefs, and to a demonstration that they overlap with, and lend support to, the 'axioms' of naturalism.

Surprisingly, they cite only one source for the 'new paradigm' and the vanguard thinking to which they refer. This is a short monograph by Schwartz & Ogilvy (1979), which was commercially produced by SRI International, and which has never been available in a journal, or through an academic publisher, or on the internet.[11] The monograph is a distillation of concepts which are said to be 'currently emerging' in a wide variety of disciplines: physics, chemistry, neuroscience, evolution, mathematics, philosophy, ecology, linguistics, psychology, politics and the arts. The idea is that all these fields reflect the arrival of a 'new paradigm', diametrically opposed to the 'old paradigm' (associated, by Lincoln & Guba, with positivism); and Schwartz & Ogilvy abstract seven 'major characteristics' of this new paradigm, which are exhibited by 'vanguard thinking' in all the listed disciplines. It is these characteristics which Lincoln & Guba claim 'resonate' with their account of naturalism.

To the 2014 reader, the ideas presented in the 1979 monograph seem superficial, confused, and quite badly dated. To some degree, this is not surprising: any understanding of 'the next big thing' is likely to seem, 35 years later, quaint, lopsided, and anachronistic. What is more unusual is that (in effect) Schwartz & Ogilvy remain influential – consequent on Lincoln & Guba's appropriation of their ideas – despite the fact that their view of the theoretical options available across the disciplines is now obsolete. Although the plausibility, or otherwise, of the 'seven characteristics' is not here my main concern, I will briefly discuss two or three examples because they illustrate an important point: in most cases, either the 'new paradigm' ideas do not, in retrospect, have the significance Schwartz & Ogilvy attribute to them, or alternatively they have been comfortably incorporated into the 'old paradigm'. Here, then are some of the claims that Schwartz & Ogilvy make.

First example: *'It is no longer sufficient to abstract out for intense study one or a few elements while holding everything else "constant".'* Not only is this, in retrospect, a wild generalisation, it was also extremely implausible at the time. Current philosophy of science acknowledges that the strategy of 'decomposition' – studying the behaviour of a system's components separately, in order to explain the behaviour of the system as a whole – does not always work. Some systems are non-decomposable. But there are numerous systems which *are* decomposable, or nearly decomposable; and the only way to find out whether a particular system is decomposable or not is to try the decomposition strategy first, and see what happens. So the claim that abstracting out 'is no longer sufficient' overshoots the scientific facts by a considerable distance. With some systems, the study of individual elements separately *can* explain the behaviour of the system as a whole; with others, it can't. It all depends on the kind of system you are proposing to study. For the best discussion of these issues, see Bechtel and Richardson (2002), a volume originally published in 1993, and a wonderfully detailed guide to explanation in the life sciences.

Second example: '*As systems become more and more complex, they "develop unique properties" that cannot be accounted for or predicted from the properties of parts.'* The problem here is the overly casual pairing of 'accounted for' and 'predicted'. The development of 'complexity theory' in the past thirty years shows that, although the behaviour of many complex systems cannot be *predicted* from the properties of their parts, it does not follow that this behaviour cannot be *explained* by reference to these properties (Wickens & Hollands 2000). The behaviour of some systems has to be observed; it cannot be anticipated purely by examining its components. However, once the system's behaviour is understood, then – often, if not always – it can be explained by showing how the components interact. So even a complex system can be explained by reference to the organisation of its components (and, in any case, not all systems are complex). On this point, too, Bechtel & Richardson (2010) is an excellent source.

Third example. *'Movement from mechanical to holographic images... While the whole is more than the sum of its parts, each part contains the whole within itself.'* This claim implies that the holographic metaphor is inconsistent with, and will replace, the mechanistic metaphor; but, in fact, both mechanism and holography remain viable ideas in different contexts. First, mechanism remains at the very centre of debate in both the philosophy of science (Machamer *et al.* 2000, Glennam 2002, Bechtel & Abrahamsen 2002), and the philosophy of social science (Hedström & Swedberg 1998, Hedström 2005, Elster 2007). Secondly, however, holographic ideas are now prominent in quantum gravity and string theory (Bousso 2002, Susskind & Lindesay 2005, Chown 2009), as well as in laser applications such as optical storage methods (Curtis *et al.* 2010).[12] But the range of holographic concepts is relatively restricted, and it is not obvious how Lincoln & Guba think they can be harnessed in the social sciences. Later in the book, they discuss 'holographic generalization', suggesting that 'samples need not be representative in the usual statistical sense to render generalization warrantable; any part or component is a "perfect" sample in the sense that it contains all of the information about the whole that one might ever hope to obtain' (p. 128). This, however, is absurdly speculative, and they give absolutely no reason for thinking that a respondent who is a member of a certain population can be considered as a 'part' of a 'whole', or for supposing that the whole in question would have holographic properties. So this passage must be regarded as no more than a random borrowing, the arbitrary application of a metaphor to an alien subject matter without even a hint of justification.

These examples are typical of the claims made by Schwartz & Ogilvy. The imply a general revolution, with the 'new paradigm' displacing the old one, when all the retrospective evidence indicates that the 'new' ideas may be applicable in some contexts, but emphatically not across the board. Rather than a 'logical successor', these 'analytical residues' represent no more than a general sprinkling of concepts and theories. Some of them have certainly proved to be valuable in various fields of enquiry, but they are not applicable to every discipline, and they are definitely not capable of solving every intellectual puzzle. Forty years after they were written, these claims seem inflated, grandiose, naive, melodramatic – and totally incapable of sustaining the weight that Lincoln & Guba wish to place on them.

Paradigms as empirically grounded beliefs

It may be labouring the obvious, but it is nevertheless worth saying, that the 'seven characteristics' of Schwartz & Ogilvy, along with the 'explanatory descriptors' which Lincoln & Guba derive from them, make various claims about the world. Lincoln & Guba incorporate these descriptors into several tables, and suggest that the reader browse through them 'as a way of building up his or her own propositional... fund of information' on the new paradigm (p. 57). The 'analytic residue remaining after the particulars of physics, chemistry, brain theory, mathematics, and so on, have been "boiled off"' (p. 65) consists of a set of striking generalisations.[13] For example:

(a) Systems and organisms cannot be decomposed (fragmented) into individual elements (parts) because their unique systemic and organic properties transcend the elements (parts).
(b) Holism is vindicated over atomism and diversity is vindicated over homogenization.
(c) Different individuals tend to experience the same order because all rational creatures order experience using the same intrinsic categories – a shared paradigm.
(d) What is detected in any part must also characterize the whole (a form of generalization).
(e) Ambiguity about the future is the condition of nature.
(f) The nature of the observation process affects the results; measurements are determined by the relationship between the observer and the observed.
(g) The universe is an interconnected network, an indivisible whole.
(h) One form of knowledge or method cannot be reduced into another.
(j) Components constrain but do not determine emergent form in morphogenetic change.

Stack them up in this way – there are dozens more – and it becomes evident that these generalisations are almost dogmatic. With the exception of (c), none of them is even slightly tentative, no exceptions are acknowledged, and the tone is very much that of the law, or a series of laws, being laid down. Of course, some of them are deeply ambiguous, and others appear mutually contradictory. For example, it is not obvious how claims (b) and (c) can be reconciled. The first rejects 'homogenization', suggesting that diversity is 'vindicated'; while the second says that all rational creatures order experience using the same intrinsic categories, which looks suspiciously like one form of homogeneity. On the other hand, it is not clear what 'diversity is vindicated over homogenization' actually means, so perhaps claim (b) can be interpreted in such a way that it is, after all, consistent with claim (c).

More significantly, as I argued in the previous section, many (perhaps most) of these claims are false, or at best only partially true. Schwartz & Ogilvy, having skimmed the 'vanguard', fashionable ideas of the 1970s, extrapolated them into exceptionless generalisations and, retrospectively, came a cropper. *Some* systems and organisms cannot be decomposed into elements; but many more can be – and are. 'What is detected in any part must also characterise the whole' appears to be true for *some* fields of enquiry; but certainly not for all of them. 'Ambiguity about the future' may be the condition of *some* parts of nature; but there plenty of systems whose future states can be predicted precisely. *Some* forms of knowledge cannot be reduced to others, at least not yet; but in certain disciplines, like neuroscience, reductionism is alive and well (Kandel *et al.* 2000, Bickle 2003). In general, the interesting developments catalogued by Schwartz & Ogilvy turned out to be no more than that: interesting developments. They are not the basis of a radically new paradigm in which all disciplines, and all areas of enquiry, are incorporated.

Most crucially of all, however, the 'analytic residue' is inductively, or perhaps abductively, derived. It is, as Lincoln & Guba note, 'abstracted' from an analysis of 'the concepts that are currently emerging in a variety of disciplines and discipline-like areas including physics, chemistry...' and the rest (p. 51). Schwartz & Ogilvy conducted a survey of the academic domain, and drew certain conclusions. Clearly, they were unduly eager to generalise, but the most significant point is that the 'seven characteristics' are grounded in empirical evidence. The 'new paradigm' is explicitly based on a review of developments in the disciplines they surveyed. It is the result of an empirical enquiry, the outcome of a spot-the-pattern, inductive form of data analysis. Challenge the data, or challenge their interpretation of data (as I have done), and you threaten to dismantle the foundations of the paradigm 'revolution' they are anticipating.

It is these inductively derived generalisations which, according to Lincoln & Guba, support naturalism, and which provide the most compelling argument in its favour. 'Is there any relationship between these sentences [the explanatory descriptors] and the five axioms of the naturalistic paradigm? ... We believe that there are substantial overlaps.' (p. 57) The implication seems to be that naturalism, like Schwartz & Ogilvy's 'new paradigm', is dependent on empirical evidence. If the explanatory descriptors provide the most compelling reason for accepting naturalism, and if these descriptors are empirical generalisations, then it looks as if naturalism rests, at least to a considerable extent, on empirical premises. Moreover, if there are any grounds for challenging those premises, as I have argued there are, then the support which they give the naturalistic paradigm is thereby attenuated.

If this is correct, then the overall argument of Chapters 1 and 2 of *Naturalistic Inquiry* – ignoring, for a moment, the digression on axiomatic systems – is as follows. First, positivism must be rejected because it fails to conceptualise science adequately, and is inconsistent with 'conceptual/empirical formulations' such as Gödel's Incompleteness Theorem, Heisenberg's Uncertainty principle, and Bell's Theorem. Second, the naturalistic paradigm is positivism's revolutionary successor, the most compelling reason for accepting it being that it is grounded in empirical generalisations abstracted from vanguard theories in virtually every discipline. Or, to put it in shorter and simpler form: the evidence supports naturalism, and is inconsistent with positivism. Naturalism, according to Lincoln & Guba, makes better sense of the data. Even if they are wrong, the point is that their 'most compelling reason' for accepting naturalism is ultimately an empirical one.

Axioms versus beliefs

Earlier, I suggested that *Naturalistic Inquiry* presents two different accounts of what a paradigm is, but it should now be clear that these accounts are not just contrasting but diametrically opposed. According to one account, paradigms are non-competing axiom systems, applicable in specific contexts; according to the second, they are competing, empirically derived sets of basic beliefs which make generalisations about the world/universe. In this section, I will indicate just how discordant these two conceptions are.

Stipulations versus descriptions

An axiom system does not make claims about reality. It does not say: 'this is how the world is'. Rather, it says: 'suppose these principles hold, what else follows?'. An axiom system is an arbitrary set of rules and definitions, which generate theorems in a purely logical hierarchy. In effect, it is just a game played with logic. The axioms are *stipulations*, not descriptions of anything.[14] Consequently, an axiom system may (or may not) correspond to something in the physical world. It might have a concrete application; or then again it might not. Euclidean geometry can be applied to tasks, problems and measurements in local space. The *Emoticon* system cannot be applied to anything.

All this is in marked contrast to sets of beliefs. The 'explanatory descriptors', which Lincoln & Guba derive from Schwartz & Ogilvy's seven characteristics, *are* descriptions. They are generalisations from the survey of academic disciplines, and they are alleged to be true (although Lincoln & Guba would not use this word, given their aversion to the concept 'truth'). For example, 'systems and organisms cannot be decomposed (fragmented) into individual elements' appears to be neither an arbitrary collection of words, nor a logical stipulation. It looks as if it is intended to provide information about the world. It is a generalisation about what kinds of thing systems and organisms are.

Arbitrary versus evidence-based

The axioms of an axiom system are arbitrary in the sense that they are not answerable to anything else. In the *Emoticon* system, for example, it makes no sense to ask whether the axioms are true. Presented with the second axiom, 'Only the symbols ☺ and ☹ can occur in a sequence', we do not ask 'Why?', or 'What is the evidence for that?'. Similarly, if the rules of chess specify that bishops move only diagonally, we do not wonder whether that accurately represents how bishops behave in real life. Moreover, changing an axiom does not imply that the new axiom and the old axiom make different statements. Axioms do not make statements. Changing Euclid's fifth axiom does not mean that we have a different theory about the world. It just means that we have created an alternative geometry, a new logical game.

In contrast, basic beliefs are clearly answerable to evidence, because they *do* represent something in the world. They are not, and are not intended to be, arbitrary. For example, the C-4 explanatory descriptor is: 'What is detected in *any* part must also characterise the whole'. This is not merely a rule in a logical game, and it is entirely appropriate to wonder whether it is true, for all systems, entities and organisms. To change it – to assert that there are some systems/entities which are not holographic in this sense – is to offer an alternative theory about how the world is. Moreover, it is possible to test the extent to which either of these claims fits the evidence. Are there, in fact, systems in which every individual part does *not* contain information about the whole? (As I have already noted, the answer to this question is quite clearly 'yes'. Deficit studies in biochemistry and cognitive neuroscience, indicating that information is in many cases localised to specific parts of the system/organism, demonstrate this rather clearly.[15])

Context-specific utility versus universal truth

The fact that an axiomatic system may apply to some contexts but not in others was illustrated earlier by Euclidean and Lobachevskian geometries. These are two different logical systems, one of which works in local space while the other works in interstellar space. Since neither of them is taken to be a general description of the world, there is no conflict between them. Instead, they are more like intellectual tools, each capable of assisting with different tasks, or with similar tasks in different contexts. In this respect, they can be compared with (for example) a knife and a saw. Both tools are used for cutting (same task), but the knife works with steak and chips, and the saw works with planks of wood. Neither is superior or inferior to the other. They are just useful for different jobs.

Sets of basic beliefs, especially of the kind which appear in Chapter 2 of *Naturalistic Inquiry,* take the form of generalisations, universal laws, totalising narratives. While Lincoln & Guba reject 'attempting to reduce all phenomena of a given class to the purview of a single (or single set of) generalization(s)' later in the book (p. 117), the majority of 'explanatory descriptors' do precisely that. There is no sense that 'this applies in some contexts, but not in others'; and we are evidently intended to recognise in (for example) 'the universe is an interconnected network, an indivisible whole' a global truth, not merely an intellectual tool with context-related restrictions. Similarly, 'ambiguity about the future is the condition of nature' cannot be construed, syntactically, as other than a universal truth. It cannot be interpreted as saying: 'in some contexts, assume that the future state of the system can be predicted precisely; in other contexts, assume that it can't be'.

Non-competing versus competing

Since axiom systems are intellectual tools which have context-dependent utilities, they do not compete with each other, any more than a knife, a saw and a screwdriver are in competition. The carpentry and cutlery equivalents of 'paradigm wars' just do not happen, and there are no pronouncements about the ontological and epistemological underpinnings of spoons, forks and chisels. Tools are complementary, selected because of their suitability for particular tasks, just as Euclidean and Lobachevskian geometries are selected for measurement on different scales. Hammers and nails are not rejected as 'repugnant and unfounded' because they belong to an outmoded, discredited paradigm which screws and screwdrivers have superseded.

Basic beliefs, however, are clearly in competition. If I hold the view that 'systems and organisms cannot be decomposed (fragmented) into individual elements', and you hold that some systems can be, then we have competing beliefs. We are making conflicting claims about the world. Moreover, both beliefs have methodological implications. Given my view, I will regard Bechtel & Richardson's 'decomposition and localisation' strategy as redundant in all conceivable cases. I just won't bother with it. Given your view, you will be inclined to adopt the 'decomposition and localisation' strategy as a default option, whenever you are confronted with a new system/organism, to see whether it works. If, and only if, it doesn't work, you will then be prepared to entertain the possibility that alternative forms of explanation might apply in this particular case. The beliefs we hold are in competition, then – but so too are their methodological consequences. The methodological strategy each of us adopts is logically contingent upon the evidence-based belief we hold.

Earlier, I indicated that Lincoln & Guba *equate* axioms with basic beliefs: 'Axioms may be defined as the set of undemonstrated (and undemonstrable) "basic beliefs" accepted by convention or established by practice as the building blocks of some conceptual or theoretical system' (Lincoln & Guba 1985, p. 33). It should now be evident that this is a very odd definition, since it yokes together the two different conceptions of what a paradigm is. Lincoln & Guba appear to think that a 'paradigm' can be *both* an axiom system *and* a set of basic beliefs. But this is clearly, and without qualification, impossible.

The Frankenstein paradigm

This, then, is the ambiguity to which I referred at the beginning of the chapter. We are presented with two alternative conceptions of a 'paradigm', and Lincoln & Guba appear not to notice the difference. Instead, they run together two different senses of 'basic belief'. One is a logical sense, in which 'basic beliefs' are equivalent to 'axioms', the postulates of an axiomatic system. These are basic in the sense that they are the starting point of the system, and all the theorems are logically derived from them. The other is an epistemological sense, in which a 'basic belief' is a generalisation abstracted from empirical evidence, and which is taken to characterise findings from a number of different fields. These are basic in the sense that they are taken to express fundamental facts about the world, facts which unsurprisingly (if they really are fundamental) tend to show up in more than one discipline. Or possibly, if we are to believe Schwartz & Ogilvy, in virtually every discipline.

This unresolved ambiguity prompts a particularly difficult and revealing question: On what basis does the researcher 'select' or 'acquire' or 'find that she is committed to' a particular paradigm? Specifically, what inclines her to accept the axioms, or basic beliefs, of the paradigm she adopts? It is not hard to see that the answer to this question will depend on which conception of a paradigm we have in mind. If, for example, a paradigm is an axiom system with context-dependent utilities, the choice will be governed by the particular context of enquiry. If we want to measure local space, we select Euclid; if we want to make calculations on the scale of interstellar space, we select Lobachevsky. In this case, the axioms of the paradigm are, in the relevant sense, arbitrary. They do not describe the world, and they may even be counter-intuitive – as the fifth axiom of Lobachevskian geometry certainly is ('Given a point, and any straight line which does not run through it, more than one line can be drawn through the point in such a way that they are parallel to the first line'). Crucially, in adopting the axiom system – for whatever task is in hand – we are not thereby announcing that we *believe* the axioms. In adopting Euclidean geometry in order to measure up for the new curtains, we are not committed to the metaphysical belief that space is three-dimensional in the way that Euclid thought it was.

However, if a paradigm is an empirically derived set of beliefs, the situation is completely different. In this case, context-dependent utility is not relevant, and everything turns on our assessment of the data. On this conception, a paradigm consists of general claims about fundamental aspects of the world, and those claims can only be made on the basis of (presumably) extended study. Either we must understand something about theoretical developments in a range of different disciplines (as Schwartz & Ogilvy do); or, failing that, we must review the work of authors who have this kind of understanding – scientists, philosophers, sociologists of science – and arrive at an informed conclusion. Once that has been done, it will be possible to decide on a methodological strategy, one which is based on current understandings of how the world actually works, and how it can best be studied.

But what do Lincoln & Guba have to say about all this? In particular, what do they say about the source (or grounding) of a paradigm's basic beliefs, and about the basis for selecting a paradigm? Does their account resolve the ambiguity? Here are the relevant comments (Lincoln & Guba 1985, pp. 14-15,36).

[1] 'Axioms (basic beliefs) are arbitrary and may be assumed for any reason, even if only for the "sake of the game".'
[2] 'Axioms are *not* self-evidently true, nor need they appear to be so; indeed, some axioms appear to be very bizarre on first exposure.'
[3] 'Metaphysical beliefs must be accepted at face value... basic beliefs can never be proven.'
[4] '[They] cannot be tested for truthfulness against some external norm such as correspondence with nature.'
[5] 'They represent the ultimate benchmark against which *everything else* is tested.'
[6] 'Paradigms represent a distillation of what we think about the world (but cannot prove).'

This is a curious hotchpotch. At first sight, [1], [2] and [4] appear to reflect the 'axiomatic' conception in a straightforward manner. Claim [3] could, at a pinch, be interpreted in the same way. But 'must be accepted at face value' seems a slightly odd thing to say about (for example) a Euclidean axiom; and Euclid's first postulate, 'A straight line can be drawn from any point to any other point', cannot sensibly be described as a 'metaphysical belief'. It is true that 'basic beliefs', construed as axioms, can never be proven; but it should not be necessary to point that out, if it is understood that they are stipulations, not substantive claims. However, claim [5] does not sound as if it is referring to axioms at all. In the first place, axioms don't really *test* anything; they are simply the postulates from which the logical system is derived. In the second place, they are obviously not the benchmark against which *everything else* is tested. An axiom system (AS) is applied to one particular region of the world, one particular context; it is not intended to exercise surveillance over *every* kind of enquiry. At this point, then, Lincoln & Guba seem to have shifted, implicitly, to the 'empirically derived generalisation' (EDG) conception.

Claim [6] seems to be a hybrid. Axioms, as we have conceded, cannot be 'proved', *because they are stipulations*. On the other hand, they quite clearly do not represent a 'distillation of what we think about the world'... *because they are just stipulations*. They do not represent beliefs 'about the world' at all. In fact, this way of talking suggests the EDG conception, since the 'explanatory descriptors' derived from Schwartz & Ogilvy are 'distillations' or abstractions from the survey of intellectual developments in the 1970s. So claim [6] appears to incorporate both conceptions at once. Paradigms 'represent a distillation of what we think about the world' [EDG], 'but cannot prove' [AS]. In assertions like this, it would seem that Lincoln & Guba want it both ways.

The ambiguity between the EDG and AS conceptions of a 'paradigm' continues throughout *Naturalistic Inquiry*. Simplifying, we can say that, according to the AS conception, axioms lack descriptive content – they are stipulations – but, for that very reason, do not require empirical warrant; while, according to the EFG conception, they have descriptive (generalising) content, but require some sort of justification. The following table summarises the position.

Conception	*Substantive claims*	*Warrant required*	*Scope of application*
EDG	**Yes**	Yes	**Universal**
AS	No	**No**	Context-restricted

In the terms of this table, Lincoln & Guba implicitly create a Frankenstein conception by combining the EDG substantive content with the AS lack of warrant (the cells printed in bold). Their implicit paradigm concept splices together generalised information content with a rejection of the need for proof, evidence or any other kind of warrant. In this sense, a paradigm represents 'what we believe about the world', but cannot (and have no need to) justify. Moreover, as the syntax of the explanatory descriptors reminds us, together with the rhetoric of an imminent paradigm revolution, the scope of the paradigm's application is universal. 'Systems and organisms cannot be decomposed; ambiguity about the future is the condition of nature; what is detected in any part must also characterize the whole.' The Frankenstein conception of a paradigm takes its substantive content and scope of application from EDG; but its rejection of the need for a warrant – 'axioms can be assumed for any reason, if only for the "sake of the game", and can never be proven; they must be accepted at face value' – comes from AS. This lumbering beast, with a conceptual bolt through its neck, is the one which Lincoln & Guba let loose on the world. It has become what virtually everybody thinks a paradigm is.

Bearing the ambiguity in mind, it becomes evident that the five axioms of the naturalistic paradigm, as formally stated half way through Chapter 1 (pp. 37-8), can be read as *either* EDG generalisations *or* AS stipulations. Consider the first axiom, for example:

> *'Axiom 1: The nature of reality (ontology)*
>
> *Positivist version*: There is a single tangible reality "out there" fragmentable into independent variables and processes...
> *Naturalist version*: There are multiple constructed realities that can be studied only holistically.'

Construed as AS stipulations, the difference between the two versions is akin to that between the fifth axioms in Euclidean and Lobachevskian geometry. There will presumably be certain contexts (akin to local space) in which the entities and organisms of the 'single tangible reality' can be fragmented into variables and studied independently. Equally, there will presumably be other contexts (akin to cosmic space) in which entities and organisms cannot be fragmented into components, but can only be studied as non-mechanistic, holistic, emergent systems. (The most significant problems for this reading are that Lincoln & Guba never spell out the contexts in which the different axiomatic systems apply, and that they subsequently treat naturalism as the revolutionary successor to positivism.)

Conversely, construed as EDG statements, the 'axioms' are generalisations modelled on the explanatory descriptors derived from Schwartz & Ogilvy, but at a greater degree of abstraction. Table 2.11 (Lincoln & Guba 1985, p. 64) demonstrates how this is done, with relevant descriptors compiled from the seven Schwartz & Ogilvy characteristics, and assembled under the *Reality* heading. The descriptors abstracted from the Schwartz & Ogilvy survey are subject to a further round of abstraction, and are condensed into the *Naturalist version* of Axiom 1. The descriptors include: 'systems and organisms cannot be separated from their environments'; 'systems and organisms cannot be decomposed'; 'the order we experience is a function of the activity of ordering performed by the mind; 'the universe is an interconnected network, an indivisible whole'; and so on. On this reading, then, the naturalist axioms are merely the Schwartz & Ogilvy descriptors in their most abstract form, and are intended to be read as universal truths. (The main problem for this reading is that the formal statement of axioms immediately follows the brief digression on axiom systems, strongly implying that these statements are intended to be read according to the AS interpretation).

Paradigm choice

What I have called the Frankenstein conception of a paradigm, illegitimately combining aspects of both the EDG version and the AS version, is the ultimate something-for-nothing, perpetual motion device. It permits sweeping generalisations to be made about the world without imposing any obligation to justify them. The 'explanatory descriptors' were at least based on analysis of intellectual developments during the 1970s. Even if they were wrong, or only partially true, they were grounded in something empirical, and could be defended on that basis. But Lincoln & Guba's hybrid removes this requirement. It claims that the basic beliefs of a paradigm 'are arbitrary and may be assumed for any reason. They are do not have to be self-evidently true, and may appear to be 'bizarre on first exposure'.'They must be accepted at face value', and 'can never be proven'. They 'cannot be tested for truthfulness against some external norm'; but 'represent the ultimate benchmark against which *everything else* is tested.' 'They represent a distillation of what we think about the world (but cannot prove).'

The result is that paradigms are now widely understood to be sets of metaphysical beliefs which are not answerable to *anything*. The claims that there are multiple realities; that systems and organisms cannot be studied by decomposition and localization; that generalization is impossible; that there is no object of knowledge independent of the knower; that objectivity is an illusion; that it is impossible to distinguish cause and effect... these claims do not have to be supported *by any argument or evidence whatsoever*.

There are two remarkable consequences of this. The first is that the ‘selection’ of a paradigm has come to be associated with what each researcher happens to find congenial. It refers to her worldview and her ‘personal taste’ (Polit & Beck 2008, p. 18). The rhetoric is one of creeds, faiths, perspectives, tastes and preferences. Consider, for example, the advice given to students in one nursing research textbook. If the student already believes that ‘“real reality” exists “out there”, driven by natural laws’ (LoBiondo-Wood & Haber 2010, p. 134), then she has an affinity with positivism. If, on the other hand, she believes that ‘multiple realities exist influenced by culture and environment’, then her affinity is with constructivism. Crucially, however, she is not expected to invest any intellectual effort in evaluating these claims. She is not required to assess the extent to which aspects of reality are ‘driven by natural laws’, or to identify which features of social reality are ‘influenced by culture and environment’ (and how). Instead, she is invited to comply with a set of directions: ‘if you believe that truth is objective reality, then you will select a quantitative/deductive approach; however, if you believe that truth is the subjective expression of reality, you will adopt a qualitative/inductive approach’ (LoBiondo-Wood & Haber 2010, p. 136).

Examples like this can be multiplied many times over, and it is quite routine to equate paradigms with the individual’s ‘worldview’ (Kikuchi 2003). The choice of an appropriate method is said to depend ‘on researchers’ personal taste and philosophy’, the selected paradigm being the one ‘that corresponds most closely to your view of the world’ (Polit & Beck 2008, p. 18). Students are therefore advised to choose the approach ‘that flows from the “how” you think, your worldview, your propensities’ (Munhall 2007, p. 25). Underlying this advice is the assumption that the individual has an antecedent belief system, on the basis of which she will adopt the corresponding paradigm, together with the methods it prescribes.

How well grounded is this assumption? It is very unlikely that, before encountering a methods textbook, most people give much thought to the nature of reality – single or multiple, fragmentable or holistic. But even if some do, it is not clear what the basis would be for any conclusions they might have reached. A study of philosophy, cosmology, physics, or theology? An analysis of personal experience? A liking for science fiction or fantasy? According to Lincoln & Guba, none of this has any relevance. ‘Basic beliefs are arbitrary’; they can be ‘assumed for any reason’, and ‘cannot be tested for truthfulness against an external norm’. So a prior study of philosophy, aside from being unlikely, is also unnecessary; and the selection of a suitable paradigm is a matter of caprice. This is the something-for-nothing characteristic of paradigms, on the Frankenstein conception. You can believe absolutely anything you want to believe, without the tedious requirement of having to produce an argument, some evidence, or a decent reason.

The second consequence is a corollary of the first. Paradigms determine – or at any rate strongly incline towards – method.[16] The point of the ‘fourteen characteristics of operational naturalistic inquiry’ (p. 39), set out in the latter part of Chapter 1, is that they are methodological consequences of the five axioms. It follows, then, that methodological decisions, according to Lincoln & Guba, are largely dependent on the beliefs, whims, prejudices and preferences of the individual researcher. Since basic beliefs are arbitrary, and can be assumed for any reason; and since basic beliefs are identified with specific paradigms; and since paradigms regulate method.. it would appear that methodological decision making is answerable only to the personal predilections of the person conducting the research. There is no logical or empirical constraint on the selection of a paradigm. Basic beliefs ‘must be accepted at face value’, and ‘cannot be tested for truthfulness against an external norm’. So the *only* way of evaluating method, according to the Frankenstein conception, is to decide whether it is in accord with the individual’s preconceptions. Are the methods she has chosen compatible with her (conceivably) ill-informed, uneducated, badly thought out – and possibly non-existent – basic beliefs about the nature of reality? If so, then her methodological decisions are validated.

Notice that this is not a matter of ‘rigour’, a concept which qualitative nursing writers have laboured to redefine in recent years.[17] The question concerns the basis for methodological decisions: what justifies a particular research design, a particular way of collecting data, or a particular form of analysis. Get these decisions wrong, and rigour is irrelevant. Bad plans, rigorously implemented, are still bad plans. So the point is this: the choice of a design, sampling strategy, data collection instruments, interview technique, and analytical procedure are entirely dependent on 'how you think, your worldview, your propensities'. The approach you adopt is the one 'that corresponds most closely to your view of the world'. This is the only parameter, according to the Frankenstein conception, that is relevant to methodological reflection. There can hardly be a more extraordinary claim in the qualitative nursing research literature than this. The primary criterion for the selection of a method – irrespective of the research question, irrespective of the canonical ways of answering it – is whether it is consistent with the inchoate array of untutored philosophical beliefs residing in the researcher's head. For this is what the advice of LoBiondo-Wood & Haber, Polit & Beck, Munhall, and many other nurse writers amounts to. On this view, the validity of empirical inquiry always and inevitably depends, not on any argument or evidence, but on the arbitrary predilections of the individual investigator. It means that method is not accountable to anything other than personal preference.

Ultimately, then, Lincoln & Guba's Frankenstein conception poses a dilemma. Either 'basic beliefs' are arbitrary, assumed for any reason, and without reference to anything 'in nature'. In which case, research methods are no less arbitrary, no less subject to caprice. Or else research methods must be anchored in something other than the researcher's predilections. In which case, 'basic beliefs' must be answerable to facts about the world; and those facts can only be determined by systematic examination. However, this is merely to restate the hybrid nature of a paradigm, Lincoln & Guba-style. Either it is based on axioms chosen for no reason; or it is anchored in an empirical review (like Schwartz & Ogilvy's) of intellectual developments across a range of disciplines.

This is the ambiguity which I talked about at the beginning, and which Lincoln & Guba never resolve. They want non-arbitrary content, adopted for purely arbitrary reasons. It is the ultimate epistemological free lunch: substantive empirical content, with no evidential bill to pay. It is not, perhaps, surprising that it has proved so popular.

Notes

1. In Patomäki & Wight (2000) constructivism is seen, oddly, as a middle ground position, between the relativistic extremes of 'postpositivism' and the staid positivist orthodoxy. In this paper, I suspect, postpositivism is aligned with postmodernism and post-structuralism. Of course, this alignment may be a generally accepted convention in the study of international relations.
2. This is also the standard use in mainstream philosophy of the social sciences (Phillips 2000, Richardson & Uebel 2007). Or, at least, the philosophy of social science sense is much closer to Lincoln & Guba (2003) than it is to Lincoln & Guba (1985).
3. I am obviously ignoring the complications arising out of Gödel's incompleteness theorem, which is not relevant to the present context.
4. Anyone familiar with the concept of axiomatic systems is welcome to skip this bit. The point I am trying to establish by providing this example – that axioms are not beliefs – will hardly be news.
5. Again, I'm ignoring subtleties such as the parallel postulate, and the fact that Euclid expressed the axioms in terms of constructions.
6. It is, of course, more complicated than this. Euclid appears to adopt additional, but unarticulated, axioms to demonstrate some of his theorems. Indeed, he uses one to prove the very first theorem. For a good review, see Ryan (2010).
7. Actually, it could be applied to any real-world object which consisted of two alternating options – a row on a chessboard, for example. It's just that it wouldn't be much practical use. You can understand alternating black and white squares without having recourse to *Emoticon* as an axiom system.
8. In fact, there are more than two, and Riemannian geometry is a sort of meta-system which includes Euclidean geometry as a special case, applying to space with constant zero curvature. But these details are not relevant to the discussion, and Lincoln & Guba also ignore them.
9. It is not often remarked that, during the first half of this chapter, Lincoln & Guba rewrite history in order to make it fit their preconceptions. Here is an illustration. In supporting their claim that positivism leads to inadequate conceptualisations of science, they suggest: 'much of Einstein's work, for example, would be considered non-scientific by positivists, who would hardly be persuaded by or interested in Einstein's thought (*gedanken*) experiments' (p. 25). This, of course, is a complete travesty. The logical positivists regarded Einstein's work, and the theory of relativity in particular, as a benchmark for the understanding of scientific method, and it had a powerful influence on the emergence of the verifiability principle. Carnap, Reichenbach and Schlick all wrote intensively about relativity in the 1920s, and were on close personal terms with Einstein himself. As Friedman (1999) suggests: 'Logical positivism... was intimately intertwined with some of the most important scientific developments of the new century: in particular, with the development and propagation of Einsteinian relativity theory... The logical positivist movement was...identified with Einsteinian physics' (p. xi). None of which suggests a lack of interest in Einstein, or a belief that 'much of his work was non-scientific'. Friedman's book is an excellent source for the history of logical positivism, and its relation to scientific and mathematical advances during the early part of the twentieth century.
10. Another travesty. Gödel was strongly influenced by Carnap, and was himself a part-time member of the Vienna Circle. Moreover, the derivation of the incompleteness theorem prompted Carnap to write *The Logical Syntax of Language*, in which his debt to Gödel is clear and acknowledged: 'I often talked with Gödel about these problems' (Carnap 1963, p. 53). Goldfarb (2005) is an excellent summary of the intellectual exchanges between Gödel and Carnap. Similarly, the younger Heisenberg was attracted to positivism; and the Copenhagen interpretation of quantum physics, for which Heisenberg is responsible (along with Bohr) is usually regarded as a positivist conception. It would appear that Heisenberg's later rejection of positivism was based on a misunderstanding (Faye 2010). Lincoln & Guba's own garbled version of positivist philosophy explains why they think that it could not accommodate Einstein, Gödel, Heisenberg and Bell. They evidently did not think it necessary to check the facts. As for Bell's theorem, Lincoln & Guba do not bother to explain why they think post-Bell experiments in quantum mechanics, ruling out the alternative of local hidden variables once and for all, are inconsistent with positivism. The best explanation is that these experiments appear to exclude one form of reductive realism on empirical

grounds (Fine 1986), and Lincoln & Guba are under the impression that logical positivism is a realist perspective. This is not a very good reason, however, because their premise – that the positivists were naive realists – is mistaken (Hacking 1983, Giere & Richardson 1996, Richardson & Uebel 2007).

11. In 1985, Lincoln & Guba reported that the monograph, or the 'larger collection of documents' of which it is part, could be obtained from SRI for $500 (p. 68). The price appears to have discouraged some academic authors from accessing it themselves, as many subsequent references to it are indirect: 'cited in Lincoln & Guba'. There cannot be many texts as influential as *Naturalistic Inquiry* whose main source is so inaccessible; and there is a bizarre sense of the book resting on an intellectual contribution that few people, other than Lincoln and Guba, have ever seen.

12. They are also associated, unfortunately, with wackier philosophies, fringe science, complementary therapies, UFOs, mysticism, and ancient spiritual teachings. For a sample, try Talbot (1996).

13. Which makes it all the more peculiar that Lincoln & Guba attack the whole project of generalising in a later chapter. Indeed, virtually every sin which they complain about in Chapter 5 they have already committed in Chapter 2: dependence on inductive logic, dependence on the assumption of freedom from time and context, entrapment in the nomothetic-idiographic dilemma, and entrapment in a reductionist fallacy.

14. Until the nineteenth century, of course, it was assumed that Euclidean geometry *was* a description of something, i.e. space-in-general. This turned out to be wrong, and it is now recognised to be a purely logical structure, an axiom system, which just happens to apply successfully in local space. This change in status solved at least one philosophical problem. As long as the Euclidean system was thought to be a description of space, there was an extremely puzzling question looking for a persuasive answer: how on earth can we have *certain and logical* knowledge of something empirical? Once Euclidean geometry, in common with all geometries, was understood to be an axiom system, the answer to the question became clear: we don't.

15. See, for example, Von Eckardt Klein (1978) and Churchland (1986), as well as must-reads such as Bickle (2003) and Bechtel & Richardson (2010). It cannot be emphasised enough that this is genuinely an empirical question. In one type of system, information is localised to specific components. In other systems, it is distributed throughout the entire network of parts. In a third type of system, information about the global state of the system really is detectable in individual components. The only way to find out which category a given system belongs to is to do the experiments. You don't know just by looking at it, or because you have a preconceived notion ('paradigm') that every system is of the third type.

16. Lincoln & Guba (2003) get quite grumpy about this, insisting that 'within each paradigm, mixed methodologies (strategies) may make perfectly good sense' (p. 266), and reminding their readers that in *Naturalistic Inquiry* they had argued: 'qualitative methods are stressed within the naturalistic paradigm not because the paradigm is anti-quantitative but because qualitative methods come more easily to the human-as-instrument' (p. 198). However, it is difficult to read *Naturalistic Inquiry* and not get the *very* strong sense that, for researchers working in the naturalistic paradigm, qualitative techniques are the default option. In particular, the section on the 'fourteen characteristics' (pp. 39-43) presents qualitative research as the approach which can more or less be inferred (theorems) from the naturalist axioms listed earlier.

167 I say 'redefine', because the familiar canons of rigour (in experimental design, for example) do not apply, and cannot apply, to phenomenology; and to reject scientific protocols on philosophical grounds, and then claim that your research is none the less 'rigorous', borders on self-contradiction. It is no great surprise, then, that the idea of 'rigour' undergoes a massive transformation. As just one example among dozens, consider de Witt & Ploeg (2006), whose five 'expressions' of rigour are: balanced integration, openness, concreteness, resonance, and actualization. Their abstract is well worth quoting: 'Balanced integration refers to the intertwining of philosophical concepts in the study methods and findings and a balance between the voices of study participants and the philosophical explanation. Openness is related to a systematic, explicit process of accounting for the multiple decisions made throughout the study process. Concreteness relates to usefulness for practice of study findings. Resonance encompasses the experiential or felt effect of reading study findings upon the reader. Finally, actualization refers to the future realization of the resonance of study findings.' One might (charitably) make a case for 'openness'

in this sense as having something to do with rigour. But to imagine that the *felt effect on the reader*, or *resonance of study findings*, can be even distantly compared to *rigour* is basically to engage in an act of self-deception.

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