The idea of nursing science

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INTRODUCTION

It is commonly asserted that nursing is a science (e.g. Rogers 1970, 1990, Parse 1987, Kirkevold 1997, and the journal Advances in Nursing Science). Those who resist this description generally do so on the grounds that nursing is an art (Weidenbach 1964); or on the grounds that ‘scientific method’ (generally an implausibly crude version of positivism) is not applicable to nursing (see Darbyshire 1994, Paley 1996). Other theorists claim that nursing is both a science and an art (Watson 1985).

This paper draws on work done in the field of the philosophy of science to argue that the attempt to conceive of nursing as a science brings with it a range of problems the significance of which has not, hitherto, been noticed. Hence, whilst the claims advanced here do not bear upon the conception of nursing as an art, they do have ramifications for conceptions of nursing as a science, or to have a significant scientific component.

The paper begins by rehearsing two reasons why it might be considered desirable to describe nursing as a science. Then an account of science is offered and criticized. It is shown how these criticisms can be taken seriously to impugn the rational image generally accorded to the scientific enterprise. A response to these criticisms is then described — the so-called ‘historical turn’ (Laudan 1996 p. 195). Finally, the relations between this ‘turn’ and the serious problems accompanied with its applicability to nursing are described.

WHY NURSING SCIENCE?

There seem to be at least two good reasons why one might claim that nursing is a science. The first stems from the status of science. O’Hear (1990 p. 1) writes: ‘There is no institution in the modern world more prestigious than science’. Given nursing’s concern that its own status is considered less exalted than that accorded to medicine, it may be anticipated that attempts to define nursing by reference to a high-status enterprise such as science would be positively encouraged.

Second, it is widely thought that the status of science is a consequence of its great success. The scientific enterprise has produced much which is fundamental to modern living: it has transformed communication, transport, health care, human survival, entertainment, and the places in which we live.

Of course, there is occasional disquiet expressed concerning certain aspects of the scientific enterprise, e.g. environmental pollution, but in the main most people seem to approve of and make use of the technological developments which are among the fruits of scientific endeavour.
It is generally assumed that this success derives from the application of a distinctive, systematic scientific method (Chalmers 1982). Hence, in wanting to render nursing actions more successful (however ‘success’ is to be construed) it may reasonably be assumed that this method could be applied to the nursing context with benefit for the profession.

Two attractions of an alignment with science are evident: status, and the adoption of a successful method. Before considering what this method may be it will be useful to consider the following taxonomy of sciences provided by Hempel (1966).

**TAXONOMY OF SCIENCES**

At the most general level, Hempel draws a distinction between the empirical and the non-empirical sciences. The latter include logic and pure mathematics, ‘whose propositions are proved without essential reference to empirical findings’ (Hempel 1966 p. 1). Within the class of empirical sciences, Hempel posits a division between the natural and the social (or human) sciences. He acknowledges difficulties related to the precise grounds for this distinction, but goes on to suggest (Hempel 1966 p. 1):

- The natural sciences are understood to include physics, chemistry, biology and their border areas; the social sciences are taken to comprise sociology, political science, anthropology, economics, historiography and related disciplines. Psychology is sometimes assigned to one field, sometimes to the other, and not infrequently it is said to overlap both.

Hempel (1966 p. 1) further states that the aims of the empirical sciences are ‘to describe, to explain and to predict the occurrences in the world we live in’.

Hempel’s taxonomy is worth reiterating here due to the tendency in nursing literature to infer that science is, by definition, concerned exclusively with empirical phenomena (e.g. Marriner-Tomey 1994 p.3). For the following discussion, my concerns will be restricted to the empirical sciences.

**UNDERMINING THE RATIONAL PICTURE OF SCIENCE**

Newton-Smith (1981 p. 1) notes that science is commonly viewed as ‘the very paradigm of institutionalised rationality’ — not least by scientists themselves. The construction of this rational image stems partly from the view that theory-neutral observations underpin the development of scientific theories, which, in turn, are either confirmed or falsified (Chalmers 1982). It is also part of this rational image that disputes between proponents of rival theories can be settled by reference to a neutral court of appeal, for example a fair and impartial test-situation. Hence developments in science may be understood to result from such test-situations. A further component of this rational image is the view that science informs us of the nature of the world; hence, theories are either true or false, and false theories are jettisoned in favour of true ones. (See Newton-Smith 1981 and Chalmers 1982 for descriptions, and critiques, of the ‘rational image’ of science.)

However, due largely to the work of T.S. Kuhn (1970) amongst others (e.g. Hanson 1958), the view of science as a rational enterprise has come under serious pressure. A number of stages in the attack on the rationality of science can be discerned. Roughly, the stages run as follows: first it is pointed out that observations are not theory-neutral, they embody some particular theory or world-view; then it is observed that criteria for testing theories inevitably presuppose the truth of further theories; then a claim is advanced to the effect that the meanings of terms are relative to scientific theories; and finally it is claimed that since proponents of rival theories cannot communicate with each other, and may even occupy different worlds, there is no rational foundation for theory choice in science. These steps will now be rehearsed in more detail.

It has become clear that the idea of ‘theory-neutral’ observations or observation reports is close to untenable. Chalmers (1982) and others (e.g. Hanson 1958) have pointed out that what an observer sees is partly determined by what he expects to see, by cultural factors such as prior knowledge, and of course, by biological constitution.

For example, consider the famous duck-rabbit line drawing referred to by Wittgenstein (1953 p. 194). This can be seen either as a duck or a rabbit. It is reasonable to suppose that two observers upon seeing the duck-rabbit line-drawing see different things, in spite of the fact that their respective retinal images can be supposed to be equivalent. For example, if one observer lives in an environment in which ducks proliferate and has never seen a rabbit, he will see the drawing as a duck. If it is supposed that for the other observer the reverse is the case, he will see the drawing as a representation of a rabbit. Hence what they see is determined by contextual considerations.

Further, Chalmers draws attention to an experiment in which subjects are shown individual playing cards from a standard pack. As would be anticipated, subjects easily identify them (i.e. as 10 of hearts, jack of clubs, etc.). But when ‘anomalous cards’ (Chalmers 1982 p. 25) are introduced, such as a red Ace of Spades, subjects mistake them for legitimate cards, e.g. an Ace of Diamonds or an Ace of Spades. Such studies, and others, indicate that what is seen is at least partly determined by what one expects to see.

Hence, what is seen seems not straightforwardly available to be ‘read off’ from the world; and what is ‘seen’ cannot simply be equated with the patterns of light which fall onto the observer’s retina. Thus, the
view that observations can provide a secure, theory neutral ‘grounding’ for theory construction is subject to serious pressure.

The points just made call into question the view that observation provides a neutral court of appeal to settle disputes between rival theorists. The reason is that, as previously noted, what is seen is determined in part by the expectations and previous experiences of perceivers. There is good reason to suppose that these differ not simply across individuals within a culture, but also more generally across cultures. For example, within a culture, what is revealed by an X-ray is seen differently by an expert radiographer and a novice (Chalmers 1982 p. 26). The novice sees only an apparently random array of lines and blotches, the expert sees an infected lung. Chalmers points out that in many cultures the idea of 2-dimensional representations of 3-dimensional objects is alien. Hence, anticipated perceptions of a Necker Cube are not had. (A Necker Cube is a 2-dimensional representation of a 3-dimensional wire cube (Gregory 1987 p. 508).) Such figures are seen simply as two-dimensional arrays of lines.

Thus, it is not clear that observations provide an unambiguous, theory-neutral ground for theory construction. Secondly, objectivity of what is seen by several observers seems open to query in that what is seen is determined, in part at least, by expectations and by other kinds of cultural factors.

These points appear to threaten the rational image of science in that the ‘grounding’ of theories in observations seems inevitably polluted by factors such as those just described. This has ramifications for attempts to evaluate rival theories, because, as already noted, there are reasons to doubt that what one sees is simply a mirror of what is really ‘out there’ in the world.

Before moving on, it is worth making one further brief point. This concerns the role of sense-extending instruments in observation. Clearly, once these are introduced the observational data they throw up cannot be regarded as theory-neutral since the legitimacy of the theoretical apparatus employed in the construction of the relevant instrument is presumed. A fundamental presupposition of the uses of sense-extending instruments in science is that they are, in fact, more likely to be accurate than naked eye observations. This ran counter to much standard opinion regarding perception during the period in which Galileo developed the telescope; he had to maintain, against the prevailing opinion, that the telescope provided more accurate data than naked eye observations (see Chalmers 1982 p. 26).

So far then, we have queried the legitimacy of any appeal to a realm of pure observational data. We have noted that these are dependent upon a variety of factors which impugn the theory-neutral status of observations.

THE SIGNIFICANCE OF THE ATTACK ON THE RATIONAL IMAGE

An intuitively plausible understanding of the aim or end of science is that it provides us with a ‘true’ description of the world. In this intuitive account, scientists employ a method which serves as a means to describe the world as it really is. Hence, the ‘end’ of science is ‘truth’ and the means are the methods which bring about that end.

But one reasonable way to understand what a true description of the world is that it is one which ‘matches’ or corresponds to the way the world actually is. But the critique just given suggests that there is no access to the world as it ‘really’ is. All that we have access to is the world as it is viewed through the lens of some theory or other. This follows since, for Chalmers, even our ordinary common sense descriptions of the world are themselves theory-laden. Hence we cannot match our descriptions of the world with the world since this would require ‘direct’ access to the world — a kind of access not tainted by prior theoretical commitments — and the above points regarding the theory-laden nature of observation suggest that we are denied this access.

Further, it is common to point out that criteria for testing theories are themselves ‘internal’ to the theory. Hence, tests of a theory will themselves involve other theoretical commitments, and more importantly, will require that these other theoretical commitments are supposed true. For example, prior to the 15th century it was generally believed that the Earth is stationary and that the sun, moon and planets rotate around a stationary Earth (the Ptolemaic/Aristotelean system (see Aristotle’s On the Heavens, Bk. 2, ch. 12)). In the 16th century Copernicus (1543) proposed a system of astronomy in which the Earth and other planets rotate around the Sun, and, hence, of course, according to which the Earth is held to be in motion and not stationary.

Those committed to the Ptolemaic system contested the legitimacy of the rival theory and devised a ‘test situation’; this has become known as the ‘Tower Argument’ (see Feyerabend 1975, Chalmers 1982). Defenders of the Ptolemaic system reasoned thus: If the Earth really is in motion such that it completes a rotation in 24 hours it must be moving fairly rapidly. Hence, a stone dropped from the top of a tall tower would land some distance from its foot (since the tower would continue to move along with the Earth’s surface). But since such a stone always lands at the foot of the tower — as predicted in the Ptolemaic/Aristotelean system — the Earth cannot be in motion, and so the Copernican hypothesis must be false. (This argument is ascribed to defenders of the Ptolemaic/Aristotelean system in Galileo (1632 p. 126) and can be found in Aristotle’s On the Heavens, in Ackrill 1987.)
A nursing example to make the same point runs as follows. Suppose it is thought that egg white and oxygen applied four-hourly to pressure areas helps to prevent pressure sores developing. A test-situation for this would seem to involve not applying the egg-white and observing whether or not a pressure sore develops. The patient is left unmoved and, sure enough a pressure sore develops. Hence, the egg-white theory is confirmed.

Of course, reasoning such as this is completely spurious. For it may be that the non-development of pressure sores is not related to the combined properties of egg-white and oxygen. Rather, pressure sores do not develop due to the fact that the position of patients is regularly changed and the relevant parts of their bodies receive a short period of massage, enhancing blood flow, and reducing the likelihood of pressure sores developing. So omitting to apply egg white and oxygen to patients’ pressure areas only leads to the development of pressure sores due to the omission of changing the patient’s position and massaging the area. The properties of egg white and oxygen are not causally related to the prevention of pressure sores, nor to their development in the absence of pressure area care. Yet this example helps to show how a test situation can be devised which simply presumes the theory to be true and does not provide a proper test.

A further criticism of science’s rational image derives from a particular view regarding the meaning of theoretical terms. According to this view, the meanings of theoretical terms are theory-relative. Hence, for example, the terms ‘space’ and ‘time’ may be said to have different meanings across Newtonian and Einsteinian physical theory: for the former spatial and temporal positions are non-relative, and for the latter they are relative (see Newton 1687 in Cajori 1934, and Einstein 1954).

To take another example, consider the two nursing paradigms identified by Parse (1987), the simultaneity and totality paradigms. It is claimed that these involve different and incompatible views of persons, health and nursing (Parse 1987 p. 136). For example, it is proposed that nursing as conceived of in the simultaneity paradigm involves ‘no systematized nursing care plans’ (1986 p. 137). She contrasts this with nursing in the totality paradigm which does involve a commitment to systematize nursing care. Given this, it is reasonable to claim that the term ‘nursing’ has a different meaning in these rival theories — similar conclusions could be advanced with respect to ‘man’ and ‘health’.

The thesis that the meanings of scientific terms are relative to theories is termed by Newton-Smith (1982 p. 12) a ‘radical meaning-variance thesis’ (RMV). What appears to follow from this is that proponents of different theories cannot then communicate with each other, due to the fact that they mean different things by the terms they use. Note that this is the case even if they employ the same terms, e.g. ‘space’, ‘health’, ‘nursing’, etc. What is expressed by these terms differs relative to the theories in which they feature and so proponents of different theories cannot communicate (according to RMV).

In fact Kuhn (1970 p. 150) goes so far as to say that theorists who are committed to differing paradigms ‘practice their trades in different worlds’. One is led to this apparently extreme claim, roughly, as follows: one’s view of the world is determined by one’s theoretical commitments; one cannot separate the question of how the world is from the question of how it appears ‘through’ a particular set of theoretical considerations; so, for practical purposes, those with differing theoretical commitments ‘see’ and thereby occupy different worlds.

In summary, then, we have noted a number of challenges to the rational image of science. The first proposed that no ‘theory-neutral’ description of the world is possible. The second maintained that criteria for testing theories are ‘internal’ to them. The third sceptical thesis is that the meanings of theoretical terms are themselves theory-relative. This has been claimed to have the consequence that proponents of differing theories cannot meaningfully communicate with one another, and even that they inhabit different worlds.

These sceptical challenges generate at least two further problems. The first is that if proponents of differing theories cannot communicate (due to RMV) how is it possible to evaluate rival theories? If proponents of the two paradigms identified by Parse mean different things by their key terms how is it possible to compare the theories, or for proponents of the paradigms to converse?

This is a problem which has seemed serious to most philosophers of science. For a rational account of science as an enterprise seems to require that the transitions between theories, as one theory is dropped in favour of another, be explicable. Ideally, it should be possible to explain how a later theory is ‘better than’ a theory it replaces. But how can this be done if criteria for theory evaluation are inevitably theory-relative; and if proponents of differing theories cannot even communicate?

Perhaps worse, these sceptical challenges may invite a still more radical challenge. Namely, a challenge to the very status of scientific accounts of the world. Such a challenge has been voiced by Feyerabend (1975). Given acceptance of the kinds of sceptical points rehearsed here, he asks why we should give greater weight to the worldview favoured in science than to any other systematic world-view, e.g. religious discourse, astrology or ‘voodoo’ (Feyerabend 1975 pp. 49–52).

Unfortunately, space does not permit discussion of Feyerabend’s challenge. What I propose to do next is to consider a more positive response to the sceptical challenges described above.
THE ‘HISTORICAL’ TURN

The problems just described seem to entail that there are no legitimate criteria by which to evaluate rival theories: such evaluations merely impose the standards of plausibility internal to some prior theory. So how can a rational, defensible basis for theory choice be derived?

One strategy proposed has been to begin to consider significant events in the history of science. This obviously requires some consensus regarding what is a significant event, but it is fair to say that certain theories and discoveries are typically put forward as examples of ‘good science’. Such examples include the work of Copernicus (1543), Galileo (1632), Newton (1687), Einstein (1954), Watson & Crick (1953) and so on. In accordance with this ‘historical’ turn one considers in detail these significant scientific developments. These are taken to point to, and help to elucidate, the means by which science progresses, or at least, develops.

It is plausible to hold that the ends of science are to ‘produce knowledge’ (Chalmers 1990 p. 95) about the world, or to describe the world; scientific method is the means by which this end is reached. We have noted or at least, develops.

If actions of a particular sort, m, have consistently promoted certain cognitive ends, e, in the past, and rival actions, n, have failed to do so, then assume that future actions following the rule ‘If your aim is e, you ought to do m’ are more likely to promote those ends than actions based on the rule ‘If your aim is e, you ought to do n’.

Roughly, then, Laudan asserts that given agreement about what the ends of a series of acts are supposed to be (e.g. to describe the world) it should be possible to justify preferring one set of means to those ends than another set of means. For example, suppose it is asserted that examination of the history of science shows that great scientists chose ‘simpler’ solutions to problems rather than complex ones, i.e. that in a choice between a simpler theory and a more complex one, the simpler theory was adopted (Kuhn 1977, Quine & Ullian 1978). Laudan’s principle proposes that we should select simpler theories if doing so has ‘consistently promoted’ the relevant cognitive ends. This can be found out by examination of the history of science (Laudan 1996 p. 212).

NURSING SCIENCE

The above discussion brings to the fore certain key problems in the philosophy of science. Insofar as nursing is to be regarded as a science it too seems forced to acknowledge certain of the difficulties discussed above. For example, it seems plain that the points regarding the theory-laden nature of observations can be carried over to the nursing domain. The significance of this is that even within the natural sciences interpretation of phenomena takes place: descriptions of observations within the natural sciences do not straightforwardly mirror the world. Hence interpretation cannot be regarded as the distinguishing criterion of the human sciences (Hiley et al. 1991, Benner 1994). Thus the attempt to distinguish nursing science from natural science by reference to the phenomenon of interpretation requires substantial qualification.

Similarly, the points regarding the ‘internal’ nature of theory testing seem to have an important application to the nursing domain. Given this, how should rival nursing theories be compared? Recall that the ‘historical turn’ in the philosophy of natural science involved looking back at the history of science and examining agreed examples of good science. Although there are some complications (Laudan 1996), overall it is fair to say that there is broad agreement concerning the ends of science: roughly, to find out about the nature of the world. Hence agreement can be presumed in two key areas: the specification of the ends of science (again, subject to minor provisos raised by Laudan); and consensus regarding what were instances of good science, i.e. what were really important and significant moves in the history of science. Considerations such as these contribute to the determination of the means by which scientists can reach agreed cognitive ends (i.e. finding out about the world).

If nursing is a science, then perhaps it will prove fruitful to apply the historical turn to it in order to determine how nurses might best meet the ends of nursing. However, there seem at least three important problems with such a strategy.

A first one stems from the observation that professional nursing, in which a period of formal training is required, is a relatively recent phenomenon, beginning only in the middle of the 19th century (Marriner-Tomey 1994 p. 73). So perhaps there simply is insufficient historical data available in order to conduct the kind of investigations the historicists in science recommend.
Second, perhaps more seriously, is it the case that there is a consensus concerning what practices constitute examples of ‘good nursing’? It is not clear to me that there is. For example, in, at least, the early part of the present century, a ‘good nurse’ was one who followed the instructions of nurses of a higher rank and medical personnel (Dock 1917). It can be claimed that the nature of nursing has changed so much over the past 40 or so years that it is not at all clear that a consensus of the kind the historical turn seems to require exists. The kinds of changes that seem important include the attempt to provide a systematic, scientific footing for nursing practice by the development of nursing theories (Silva & Rothbart 1984), and also the increasing emphasis upon ethics and accountability (United Kingdom Central Council for Nursing, Midwifery and Health Visiting 1984). To take a specific example, there is much greater emphasis placed in contemporary nursing on ‘respecting the autonomy’ of patients than has been the case earlier in this century (Chadwick & Tadd 1992). The radical change in recent years in the nature of the nursing care of people with mental health problems and learning disabilities — from institutional to community care — is a further example of the way in which nursing has changed. It seems reasonable to claim that these are significant developments in the history of nursing that signal a change in the conception of the nature of nursing. (If it is accepted that there have been such changes, they seem to present a serious problem for Silva & Rothbart 1984 who advocate a historical ‘turn’ of the kind described above.)

Third, again seriously, is it the case that the ends of nursing can be specified? The reason why this may be problematic is that the phenomena of illness and health seem to have an essential experiential, subjective component to them. That is to say, the question of whether nursing can be specified? The reason why this may be problematic to the kind described above.)

References

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