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Abstract

Understanding the dynamics of dissent and heresy in medicine can be aided by use of suitable frameworks. The dynamics of the search for truth vary considerably depending on whether the search is competitive or cooperative and on whether truth is assumed to be unitary or plural. Insights about dissent and heresy in medicine can be gained by making comparisons to politics and religion. To explain adherence to either orthodoxy or a challenging view, partisans use a standard set of explanations; social scientists use these plus others, especially symmetrical analyses. There is a wide array of methods by which orthodoxy maintains its domination and marginalises challengers. Finally, challengers can adopt various strategies in order to gain a hearing.

Keywords: Dissent; Heresy; Orthodoxy; Medical knowledge; Medical research; Strategies

Introduction

The conventional view is that the human immunodeficiency virus, HIV, is responsible for AIDS. But for many years a few scientists have espoused the incompatible view that HIV is harmless and is not responsible for AIDS (Duesberg, 1996; Maggiore, 1999). The issue came to world attention in 2001 when South African President Thabo Mbeki invited a number of so-called HIV/AIDS dissidents to join an advisory panel. In response, more than 5000 scientists signed a statement affirming support for the standard view that HIV is the cause of AIDS. These events were unusual in their visibility: few challenges to medical orthodoxy receive such high-level media coverage. For example, the proposal that squatting for defecation is a means for preventing haemorrhoids has received little scientific attention, with most discussion being in the pages of alternative health magazines (Dimmer, Martin, Reeves & Sullivan, 1996). Furthermore, there are challenges to orthodoxy that cannot be found in the medical or any other literature, since their proponents are not able to get published. When it comes to orthodoxy and challenges to it, there is a tremendous variation in ideas, support, visibility and outcome.

What is the best term for referring to a challenge to orthodoxy? Wolpe (1994) offers an illuminating typology of internal challenges. One type of challenge is to "knowledge products" such as disease prognoses that question current knowledge - namely, what are considered to be facts - while operating within conventional assumptions about scientific method. Wolpe calls this sort of challenge *dissent* and gives the examples of Peter Duesberg and, at the collective level, doctors practising homeopathy. A second type of challenge is to the profession's authority structure, without challenging knowledge systems or methods. Wolpe calls this *rebellion* and gives examples of doctors using untested AIDS therapies and women entering previously male-dominated medical domains. The third type of challenge is to the central values of the orthodoxy, including the very assumptions about how claims should be evaluated. Wolpe calls this *heresy* and gives the examples of Thomas Szasz's claim that mental illness is a myth and, at a collective level, the holistic health movement. Wolpe's useful classification of challenges into dissent, rebellion and heresy will be adopted here; the main focus will be on dissent and heresy.

Wolpe (1994) notes that these forms of challenge are not always discrete. For example, some cases of dissent, such as Benveniste's finding that extremely dilute solutions can have biological activity (Davenas, Beauvais, Amara, Oberbaum,

Robinson, Miadonna, et al., 1988), can turn into heresy, in this case by providing support to the heretical field of homeopathy. Another important distinction made by Wolpe (1994) is between heresy and reform, the later being a challenge couched in orthodox terminology and treated seriously by adherents of orthodoxy. Heresy is in effect created by the response of orthodoxy: by attacking certain views, those views become delineated as beyond the pale. Heresy and dissent can be said, then, to be socially constructed: their status as forms of ideological challenge is not inherent in knowledge claims but depends on the way they are treated by the orthodoxy.

It is a simplification to talk of any particular type of dissent or heresy as if it constitutes a cohesive alternative. For example, the views of Peter Duesberg, by far the most prominent HIV/AIDS dissident, are often assumed to represent the views of all HIV/AIDS dissidents, but actually there is a considerable range of perspectives, not all compatible, including the view that there is no solid evidence that HIV even exists (Papadopoulos-Eleopoulos, 1988), causing infighting within the dissident movement (<http://www.virusmyth.net/aids/>). Delving into any particular case study can lead to increasing complexities that seem to defy attempts at generalisation. Nevertheless, it can be useful to seek to discover regular patterns and to develop ways of explaining dissent and heresy. With the large qualification that the full complexity of actual cases can never be captured by any model, the task of this paper is to outline some frameworks for understanding the dynamics of dissent and heresy in medical theory and research

There are several ways to proceed. One fruitful approach is to analyse case studies, which can reveal a wealth of insight. Another is to start with principles of good research and assumptions about the purpose of theory, looking for guidance about practical implementation. Here a somewhat different approach will be used. Various ways of explaining adherence to orthodoxy and dissent/heresy will be described from the characteristic viewpoints of partisans and social scientists, and various methods for domination and marginalisation will be outlined, which is basically an exercise in describing the operation of power. Then a number of strategies that challengers can adopt to gain a hearing will be presented. Focussing on methods and strategies is a pragmatic approach that does not seek to pass judgement on claims and counterclaims.

But before examining methods and strategies, it is worthwhile stepping back a bit and asking, "Why should dissent and heresy exist?"

Models of the search for truth

That dissent and heresy exist seems patently obvious, as examination of any number of cases testifies, from cancer to vaccination. Could it be otherwise?

A wider picture can be grasped by looking at two assumptions: whether there is a single truth or a plurality of truths and whether the search for truth occurs by conflict or cooperation. This leads to four possibilities, as shown in Figure 1.

	Cooperation	Conflict
Unitary truth	IV. Cooperative search for truth and social benefit	I. Orthodoxy versus dissent/heresy
Plurality of truths	III. Cooperative tolerance	II. Competition; market struggle

Figure 1. A classification of modes of search for truth in terms of assumptions about cooperation/conflict and unity/plurality of truth. The four quadrants are labelled I through IV clockwise from upper right.

Quadrant I assumes conflict over truth, assumed to be unitary. These conditions help account for the viciousness of many struggles, which are win-lose: if there is only one truth, then every other viewpoint must be wrong. Duesberg argues that HIV is neither necessary nor sufficient to cause AIDS, whereas the dominant view is that HIV is a necessary factor. Both sides believe that only side can be correct - namely, they assume a unitary truth about HIV's role - and, in practice, conflict is the primary mode by which the issue is engaged.

If it is assumed instead that there are multiple truths (a standard postmodernist presumption), while retaining a conflict orientation, then we enter Quadrant II, in which the characteristic mode of interaction is competition, for

example in a "market of modalities." This model seems to fit some ailments such as back pain, in which different patients consult doctors, chiropractors, osteopaths, acupuncturists or others, without a general presumption that any single modality provides a universal answer. This model does not ideally fit any disease, since many practitioners continue to believe they have a special insight into the truth, but the increasing role of markets in health and medicine means that modalities compete with each other in a market in which claims to exclusive truth are less persuasive than in the past, with consumers' demands for "choice" fostering a tolerance for diverse truths (Gottlieb, 1997).

Moving to Quadrant III, we enter a region where cooperation combines with an assumption of a plurality of truths. In this hypothetical world, researchers and practitioners would be happy to help each other develop greater insights on a range of perspectives. Imagine, for example, orthodox practitioners helping homeopaths to do better homeopathy, and vice versa! This would be a dramatic contrast to Quadrant I. This sort of cooperative tolerance can happen on an individual level, such as when a referee disagrees with an author's perspective but, rather than attacking it, offers insights on improving the argument within the author's framework. Cooperative tolerance may occur in some patient support groups, in which the goal of helping others takes precedence over epistemological differences.

Finally, Quadrant IV describes the ideal world of scientific research, in which researchers cooperate in a search for truth. Although this is the model of research commonly portrayed in science textbooks and uncritical histories, it is far from what is usually found in the actual practice of science, which is marked by rivalries and power plays (Boffey, 1975; Dickson, 1984; Greenberg, 1967). Quadrant IV is the model that seems to explain research when there are no challengers. Within a paradigm, many researchers cooperate to solve puzzles. On many issues in medicine there is no disagreement, for example concerning whether it is wise to stem massive loss of blood. Because cooperation is much less dramatic than conflict, there is a tendency to focus on conflict as the norm. Actually, conflict can only thrive on a foundation of agreement about many other matters.

The four quadrants in Figure 1 represent ideal types: knowledge systems and interactions between them seldom fit nicely within a single quadrant. A medical controversy might begin mainly in one quadrant and proceed through others, while exhibiting some elements of all four at any

given time. For example, in the debate over the causes of schizophrenia, competition between various biomedical explanations could be said to fall within Quadrant IV (though with some competitive elements), while alternative models - the myth-of-mental-illness model and the mystical model - are heresies with respect to the overall biomedical orthodoxy, with the dynamics fitting squarely into Quadrant I (Gosden, 2001). Another example is acupuncture, whose challenge to biomedicine would normally sit in Quadrant I. However, medical practitioners who use acupuncture and redefine it in biomedical terms move the dynamics towards Quadrants II or IV (Dew, 2000a).

Perspective on dissent and heresy in medicine can be gained by making comparisons with politics and religion. First consider politics. In the Quadrant I political perspective, states claim a monopoly on political truth, treat opponents as heretics and crush them by any means possible. Examples are state repression and totalitarianism. In Quadrant II, conflict is moderated by a recognition that truth is not unitary, as when political parties compete electorally. (This may occur within the context of a shared assumption about certain political truths, such as that governments cannot tolerate nonparty challenges, for example from workers.) An example fitting with Quadrant III is the canton system, which in principle allows local populations to adopt different political systems within an overall framework of cooperation, as found in Switzerland and was proposed, in more radical form, for South Africa (Kendall & Louw, 1987). Finally, examples fitting Quadrant IV include consensus (also called unitary democracy), such as in small cooperatives, and - to use a very different case - so-called "democratic centralism," in which a political party elite agrees on a unified "line," as is typical of Leninist parties. As in the case of medicine, the four "political quadrants" are ideal types, with actual political systems exhibiting some elements of all four types, with different weights at different times.

What can be learned from this comparison between models of medicine and politics? One point is that no particular model (i.e., quadrant) is necessarily good or bad. In politics, systems based on conflict and on cooperation - typified by voting and consensus, respectively - each have strengths and weaknesses as democratic forms (Mansbridge, 1980). Quadrant I includes totalitarianism, with repression of all dissent - including scientific dissent (Popovsky, 1980) - but can also describe one face of a generally tolerant society, namely when the government uses repression against those labelled as traitors or terrorists. Nonetheless, the social costs of operating in Quadrant I are considerable. In politics,

repression of challengers, however justifiable, commonly results in a reduction in civil liberties, so by analogy we might expect that attacks on medical dissidents are likely to inhibit open expression in medical research. Certainly there is evidence that workers in many occupations are afraid to challenge the status quo, for example in environmental science (Wilson & Barnes, 1995) and government employment (Zipparo, 1999).

Another important point is that there are alternatives to the model of orthodoxy versus dissent/heresy. In the heat of battle, the existence of alternatives is often forgotten.

Next consider religion or, perhaps more accurately, religious establishments. The Quadrant I perspective on religion fits what might be described as "intolerant monopolising religions," namely those that consider they are holders of the one and only truth and that those who do not agree are heretics. Examples are Christianity and Islam during long periods of their history. Proponents of other religions can come under attack, but special enmity is reserved for insiders who deviate from orthodoxy: these heretics are the most feared and reviled (Kurtz, 1983, 1986).

In Quadrant II, religious hatreds are greatly reduced. Rather than seeking to impose a monopoly on religious truth, there is a competition for allegiance. This describes relations between churches in many contemporary societies with secular governments. It also applies to denominations within some religions, such as different Protestant churches.

Quadrant III fits those liberal-minded or free-thinking individuals who are found both within some religions and outside of organised religion altogether, who seek spiritual truths wherever they can find them, and encourage others to find their own truths, using the resources of each religious tradition to maximum effect. Cooperative tolerance also describes some spiritual traditions such as Zen Buddhism.

Finally, in Quadrant IV might fit some aspects of ecumenical movements that see different religions as all speaking about the same thing, but in different languages, an approach not greatly dissimilar to Quadrant III.

As before, the four religious quadrants are ideal types that do not capture the messiness of reality. For example, leaders of many churches may believe they have special access to the truth but in practice engage in market-style competition for allegiance because they do not have the power to impose their views on others.

These models of religion offer some insights concerning medicine. The orthodoxy-heresy model of religion applies most obviously when a religious establishment has a great deal of political and social power that is linked to hegemony in the realm of ideas. For example, during the Middle Ages in Europe, the Catholic Church had enormous economic resources of its own, strong ties to monarchs and a monopoly over education, as well as crucial ideological control. In most parts of the world today, no church has anything like this degree of power, so there is greater emphasis on market competition or a more cooperative approach. However, in militant theocracies, such as Iran and Afghanistan when crusading religious elites have controlled the state, the orthodoxy-heresy model fits very well.

Another point is that whereas differences in beliefs can be extremely threatening to an establishment, in a more cooperative environment, these differences become opportunities for learning. In other words, no belief is heretical in itself. What makes it heresy is the attitude of the dominant group. (This also applies to political beliefs.) In short, it can be said that dissent and heresy are created by attempts to create or maintain hegemony.

Finally, challenges from the inside - heresy and dissent - are far more threatening to an establishment than outside challenges. This is true of all establishments, not least medicine (Dew, 1997; Wolpe, 1990).

Models for explaining adherence to orthodoxy and dissent/heresy

In the remainder of this paper, the focus will be on medicine as described by Quadrant I, namely arenas in which competition over an assumed unitary truth leads to the dynamics of orthodoxy and dissent/heresy. Within this model, a key question is how to explain adherence to either medical orthodoxy or a challenging view. Partisans typically explain their own views as being based on fact, logic and sound scientific procedure, in short arguing that truth is on their side. What is more interesting is how they explain others' support for some different position. It is useful to outline four explanations frequently articulated by partisans in disputes.

Table 1. Common explanations by partisans for others' adherence to contrary beliefs

1. Wrong ideas
2. Personal prejudice; unscientific behaviour
3. Paradigm-boundedness
4. Vested interests

Explanation 1 is that the other side is wrong in terms of facts, arguments and theories. For example, the medical establishment claims that homeopathy is impossible since, after sufficient dilutions, there is no physical mechanism by which homeopathic medicines can cause any biological effect. From the viewpoint of orthodox medicine, then, homeopathy is rightly marginal, because it is based on wrong ideas, and the orthodox view is dominant because it is scientifically correct or at least founded on sound scientific principles.

Advocates of homeopathy, on the other hand, believe that medical orthodoxy is wrong. (Indeed, on investigating any medical controversy, it is striking how fiercely each side believes in its own validity and the other side's error.) But this provides no way of explaining why the orthodoxy is dominant, so homeopaths must seek some other explanation for this.

Explanation 2 says that adherence to scientific beliefs is based, in part, on scientists' personal prejudice. Although the standard picture is that scientists deal with facts and logic neutrally and unemotionally, in short objectively, there is quite a lot of evidence that personal commitment, rivalry, spite and other emotional drives affect scientific beliefs (Mahoney, 1976; Mitroff, 1974; Watson, 1938). One need only observe scientists in action to accept the role of prejudice and "unscientific" behaviours. In a controversy, this explanation is commonly applied by each side to the other. Defenders of orthodoxy attribute dissent and heresy to the psychological shortcomings of challengers: they have grasped onto a bad idea and only stick with it because of emotional commitments, rather than behaving scientifically. Similarly, challengers explain adherence to orthodoxy by the prejudice of establishment scientists.

Explanation 3 is based on the idea of a scientific paradigm,

proposed by Kuhn (1970) and elaborated and modified by others (Barnes, 1982; Fuller, 2000; Lakatos & Musgrave, 1970). A paradigm is a unified set of ideas and practices that shapes scientific research in an area. This explanation does not require any individual bias. The bias, in the form of foundational assumptions, is built into the framework underlying thinking and research in the area. Explanation 3 is commonly used by heretics to explain the resistance by orthodox practitioners to any idea outside their standard framework. Citing the well-known resistance to Copernicanism, evolutionary biology and quantum physics, heretics tie their own beliefs to a glorious tradition of paradigm challenges. Within medicine, there are many examples of challenges that later became orthodoxy (Stern, 1941), most famously Semmelweis's advocacy of sterile conditions in maternity wards. Resistance to new ideas can be interpreted as deriving from a commitment to a well-developed framework of ideas and an associated set of practices. Using Wolpe's (1994) distinction, it can be said that heretics challenge the reigning paradigm whereas dissidents challenge only some elements within the paradigm.

Defenders of orthodoxy are less likely to attribute heresy to paradigm-boundedness, but when they do, it is on the basis that the current paradigm is correct and that the challenging paradigm is wrong. After all, paradigms have proved highly successful in guiding research, and most challengers turn out to be wrong. Western medical researchers might acknowledge that acupuncture is based on a completely different theory of body dynamics but simply reject the alternative theory as baseless even if the procedure is sometimes effective.

Explanation 4 attributes support for ideas to the role of interests such as money, power and fame. For example, a scientist may obtain, or hope to obtain, research funding from aluminium companies to investigate Alzheimer's disease, and hence have a preference for all theories aside from the role of aluminium in the disease. A high-level medical administrator and adviser may have a lot of power as long as little criticism is made of the role of government policy in focussing on medical treatment rather than environmental prevention. An orthodox researcher's substantial reputation might be jeopardised by openly supporting a "fringe" position such as megavitamin therapy. When an interest is well established such as through law, economic power or custom, it is commonly called a vested interest. A researcher can have an interest in getting a particular paper published, but this interest is typically fleeting and limited compared to the vested interest of a

pharmaceutical company in drug sales and hence in manipulating testing and influencing government regulations (Abraham, 1995).

Given the massive role of government and corporate funding in medical research, it is not hard to perceive the role of political and economic interests. For example, it is common for researchers to be paid by pharmaceutical companies to test proprietary drugs. Sometimes researchers stand to gain large amounts of money by supporting a corporate line, most notoriously in the case of scientists who testify on behalf of tobacco companies. For many research scientists, though, fame is a more powerful lure. Nobel prizes are seldom awarded to advocates of fringe therapies.

Challengers can become adept at explaining adherence to orthodoxy by the role of vested interests. For example, it might seem that dentists have little to gain from fluoridation, since it is intended to reduce tooth decay in children. Opponents of fluoridation, though, point to several pro-fluoridation vested interests, including the careers of leading pro-fluoridation researchers, the dental profession's improved image by being associated with a scientifically sophisticated intervention, the aluminium industry's economic stake in having its fluoride waste seen as a nutrient rather than a pollutant, and advantages to the sugary food industry in diverting attention away from the role of sugar in tooth decay (Martin, 1991). Proponents of orthodoxy can also invoke vested interests in explaining opposition. For example, supporters of fluoridation have pointed to the role of right-wing political organisations, religious groups and health-food businesses as having something to gain from opposing fluoridation (though more commonly proponents rely on explanations 1 and 2).

If partisans deploy explanations 1 to 4 to explain others' positions, what about social scientists? Figure 2 divides up "explanatory space" in two ways. First is whether the focus is on knowledge, actors (namely the participants in the dispute) or social structures (such as capitalism and patriarchy). Second is whether the analysis treats the contending knowledge claims, partisans and social structures with the same conceptual tools.

	Asymmetrical analysis	Symmetrical analysis
Knowledge	vi. Positivism	i. Sociology of

		knowledge
Actors	v. Social dysfunction	ii. Group politics (procedural)
Social structures	iv. Structural analysis (hegemonical)	iii. Structural analysis (constructivist)

Figure 2. Classification of some social science approaches to studying orthodoxy and marginality.

The frameworks in Figure 2 are ideal types. Actual analyses commonly combine elements of two or more of the approaches, especially in looking at both epistemological and political dimensions of a controversy, namely both knowledge and actors/structures.

In the asymmetrical approaches, the assumption is that one side is "right" scientifically and/or politically, so that the main task of the social scientist is to explain deviation from the correct view. The positivist approach (box vi) typically involves the social scientist deciding what is scientifically correct, often by determining the view of establishment scientists. Adherence to this view, which is usually the orthodoxy, is not considered to require sociological explanation. The task then becomes to explain why some people support contrary views. Psychological and social factors can be used, such as ignorance, prejudice, fear, confusion or any number of other variables, which can be classified as forms of social dysfunction (box v). The essence of the typical asymmetrical approach is that social explanations are required only of those who deviate from orthodoxy. To use a medical analogy, explanations are sought for pathology but not good health. This can be illustrated in Figure 3.

	Good science	Bad science
Favourable reception	IV. No explanation required	I. Bias, paradigms, vested interests
Unfavourable reception	III. Bias, paradigms, vested interests	II. No explanation required

Figure 3. Types of social explanations for orthodoxy and marginality sought using an asymmetrical approach, as a function of whether the science is considered good and whether it is favourably received.

The asymmetrical approach involves seeking social explanations for Quadrants I and III, where bad science is favourably received or good science is unfavourably received, but requires no explanation for Quadrants II and IV.

Social structural approaches switch focus from *actors*, characteristic of social dysfunction or group politics, to *social structures* such as class, gender, ethnicity, the state, bureaucracy and profession. A social structural approach to chiropractic might focus, for example, on the role of the state in creating a monopoly for conventional medicine. Analyses that focus on the shaping of medical knowledge and politics by capitalism often fit into the category of asymmetrical social structural analyses (box iv), since only the deformations of establishment knowledge are examined, not those of knowledge linked to the working class; those analyses that treat Marxism as "scientific" also draw on a type of social science positivism. Pure structural analyses are relatively rare, since to get at the nitty-gritty of controversies it is necessary to examine actions as well as structures.

The symmetrical approach, by contrast, seeks social explanations for all beliefs, whether they are considered correct or incorrect by scientists (Barnes, 1974; Bloor, 1976; Fleck, 1979; Mulkay, 1979; Wallis, 1979). This is illustrated in Figure 4, where more neutral terms are used instead of "bias" and "vested interests."

	Good science	Bad science
Favourable reception	IV. Psychology, paradigms, interests	I. Psychology, paradigms, interests
Unfavourable reception	III. Psychology, paradigms, interests	II. Psychology, paradigms, interests

Figure 4. Types of social explanations for orthodoxy and marginality sought using a symmetrical approach, as a function of whether the science is considered good and whether it is favourably received.

Unlike asymmetrical approaches, which are based on a dichotomy between scientific and social explanations (so that a social explanation is assumed to be "unscientific"), a sociology-of-knowledge approach (box i) does not pass judgement on scientific validity and says that a social explanation can be compatible with scientific validity. The sociology of medical knowledge, unlike positivism, involves social explanations for medical orthodoxy (Figlio, 1978; Gubrium, 1987; Wright & Treacher, 1982).

The group politics approach (box ii) involves analysing the actions of various groups in the controversy, such as via public statements, meetings, fund-raising and law-making. For example, a group politics approach to chiropractic would look at actions by chiropractor organisations, doctor associations, governments and patient groups, for example in organising training, credentials, research, licensing and medical insurance coverage. A purely symmetrical group politics approach uses the same conceptual tools to examine groups on both sides of any conflict. Studies drawing on resource mobilisation theory or political process theory can be pursued symmetrically, though in practice analysts often focus on actions by challenging actors, thus fitting more into box v.

An example of constructivist analysis at the structural level (box iii) might be an examination of the influence of organisational cultures on knowledge production both within conventional research institutes and within groups that undertake research into challenging paradigms. There appears to be little work that fits into this category.

Although the sociology of knowledge places the analyst in a position of being formally neutral with respect to knowledge claims by participants, in practice it may be impossible for social scientists to remain separate from the controversies they study, at least in the case of ongoing controversies. Some analysts are open or covert partisans. Even when social scientists are personally indifferent to the issues and claimants, their

writings and comments can be used by partisans to advance a particular side to the dispute (Scott, Richards & Martin, 1990). Furthermore, the choice of a framework of analysis and the choice of an issue to study contribute to a "de facto partisanship" by the analyst (Bammer & Martin, 1992). Thus, the issue of symmetry versus asymmetry is far more complex than it might appear on the surface.

The classification in Figure 2 assumes a snapshot of an issue, but changes occur over time. Many studies of scientific controversies have paid attention to "closure," namely the ending of a dispute (Engelhardt & Caplan, 1987). This has an epistemological dimension, namely the reaching of scientific agreement, as well as social and political dimensions. Orthodoxy may be able to defeat a direct challenge; if the losers continue their efforts by establishing a separate research programme, this can be called heterodox science, a description that might fit the HIV/AIDS dissidents in recent years. This could also be seen as a move from Quadrant I to Quadrant II in Figure 1.

Given this highly abbreviated overview of explanations for orthodoxy and dissent/heresy, it is possible to compare the typical explanations by partisans and social scientists. A fair generalisation is that virtually all partisans are positivists: they explain their own positions as being based on science and seek to provide social explanations for their opponents' positions. Partisans also draw on asymmetrical actor-oriented and occasionally structural analyses to explain the dynamics of dissent and heresy. Thus, the most distinctive approaches used by social scientists but almost never by partisans are the symmetrical ones, which seek to explain all knowledge claims and examine all social action using the same conceptual tools. Note that a rudimentary sociology-of-knowledge analysis can be artificially composed by combining the positions of partisans from both sides of a dispute, for example drawing on the attributions of interest made by each side of the fluoridation controversy about the other: such attributions are valuable guides for any social scientist studying the role of interests in a controversy.

Figure 2 presents six ideal-type social science approaches to studying orthodoxy and marginality as if the researcher can simply choose whichever one seems

most fruitful or congenial. In practice, though, many scholars are committed to particular approaches, sometimes so much so that it is hard to recognise that other approaches could be valid. Consider, for example, Linus Pauling's claim that vitamin C in large doses can cure cancer. A positivist would say that the reason that megadoses of vitamin C has been rejected as a cancer therapy is simply that the evidence has not been anywhere strong enough. Richards (1991), who adopts a symmetrical analysis, argues that Pauling's work was marginalised through social and political means, not by disinterested, rational processes; for example, in the trials of vitamin C carried out by the Mayo Clinic, Pauling's clinical and evaluative framework was not used, thereby prejudicing the result. The choice of a social science approach affects not just the form of analysis but also the choice of what to study. As indicated in Figure 3, those using an asymmetrical approach are unlikely to feel the need to explain either the ready acceptance of chemotherapy (quadrant IV) or the rejection of vitamin C (quadrant II). In contrast, Richards (1991) examines both the wide acceptance and use of cytotoxic drug 5-fluorouracil in treating cancer - despite it never having been proven effective through double-blind trials - as well as the rejection of vitamin C, using the same analytical tools, as in Figure 4.

Methods of domination and marginalisation

To focus on methods of domination and marginalisation is to narrow the focus yet further, away from epistemological issues to the role of interests. In terms of partisans' explanations, domination and marginalisation result from vested interests and paradigms. In terms of social scientists' explanations, domination and marginalisation result from asymmetries in social structure or from inequalities in the power of relevant groups, both of which are compatible with a constructivist framework. Table 2 lists some of the prime methods for domination or hegemony, or in other words maintaining an orthodoxy.

Table 2. Some methods of domination in medical research

- State power
- Training
- Restriction on entry
- Career opportunities
- Research resources
- Editorial control
- Incentives
- Belief system
- Peer pressure

These methods can be illustrated by the case of the dominance of conventional treatments for cancer, namely surgery, radiotherapy and chemotherapy, supplemented by diagnostic testing (Hess, 1997, 2000; Moss, 1996; Proctor, 1995).

The state exercises power over medical treatment in a number of ways, including licensing of doctors (with associated banning of certain procedures by unlicensed practitioners), health insurance systems, and legal restraints. For example, only licensed doctors are allowed to carry out surgery; government health insurance schemes cover conventional treatments but not alternatives; and laws and regulations prevent some substances being used for cancer treatment, such as marijuana for pain relief.

Training to become a doctor is a process of enculturation and indoctrination. The heavy work-load of memorisation and intensive practical work discourages independent thinking. Future doctors and medical researchers are taught all about surgery, radiotherapy and chemotherapy, assumed to be the appropriate treatments, but seldom anything positive about nonstandard approaches.

Examinations provide a screening process that encourages orthodoxy. For those who pursue a research path through the PhD, the process of writing a thesis or dissertation further weeds out those who might challenge orthodoxy (Schmidt, 2000). Those who spend their time investigating unorthodox ideas about cancer will be less prepared to pass examinations and likely to have a much greater difficulty gaining their credential, especially if it is at a mainstream institution.

Career opportunities include jobs, good salaries, high status and some positions of power and influence in advisory or decision-making bodies. These are available to supporters of orthodoxy but almost never to challengers. Some dissidents and even fewer heretics may slip through the training and credentialing system, but then there are few desirable career paths.

Research resources include jobs with attached research facilities, plus grant systems. In the cancer field, these are overwhelmingly allocated to supporters of orthodox approaches, with a margin of innovation allowed.

Editorial power is involved in setting up journals, accepting papers and running advertisements. Mainstream medical journals deal largely with conventional cancer therapies and publish ads linked to these. Articles supporting alternative therapies seldom can get past editors and referees at mainstream journals and seldom are backed by companies able to pay for major ads.

The category "incentives" covers a variety of encouragements for adherence to orthodoxy, including prizes as well as payments from companies, for example to attend conferences, provide testimony or recommend certain drugs.

"Belief system" refers to the domination of a set of ideas, such as that a particular theory is scientifically correct, ethically proper or socially appropriate. When cancer researchers simply assume, in choosing research projects, that the biomedical model and conventional therapies are the best way to proceed, it can be said that the conventional cancer belief system is hegemonic.

Finally, peer pressure is the influence of co-workers, friends and respected figures in the profession. When everyone else believes and acts according to a single perspective, it can be extremely difficult to pursue a contrary path. In the cancer field, accepting or at least not criticising orthodox approaches is usually necessary in order to maintain the respect of peers.

Other methods can be added to the list, depending on the issue. In some cases, patient groups provide support for orthodoxy, for example when cancer support groups raise funds for radiotherapy units. On some issues that have popular appeal, the mass media contribute to domination, such as when they report uncritical accounts of cancer "breakthroughs," always in the mould of the biomedical model. The aim here is not to provide an exhaustive list but to indicate some of the more important methods.

The different methods of domination interact with each other, most commonly by mutual reinforcement. For example, when medical school teachers hold to the conventional cancer belief system, they encourage students to adopt the same beliefs; when journals mainly publish articles in the orthodox tradition, this aids the careers of the authors; and peer pressure usually comes from widespread acceptance of a belief system.

When all or virtually all the methods of domination line up to support the same ideas, this can be called "unified domination." This is largely the case for orthodox cancer theory and therapy: for example, the dissident idea that surgery has not been proved to be effective for treatment of cancer (Benjamin, 1993) is not supported by any of the methods of domination. When some methods of domination support certain ideas but others are not relevant, this can be called "limited domination." This often applies to disputes within specialities that do not threaten the wider framework, such as over the conditions when surgery for prostate cancer is advisable. When some methods of domination support particular ideas but others support contrary ideas, this can be called "divided domination." For example, the idea that smoking causes lung cancer (or, more recently, that passive smoking causes lung cancer) is supported by most of the methods in Table 2, but the tobacco industry retains considerable financial resources, thus providing incentives for a few scientists to argue the

ever more discredited view that the smoking-cancer connection is not proved.

To each of the methods of domination in Table 2 there is a corresponding method of marginalisation, as listed in Table 3.

Table 3. Some methods of active marginalisation in medical research

- State attacks
- Deregistration
- Restriction on entry
- Career blockages
- Lack of resources
- Editorial rejection
- Disincentives
- Belief system
- Peer pressure

There is a considerable literature on suppression of challenging views in medicine and science illustrating these and other methods of marginalisation (Carter, 1993; Deyo, Psaty, Simon, Wagner & Omenn, 1997; Fagin & Lavelle, 1996; Hess, 2000; Insight Team of *The Sunday Times*, 1979; Martin, 1999; Moran, 1998; Moss, 1996; Rosner & Markowitz, 1985; Walker, 1993). In the cancer field, there have been government raids on practitioners of alternative cancer therapies; some such practitioners have had their medical licenses revoked; students with dissident views have had trouble gaining degrees; challengers have had promotions denied and appointments blocked; research funding has been denied or withdrawn; research papers have been denied publication; recognition and rewards have been unavailable; standard belief systems have not had a space for

contrary views; and peers have ostracised dissidents. Linus Pauling was perhaps the most prominent of all cancer dissidents, having considerable initial advantages compared to most other challengers, including a huge reputation (for example having won two Nobel prizes), a full career behind him and hence few career risks, and connections with the scientific establishment. Nevertheless, he had to contend with lack of funding, denial of publication and fierce attacks on his credibility as a scientist (Richards, 1991).

Note that Table 3 refers to methods of *active* marginalisation. This is when supporters of orthodoxy take overt steps against challengers. Far more common and difficult to deal with is what can be called *passive* marginalisation, for which neglect is the primary mechanism. A scientist may present an unorthodox idea and not be overtly penalised, just greeted with silence and lack of interest. An example is the nutritional prevention of kidney stones by taking magnesium and vitamin B6 (Gerras, Hanna, Feltman, Bingham, Golant & Moyer, 1976). Arguably, if the researchers who discovered this mode of prevention had instead developed a proprietary drug or an expensive apparatus for eliminating kidney stones once they are formed, their ideas would have rapidly become standard practice but, without support from any powerful interests, their cheap and easy approach has been largely ignored.

The most common initial response to challengers to orthodoxy is passive marginalisation. If, nonetheless, a challenger gains some degree of attention such as through media coverage or patient interest, then active measures may be used. Finally, if the challenge is too strong to defeat by active measures, then cooption may work to minimise the damage to orthodoxy (Willis, 1989). Arguably, the transformation of "alternative therapies" into "complementary therapies," used as minor supplements to conventional medical therapies, serves to maintain medical hegemony in a situation where many patients might otherwise opt entirely for alternatives.

Strategies for dissidents and heretics

Faced with a hostile establishment and having limited resources, what should a dissenting medical researcher do? The analysis here implies that the prerequisite for effective action is a shedding of the idealistic belief that medicine operates purely on the basis of a communal quest for truth and health. Those who develop new ideas often imagine that all they need to do is to present solid arguments and evidence in order for their ideas to be taken seriously. Arguments and evidence are crucially important, to be sure, but are seldom adequate to make an establishment change. To have a chance of success, challengers need to recognise the central role of power and the way it is enmeshed with knowledge and practices.

There are numerous ways for medical challengers to proceed. For example, they can try to develop an alternative ideology, publish in leading journals, publish in popular magazines, enlist patrons, join forces with other challengers, expose unsavoury establishment behaviour and make links with social movements (Hess, 2000; Martin, 1998; Wolpe, 1990, 1994). To categorise these varied responses, it is useful to return to Figure 1 and to assign responses into one of the four quadrants.

Challengers working within Quadrant I essentially aim to defeat the prevailing orthodoxy and themselves become bearers of the new orthodoxy, a strictly win-lose process. The usual strategy is to play the same game as the orthodoxy but play it much better in order to overcome orthodoxy's inherent advantage. A typical plan is to carry out excellent research and get it published in top journals and to produce excellent clinical results and win support from other practitioners. It is advantageous to be seen to operate within the same epistemological universe as the orthodoxy, drawing on previously subsidiary themes and winning adherents by being seen to solve important problems while not being alien to the dominant discourse. This strategy sounds straightforward but can still be difficult to bring off. An example is the theory that many gastric and duodenal ulcers are caused by infection. The proponents of the new theory required many years of publication and clinical results before displacing the orthodox position (Kidd & Modlin, 1998).

For challenges that are more sweeping or more epistemologically divergent from the orthodoxy,

strategies fitting into Quadrant II are more promising. Rather than try to become a new orthodoxy, the aim here is to compete for "market share" in a marketplace of diverse knowledges and practices. Examples here are alternative modalities to conventional treatment, such as chiropractic, acupuncture, reflexology and iridology. Instead of trying to compete on epistemological grounds, namely tackling orthodoxy on its own terms, it is useful to examine each of the methods by which orthodoxy maintains its position (Table 2) and to consider building alternatives. For example, it may be possible to win over elements within the state, such as members of a regulatory or policy agency who are favourably inclined to alternatives; to create alternative training institutes, such as chiropractic colleges; to win over a few independently-minded researchers or to raise money to fund research; to set up journals dedicated to the alternative; to elaborate a convincing belief system; and to modify peer pressure by promoting an ideology of tolerance for competition (rather than the intolerance that creates heresy). Combining several of these components into an overall programme is essentially a process of building a competing constituency (Dew, 2000b).

Quadrant II strategies often can greatly benefit by "going public," namely taking claims directly to nonscientific audiences, such as through media stories, conferences and direct mail. Although this might be seen as deviating from what is seen as a "scientific" approach, actually orthodoxy uses the mass media and other public forums regularly. Since the orthodoxy normally has control over mainstream scientific journals, going direct to the public is often the best way to compete, and may even lay the groundwork for more serious treatment in the scientific literature. This point can be illustrated by the response to the theory that AIDS originated from contaminated polio vaccines used in Africa in the 1950s. In the 1980s, several submissions about the theory were rejected by scientific and medical journals. It was only after a popular treatment in the rock magazine *Rolling Stone* (Curtis, 1992) that leading journals discussed the theory and a panel of scientists was set up to assess it (Martin, 1993). However, little serious scientific investigation of the theory was undertaken until after publication of *The river* by writer Edward Hooper (2000), a book that generated so much attention that it could not be ignored by the AIDS establishment

(Weiss & Wain-Hobson, 2001).

Another dimension to Quadrant II strategies is alliance with or creation of a social change constituency. For example, supporters of an approach to cancer based on nutritional prevention could find common cause with movements for organic farming, campaigns against cancer-causing chemicals such as bovine growth hormone or against polluting chemical plants, as well as more general affinities with environmentalists and public health campaigners. On the surface, to join a social movement and push for social change may be seen as "unscientific," but the orthodox medical establishment is just as much involved in such activities, such as via corporate funding for research and public relations campaigns. The establishment is also "political" in what it doesn't do, namely ignoring and thus tolerating promotion of junk food, industries producing dangerous by-products, hazardous work practices, urban planning that reduces incentives and opportunities for exercise, and many other unhealthy aspects of everyday life, not to mention the massive level of iatrogenic disease. Making ties with a social movement is perhaps the most powerful means of challenging orthodoxy through Quadrant II strategies.

Competition has a much better chance of success when the challenger has not just an idea but also a practice, such as a treatment or a type of therapy, since this provides a direct outcome that can be used to demonstrate effectiveness, for example to patients or potential patrons. But when challenges are primarily in the realm of ideas, it can be harder to compete. Therefore it may be worth considering Quadrant III strategies, based on cooperative tolerance. Perhaps the best hope here is to find an open-minded scientist who is willing to provide sympathetic comment and, if appropriate, advocacy. For example, there are a few successful senior scientists who no longer feel obliged to compete for status and resources and thus have less of a commitment to orthodoxy. One key supporter of the theory that AIDS originated from contaminated polio vaccines was the late W. D. Hamilton, a highly prestigious biologist, who called for examination of the theory. Although the debate over the origin of AIDS has largely followed a conflict model, Hamilton can be seen as a figure more in the mould of cooperative tolerance. However, a strategy based entirely on Quadrant III premises is unlikely to have much chance of success, so strong is the conflict orientation in areas

of scientific disagreement.

Finally there are strategies based on Quadrant IV, which presume cooperative search for a single scientific truth. It is here that many challengers devote great but futile efforts: they believe that by presenting their ideas honestly and openly to the scientific community, the response will be fair-minded scrutiny and, when warranted, acceptance. This happens so seldom that it might be fair to say that the cooperative search for scientific truth is a myth (Collins and Pinch, 1998; Feyerabend, 1975; Mitroff, 1974). But it is a pervasive and powerful myth, which is why so many naive challengers persist in seeking an open-minded appraisal of their ideas. The usual outcome, especially when the challengers are outsiders, is total lack of interest, or occasionally active hostility, namely a Quadrant I response.

Nevertheless, the myths associated with Quadrant IV can be used to advantage by sophisticated challengers, by exposing double standards and suppression. Although rejection of dissent and heresy is the standard mode of operation of science, the establishment normally trades on a belief that ideas are treated on their merits. In other words, a Quadrant I reality is disguised by a Quadrant IV ideology. If challengers can reveal the reality, for example by showing that defenders of orthodoxy use double standards, lie, unfairly block publications, harass opponents, destroy documents, withdraw grants or dismiss researchers, this can lend credibility to the challengers and attract support for fairer treatment. Many believers in orthodoxy believe in fair play; some of them, after being made aware of suppression of dissent, can be encouraged to genuinely cooperate in truth-seeking according to the scientific ideal, though of course this need not imply endorsement of any dissenting view.

Conclusion

An orthodoxy that draws on the full range of resources, namely which exercises unified domination, is incredibly difficult to challenge. Many challengers subscribe to the myth of scientific medicine as being based on open-minded examination of evidence, and

thus handicap themselves, since in practice they are ignored or attacked. In order to have a chance, they need to understand that science and medicine are systems of knowledge intertwined with power, and that if their alternative relies entirely on knowledge, without a power base, it is destined for oblivion.

Success is least likely when orthodoxy is tackled head-on, attempting to overturn it and become the new orthodoxy. The biomedical model is not about to be overthrown soon; at most some subsidiary features of the model may be reformulated. Far more promising are strategies based on competition, promoting belief in a plurality of approaches. But even in a marketplace of multiple alternatives, some approaches have great advantages over others, especially due to links to vested interests. Hence, for idealistic believers in a search for truth and social benefit, the vision of a cooperative striving for knowledge and human betterment remains appealing. Ironically, though, strategies based on this vision seem to have little chance of success compared to more cynical strategies based on cold calculation in a ruthless market.

What can be said about the role of social science in this process? Much scholarly analysis is aimed primarily at understanding, with the primary audience being other scholars rather than participants in controversies. Within this domain, there are divergences and disagreements, expressed in different ways, between positivism and constructivism and between actor- and structure-oriented analyses. These and many related theoretical issues are vitally important intellectually, but how important are they for participants in struggles over medical knowledge?

In assessing whether participants can actually use scholarly analyses and insights, the differences between positivism and constructivism or between structural analysis and group politics may not be nearly as important as they are for social scientists. More vital is the actual topic addressed in the social science research. Many studies remain entirely within the bounds of orthodoxy, giving no inkling that challenges even exist; others acknowledge the existence of challenges but implicitly justify orthodoxy by adopting standard assumptions about how medical science operates.

Most useful to dissidents and heretics is serious

attention. Their usual fate is to be made invisible and to be written out of history. When social scientists acknowledge the existence of a challenge - by reading documents, by talking to and corresponding with challengers, by recording their treatment - they can give them encouragement, even when the social scientists themselves are neutral or critical of the challengers. Thus in addition to the content of social science research, which can ignore, attack or support challengers, the process of the research is a contribution to the ongoing controversy. Even historical investigations have relevance to ongoing disputes, since to take dissent and heresy seriously in previous eras is to open the door to questioning of current orthodoxy. Thus, there is no way that social science research into dissent and heresy can possibly be neutral in any practical sense. The question is who is being supported and how.

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