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Chapter 13

Feng Shui as Pseudoscience

Feng shui is a multi-billion-dollar industry, affecting millions of people. It has medical, health, architectural, building construction, town planning, interior design, and divination components. Given the extent of feng shui belief, and the personal, social, cultural and economic impact that it has, everyone can benefit from judging its scientificity. Is it a science? Is it an immature or proto-science that might be on its way to science? Is it a pseudoscience? Making these judgements is in everyone's interest. When doing so in school programmes, especially when done in a coordinated, cross-disciplinary manner, more can be learnt about the nature of science and about the three-millenia long cultural tradition that has historically sustained feng shui, and that enables it to continue, and indeed flourish, in the contemporary world.

Alfred Hwangbo, a scholar who has documented the impact of feng shui on contemporary architecture, well cautioned that:

> The current sweeping phenomenon of feng shui seems to have come, along with the proliferation of new religions, in reaction to modern nihilism. It feeds the illusion of a modern panacea …. Looked at positively, it could herald a return of spiritual values, but only if understood at a much more profound level. Whether contemporary architecture can attain any benefit by extending the tenure of feng shui principles, or whether it is just another way of commercialising tradition, remains to be seen. (Hwangbo 1999, p.198)

The beginning of an answer to these questions is to recognize that belief systems that make cognitive or 'truth-apt' claims about the world - that is they generate propositions that can be true or false, probably true or probably false, or hypotheses that can be warranted or unwarranted - can usefully be categorized as:

- *Science* which in turn can be *natural* or *social*, and either can be *mature* or *immature*; and these in turn can be *adopted, disputed* or *rejected*.

- *Non-science* which in turn can be categorized as *claiming to be scientific* or *not claiming to be scientific.* In the first there will be *protoscience* and *pseudoscience;* in the second there will be a range of *humanities* (Art, Theology, Mathematics, Philosophy, etc.) that make truth claims without claiming to be scientific.

Systemic Cognitive (Truth-apt) Claims						
SCIENCE			**NON-SCIENCE**			
Physical Science		**Social Science**	**Claims to be science**		**No claim to be science**	
Physics, chemistry, biology		*History, sociology, anthropology, economics*				
Mature and are or were adopted	**Mature and disputed**	**Mature and rejected**	**Proto-science**	**Pseudo-science**	**Humanities**	**Arts**
Newtonianism Darwinism	*Punctuated equilibria*	*Phlogiston theory; caloric theory; Velikovsky*	*String theory; Cold fusion*	*Feng shu; Christian Science; tobacco industry research*	*Literature Poetry Theology*	*Music appreciation Art criticism*

Table 13.1 Classification of Systemic Cognitive Claims

Such classification does depend upon demarcation criteria at each level, but these need not be sharp, and they need not be timeless and essentialist. Demarcation criteria can and have changed over time as scientific inquiry matures and takes new forms.[1] In 1938 Robert Merton provided the beginning of a modern classification when he characterized science as: Disinterested, Universal, Communal, Skeptical (Merton 1938/1973). The basic division is not all-or-nothing. Science contains non-empirical elements - mathematics, logic, ethics and metaphysics, to name the obvious ones. Humanities contain scientific elements – historical research, biographical details, and sociological information, to name the obvious ones. Membership of a category is not cut and dried, it is a matter of family resemblance; there are clusters of criteria that mark out the categories, these can change over time, and the borders are to some extent porous.

In the above table, cold fusion research could reasonably be placed in the 'mature and rejected' category as it was originally a detailed theory proposed by competent and established scientists; or now in the 'pseudoscience' category on account of persisting with a uniformily rejected research programme indicates a failure to be scientific. Likewise, tobacco industry research showing that smoking is unrelated to lung cancer, initially was scientific, but over time became 'bad science' because its claims were disproved; and now is pseudoscience because it has lost all credibility and contact with the scientific community.[2] To continue to pursue it indicates a lack of scientificity; it becomes an ideological not a scientific practice.

[1] There is an enormous amount of philosophical discussion on the 'demarcation problem'. See at least: Bunge (2001, chap.8), Butts (1993), Hansson (2009, 2013), Mahner (2007, 2013), Nickles (2013), Pigliucci (2013) and Shermer (2013).

[2] On the scientific research of the tobacco industry see Brandt (2007) and Oreskes & Conway (2010).

All pseudoscience contains some scientific content – concepts, mathematics, instruments, recordings - in order to give the practice credibility. It is of the essence of pseudoscience to appear to be scientific; its 'authority' depends on mimicking science. Science has journals, so pseudosciences commence their own or 'take over' established journals; science has peer review, so pseudoscience has the same; science has numbers and statistics, so pseudoscience has tables, figures, correlations; science has experiments, so pseudoscientists conduct their own; science has meetings and conferences, so pseudoscience does the same, and so on. The practical and philosophical task is to reliably separate the real from the mimick and the gimick. The beginning of this task is first to distinguish science from non-science.

Demarcation of Science from Non-Science

Efforts to distinguish science from non-science, the original 'demarcation problem', have been pursued since at least David Hume's (1711-1776) time when in his *Inquiry* he advised that:

> When we entertain, therefore, any suspicion that a philosophical term is employed without any meaning or idea (as is but too frequent), we need but enquire, *from what impression is that supposed idea derived?* And if it be impossible to assign any, this will serve to confirm our suspicion. (Hume 1777/1902, p.22, emphasis in original)

Hume was enunciating his empiricism and using the grounding in sensation as a way of separating 'sensible' ideas from the wide class of others. Ernst Mach took Hume's point seriously and, with recourse to his philosophical phenomenalism argued that a whole raft of central scientific concepts – mass, force, absolute space, absolute time, atom, molecule – were not scientific as they went beyond their sensory anchors, or the observation statements that grounded them (Mach 1910/1992). He famously said that he would 'leave the Church of Physics' if belief in atoms was required for its membership (Blackmore 1989).[3]

Karl Popper acknowledged the force of Mach's critique, but rather than accept the bulk of orthodox science as unscientific, he proposed in his 1934 *Logik der Forschung*[4] a new demarcation of science from non-science, namely Falsificationism or Testability. Rejecting the Humean/Machian/Positivist experiential confirmatory criterion, he proposed instead:

> But I shall certainly admit a system as empirical or scientific only if it is capable of being tested by experience. These considerations suggest that not the *verifiability* but the *falsifiability* of a system is to be taken as a criterion of demarcation. (Popper 1934/1959, p.40)

He addressed this foundational demarcation issue in a 1953 Cambridge lecture 'Science: Conjectures and Refutations' published in his 1963 anthology *Conjectures and Refutations: The Growth of Scientific Knowledge* (Popper 1963). He was adamant that his falsifiability criterion was not meant to separate meaningful from meaningless statements (Hume's project) but scientific from non-scientific statements or systems. There, dismissing the positivist link-to-experience (sensation) criterion as a demarcator of science, he says:

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[3] Mach's seemingly antediluvian position can be defended by saying he forsook committed belief in the then current 'plum pudding' picture of the atom that had been advanced by J.J. Thompson. This is an issue for Machian scholarship.

[4] First English translation in 1959, *The Logic of Scientific Discovery* (Popper 1934/1959).

> But this criterion is too narrow (*and* too wide): it excludes from science practically everything that is, in fact, characteristic of it (while failing in effect to exclude astrology). No scientific theory can ever be deduced from observation statements, or be described as a truth-function of observation statements. (Popper 1963, p.40)

And proposed instead:

> One can sum up all this by saying that *the criterion of the scientific status of a theory is its falsifiability, or refutability, or testability*. (Popper 1963, p.37, emphasis in original)

And later:

> A system is to be considered as scientific only if it makes assertions which may clash with observations; and a system is, in fact, tested by attempts to produce such clashes, that is to say by attempts to refute it. (Popper 1963, p.256)

Popper's original concern was to separate and defend good and revolutionary science, as manifest in Einstein's theory of general relativity that had spectacularly, and very publicly, been confirmed by Arthur Eddington's 1919 solar eclipse expedition, from popular belief-systems of the time that were also being enthusiastically embraced: Astrology, Psychoanalytic theory, Historical Materialism. For Popper, each of the latter was a pseudoscience, and his testability criterion was meant to separate them from the real thing.

But falsifiability did not quite work this way. On the one hand, many supposed pseudosciences made claims about the world that could be, and were, falsified – creationist science and astrology, for instance. So, these should be just 'bad' science, not 'pseudo' science. On the other hand, many established sciences made claims that were falsified by empirical evidence, but this did not result in rejection of the theory. So, these should be pseudoscience.

Karl Popper was correct in identifying the *growth* of knowledge as a hallmark of the scientific tradition; a static tradition is not scientific. In a 1961 Presidential Address to the British Society for the Philosophy of Science, he stated:

> My aim in this lecture is to stress the significance of one particular aspect of science – its need to grow, or, if you like, its need to progress. … I assert that continued growth is essential to the rational and empirical character of scientific knowledge; that if science ceases to grow it must lose that character. It is the way of its growth that makes science rational and empirical; the way, that is, in which scientists discriminate between available theories and choose the better one or (in the absence of a satisfactory theory) the way they give reasons for rejecting all the available theories, thereby suggesting some of the conditions with which a satisfactory theory should comply. (Popper 1963, p.215)

Fifty years later, the German philosopher Paul Hoyningen-Huene concurred, writing:

> One of the most astonishing facts about science, especially about modern natural science, is its remarkable growth, both in scope and in precision. Science is a dynamic enterprise through and through. This feature probably best distinguishes science from all other knowledge systems, past and present. (Hoyningen-Huene 2008, p.176

Consider the 2017 detection of gravity waves for which Barry Barish, Rainer Weiss and Kip Thorne were awarded the Nobel prize in physics. Since their initial postulation by Henri Poincaré in 1905 these waves had something of the appearance, or feel, of feng shui's chi waves: they seemed mysterious, there was no obvious indicator for them, and seemingly their only warrant was speculation. But this piece of metaphysics was different from feng shui metaphysics: it did not emerge from no-where, or from textual analysis. Poincaré thought gravity waves had to be a consequence of Lorentz's electron theory; the latter required the former. In 1916 Einstein cemented gravity waves' place on the scientific agenda by showing that they were a requirement of his own General Theory of Relativity; 'ripples in the fabric of space-time' as they have been called. But it was a full century of theoretical and experimental refinement, and finally millions of dollars spent in the LIGO project, before the 'gravity wave' agenda item was approved.

The contrast with feng shui speculation is dramatic. In all of the 3,000+ years of chi-talk and appeals to mysterious energies, there simply has been nothing comparable to the proposing and search for gravity waves. It was the continued and deep engagement with science that moved gravity waves from speculative metaphysics to tentative physics and then to being part of the accepted furniture of the world. There is no such movement in the feng shui tradition. Although there is a surfeit of spread, there is no intellectual depth. The same stories and mantras are endlessly repeated.

A great deal of late twentieth-century philosophy of science has been taken up with problems occasioned by using Popper's testability as a demarcation criterion for science, and with efforts to find other more adequate criteria. Willard van Orman Quine, Thomas Kuhn, Imre Lakatos, Paul Feyerabend, Paul Thagard and Larry Laudan all contributed to this debate.[5] Lakatos thought that his 'methodology of scientific research programmes' did provide a warranted demarcation in the way that Popper and Kuhn's had failed to do (Lakatos 1970). Further this was important because:

> … the problem of demarcation between science and pseudoscience is not a pseudo-problem of armchair philosophers: it has grave ethical and political implications. (Lakatos 1978, p.7)

The mushrooming, internationalizing, billion-dollar feng shui industry, and its related alternative or holistic medicine industry, is an example of the ethical, political, and cultural consequences of failing to identify pseudoscience; or saying that such identification is impossible. Being able to robustly identify feng shui as pseudoscience might put some brake on its spread and impact, it might redirect people's monies to effective treatments, in some jurisdictions it might enable conviction for false advertising, or even fraud. And beyond this, familiarity with such identification procedures can engage citizens in a better understanding the nature of science.

Carl Hempel usefully offered a list of seven *desiderata* that identified good scientific theories, and which can serve in characterizing good scientific practice:

- A theory should yield precise, preferably quantitative, predictions.
- It should be accurate in the sense that testable consequences derivable from it should be in good agreement with the results of experimental tests.
- It should be consistent with currently accepted theories in its own and neighboring fields.

[5] For an outline of the arguments and literature, see especially Ladyman (2002, chap.3) and Nickles (2013).

- It should have broad scope.
- It should predict phenomena that are novel in the sense of not having been known or taken into account when the theory was formulated.
- It should be simple.
- It should be fruitful. (Hempel 1983, pp.87-88; author formatting added)

This account usefully employs a number of criteria to distinguish good theories from not-so-good or poor theories. Indeed, 'marks out of five' can be given to theories on the basis of how well they meet each criterion, with a maximum possible score of thirty-five. Then discussion can occur about 'cut-off' marks for separating good from poor theories or from proto-theories. On this account, poor theories can be improved, they can raise their mark by attending to one or other deficiency.

Hempel's *desiderata* are meant to separate good science from not-so-good or poor science. But there comes a point where poor marks indicate something is other than a poor or a protoscience, but it is rather a pseudoscience. Minimally, a zero on the third *desideratum* - consistency with currently accepted theory – is a strong indicator that something belongs to a pseudoscience, rather than being just part of a poor science. This is, of course, a conservative criterion; it puts something that is entirely inconsistent with best established science in a domain, beyond the pale. There is an element of 'closed shop' here, but it can be justified. Over the span of about 400 years the Galilean-Newtonian Paradigm (GNP) has developed and matured into modern science with its ontological, methodological, ethical and sociological dimensions. If something is inconsistent with all of these core characteristics, then it maybe something, but it is not science; to claim that it is, amounts to being a pseudoscience.

In appraising feng shui, it is important to note that good theories, as Hempel characterizes them, are the expected outcome and indicator of good science; but science as an organized, structured, historical-sociological entity, needs further characterization beyond what suffices for the identification of good theory. Extra ontological, methodological and sociological criteria are required; the more so in order to separate science as an historically-situated, organized, knowledge-seeking activity, from pseudoscience. For a research group to be called a scientific group, or for it to be pursuing a scientific practice or inquiry, it needs have the following characteristics:[6]

- It should reliably produce a 'quota' of good scientific theories.
- It needs to seek new knowledge and to do research; not be ossified, stand still, and repeat extant knowledge.
- It should be constituted as a research community pursuing cognitive goals and committed to finding out new things about the natural and/or social worlds; not just a community sharing beliefs, inquiring into texts, or formulating legislative laws.
- Its members need be trained or certified in such cognitive inquiry; science can be advanced by lay-people, but if no or few members of the community are suitably trained, then the community falls short of being a scientific community.
- It should appeal only to ontologically stable entities in its explanations and theorizing. Reference to 'here today, gone tomorrow' entities - or entities that come in and out of existence depending on who is thinking about them, or for

[6] See Bunge (1991a, 2001 chap.8) who develops these points.

what culture they exist - diminish the scientific status of theories and communities that propose them.

- It needs be committed to at least pragmatic methodological naturalism as the basis for evidence collection and theory appraisal; appeals to political, ideological or religious authority is simply not allowed. Nor is deference to divine scripture or revelation permitted in justifying metaphysics or defending particular claims. Science simply does not allow such appeals to outside authority.

Feng shui fails both the scientific *theory* test and the scientific *organization* test; it lacks scientificity.

Rejecting the Demarcation Project

Larry Laudan, in a much commented-upon paper hoped to bring this discussion to an end with his claim that the demarcation quest was hopelessly and in-principle contentious:

> … it is probably fair to say that there is no demarcation line between science and nonscience, or between science and pseudo-science, which would win assent from a majority of philosophers. (Laudan 1983/1996, p.211)

And further that the efforts were misdirected because they:

> managed to conflate two quite distinct questions: What makes a belief well founded (or heuristically fertile)? And what makes a belief scientific? (Laudan 1983/1996, p.222)

He concluded his paper with the admonition:

> If we would stand up and be counted on the side of reason, we ought to drop terms like 'pseudo-science' and 'unscientific' from our vocabulary; they are just hollow phrases which do only emotive work for us. (Laudan 1983/1996, p.222)

Laudan's paper is puzzling. He says that the term 'pseudoscience' is merely rhetorical and lacks specification. Yet two years earlier he published a detailed contribution to the 'Science Wars' (Brown 2001) critical of the Edinburgh Strong Programme, and its pretension to reduce philosophy of science to sociology of science, and rationality to politics by other means. The title of his earlier paper was: 'The Pseudo-Science of Science?' (Laudan 1981/1996). And Laudan there had recourse to a substantive view of pseudoscience that goes beyond just a banner headline. He rejects in its entirety David Bloor's, and the Strong Programme's, key work *Knowledge and Social Imagery* (Bloor 1976/1991), saying:

> … one must regard his [Bloor's] efforts at legitimation by assimilating himself to the scientist as rhetorical window dressing and nothing more than that. As for my calling his approach 'pseudo-scientific', the label comes to seem increasingly appropriate. A pseudo-scientist is, after all, one who claims himself to be a scientist but who is unable or unwilling to indicate what is scientific about his beliefs and his modus operandi. (Laudan 1981/1996, p.207)

Why two years later, 'pseudoscience' is relegated to mere rhetoric is not made clear.

Independently of Laudan, Roger Cooter a historian also argued that the label 'pseudoscience' has no epistemological value, it has only rhetorical value:

> … it would be preferable to have the term 'pseudoscience' replaced in our vocabularies with something like 'unorthodox science' or 'non-establishment science'. (Cooter 1982, p.138)

Another historian, in writing of the Velikovsky Dispute, makes the same claim:

> 'Pseudoscience' is an empty category, a term of abuse, and there is nothing that necessarily links those dubbed pseudoscientists besides their separate alienation from science at the hands of the establishment. (Gordin 2012, p.206)

Cooter argued for his case on social constructivist grounds, maintaining that all knowledge claims are the result of social negotiation in which truthfulness or falsity do not play a determining role; the rise and fall of theories reflect differences in social and cultural power. Truth tracks power. Attaching labels is a matter of ideological contention and the label's purpose is to either hide or serve social interests. So, the label 'pseudoscience' simply indicates 'sociopolitical deviance' (Cooter 1982, p.137). Earlier he had written that whenever the label 'pseudoscience' is used, it is in the service of 'conserving social interests' (Cooter 1980, p.237). This because:

> … since all knowledge of external nature is made by men and socially constructed, the identification and criticism of any particular body of knowledge as 'pseudoscientific' must count as a defence of some other body of knowledge. (Cooter 1980, p.259)

Cooter's papers are in the tradition of social constructivist history[7] that was energized by the philosophical claims of the Edinburgh Strong Programme. The founders of this programme were Barry Barnes (1977), David Bloor (1976/1991), Harry Collins (1985), Bruno Latour and Stephen Woolgar (1979/1986) who all explicitly appealed to Thomas Kuhn's account of science in order to get the programme off the ground. The strong programme predictably energised constructivism, relativism, and multiculturalism in education. It gave succour to those arguing for the public funding of Alternative Medicine research and the establishment of Non-Traditional Medicine departments in universities. After all, if scientific theories are a 'front' for social forces, then all such 'fronts' or representatives should be equally supported, with perhaps affirmative action for rejected theories and poorly supported programmes. The programme has been thoroughly criticized, including by Kuhn (Kuhn 1991/2000).[8]

Against Cooter, the later Laudan, and all other social constructivists who reject the use of 'pseudoscience' on account of its rhetorical function, it needs be recognized that labels can have both rhetorical *and* epistemological functions; to acknowledge a rhetorical function is not to say that the term has no epistemological import; to say that some analysis supports a particular social group, is not to say that the analysis is not correct, true, or constitutes knowledge. To say of a football team that it is 'excellent' is to support the team but at the same time, its use makes claims about the competence of the team. That part of the claim can be appraised in standard public ways. The theory of global warming might support the renewable energy lobby, but that does not mean it makes no truth claims, or that its claims are false or compromised. Appraising of those claims can be detached from appraisal of the political claims; the two appraisals are orthogonal.

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[7] For scholarly and tightly argued refutation of this historicist programme, see Wootton's *The Invention of Science* (Wootton 2015). The book is reviewed in Matthews (2017).

[8] For critiques of the strong programme see, among many: Brown (2001), Bunge (1991b, 1992), Nola (1991, 2000) and Slezak (1994a, b).

Laudan's philosophical argument against demarcation and for the merely rhetorical function of 'pseudoscience' gained the assent of the majority of philosophers of science; not just the assent of the more general scholarly or educational constructivist community who could be expected to readily embrace it as Laudan was 'speaking their language'. Constructivists were very happy to hear prominent philosophers saying that 'everything is science; it is only politics, ideology, or culture that makes distinctions for their own purposes'. This view, of course, was well received by Creationists and Intelligent Design advocates who were outraged at Judge Overton's ruling in the US 1981 *McLean vs. Arkansas* trial that Creationism was not scientific, and so had no place in US classrooms (Ruse 1988). Also happy with Laudan were proponents of multicultural science, specifically those wanting to recognise feng shui as science, not just as 'traditional' science, but as science and consequently warranting an endorsed place in the science programme, not just a showcase to illustrate non-science or pseudoscience.

Although many philosophers concurred with Laudan's arguments on the problems of demarcation, not all did so. Robert Pennock was one among many defending demarcation in the Humean-Popper tradition:

> Because Laudan's and Quinn's discussions of demarcation, which can only be described as histrionic and ill-considered, and those of their careless imitators continue to muddy the waters to the detriment of both science and philosophy of science. (Pennock 2011, p.180)

Other philosophers felt the same way, and engaged in careful, informed and detailed refutation of Laudan's arguments.[9] His obituary for demarcation was premature. Mario Bunge provides both a broad and detailed account of the requirements for any cognitive field (that is, any inquiry generating putatively true or false propositions or theories) to be scientific (Bunge 1967/1998 chap.1; 2001 chap.8). His account subsumes the central theses brought forward by different contributors to the Laudan debate. For Bunge, a mature science has ten features:

- A community (C) of appropriately trained inquirers with recognized public means of information exchange.
- A general outlook or philosophical background (G) that includes an ontology of discernible things, a realist epistemology, and an ethos supporting the free search for truth.
- Its domain of investigation (D) is real events and processes in the world, not texts and not ideas, though, of course, the latter are utilized.
- Its formal background (F) is a collection of current best logical and mathematical theories about D.
- Its specific background (B) is a collection of up-to-date and reasonably well confirmed data, hypotheses and theories from other fields relevant to F.
- Its problems or puzzles (P) consists of cognitive rather than practical matters concerning items and events in D, being usually a quest for laws.
- Its fund of knowledge (K) is a collection of up-to-date and testable (though not final) theories, hypotheses, and data compatible with B.
- Its aims or goals (A) are the discovery of laws or confirmed hypotheses about elements of D.

[9] See at least: Bunge (1991a, 2001, chap.8), Butts (1993), Derksen (1993), Ladyman (2013), Mahner (2007, 2013), Pennock (2011), Pigliucci (2013), Shermer (2013), most of the 23 contributions to Pigliucci & Boudry (2013), and contributors to Boudry & Pigliucci (2017).

- Its methods (M) consist exclusively of scrutable, checkable and justifiable procedures; there need not be commitment to a single method.
- It has a significant overlap (O) with other scientific fields of inquiry such that there are overlaps in the respective G, D, F, B, P, K, A, M sets. A mature science does not exist in cognitive isolation from other mature sciences; they learn from and feed off each other (Bunge 2001, pp. 170-171)

Pseudoscience as a Warranted Category

It helps the argument of this book to focus on just the first distinction, namely Science-Pseudoscience rather than the wider task of separating both from Non-sciences such as Art, History, Mathematics, Theology, Music and so on. What constitutes justifiable warrant for claims in these latter inquiries or disciplines is a matter for separate investigation as one finds in philosophical theology, philosophy of mathematics, aesthetics, and so on.

Different philosophical, sociological and political indicators or markers of pseudoscience have been advanced. Pseudoscience can be identified by working through each of Bunge's foregoing ten identifiers of mature science and taking the degrees of their negation of each feature. Sven Hansson provided another such list whereby a corpus of belief and practice can be judged pseudoscientific in as much as:

- There is overdependence on authority figures.
- Unrepeatable experiments are too frequently adduced.
- Data selectivity, or cherry-picking of evidence is too common.
- There is an unwillingness to seriously test claims and predictions.
- Confirmation bias is endemic and disconfirmation is neither sought nor recognized.
- Some explanations are changed without systematic consideration. (Hansson 2009)

And when:

- They make claims about events and mechanisms in the natural world.
- The claims cannot be epistemically warranted, yet effort is made to show their scientificity.
- They too easily resort to auxiliary hypotheses to insulate claims from empirical refutation. (Hansson 2009)

A further characteristic that can be added to Hansson's list, is:

- The practice makes scientific claims but refuses to engage with the scientific community by publishing in established research journals and presenting at research conferences.

Pseudosciences violate the fundamental principle that 'no science is an island sufficient to itself'. All scientific endeavours and disciplines have contact with their neighbours; more than contact, they need to accommodate adjacent sciences. This is what drives the creation of cross-over or interdisciplinary sciences: biochemistry, electrochemistry, geophysics, paleoanthropology, physicalchemistry, and so on. Intellectual isolationism is a key marker of pseudoscience.

Consider for instance 'Black Hat' Tantric Esoteric Buddhist Feng Shui (BHB) which is enormously popular in the USA. Black Hat feng shui was brought from China by His Holiness Grandmaster Professor Thomas Lin Yun, who was feted on numerous university campuses, in many business boardrooms and has thousands and thousands of followers.

According to the BHB website: 'His Holiness was not only revered as a religious leader, a scholar, but also the world's most prominent authority on Feng Shui'. The BHB web site says its teachings:

> Represent a comprehensive integration of Buddhist teachings, yin-yang philosophy, I-Ching, Feng Shui, theory of Ch'I, holistic healing, Chinese folklore, transcendental cures, meditation, spiritual cultivation and development, Chinese poetry, etc. [10]

Further understanding, by outsiders, of the teachings is difficult as BHB can only be communicated orally; listening is essential to the message.

> In the Black Sect Esoteric Buddhist tradition, the only legitimate path for instruction is the sacred discipline of oral transmission from teacher to pupil. Her Holiness Kahdro Crystal Chu Rinpoche is the exclusive teacher and transmitter of the teachings of Black Sect Esoteric Buddhism, as appointed buy His Holiness the late Grandmaster professor Lin Yun. [11]

The fiat that 'only insiders can understand the teachings' is a common defensive ploy for charlatons and purveyors of pseudoscience. It protects the 'theory' and isolates the practice from relevant established sciences.

Fig. 13.1 H.H. Lin Yun & H.H. Crystal C. Rinpoche

[10] See, http://www.yunlintemple.org/home
[11] See, http://www.yunlintemple.org/home

Recall Jerry King, mentioned in Chapter 1, who studied Feng Shui and Four Pillars under various masters in Taiwan and Hong Kong. He specializes in Purple Star Astrology readings and travels extensively, consulting globally and obtaining research data and verifying theories of cosmic flow in the Four Pillars of Destiny.[12] The claim about 'obtaining research data and verifying theories', clearly invites the first question: But is it science? Having on all the above grounds, answered 'No'; the second question arises: Is it pseudoscience? And here the answer is 'Yes'.

Not surprisingly, cognitive isolationism makes feng shui sectarian. For instance, Kathryn Weber, a 'former Black Hat practitioner' writes in defense of her reversion to classical feng shui that:

> Here in the US, Black Hat is the preferred method because of how easy it is to apply – the front is always north, and the back left is always the wealth corner and the rear right is always the romance direction irrespective of the actual compass directions. Black Hat feng shui is often considered more spiritually-oriented versus classical feng shui. It's (sic) disadvantage is that it doesn't take into account unique compass directions or time and its influence.[13]

It is a mark of pseudoscience that these sectarian differences cannot be settled. There are controversies, even long-standing ones, in science but there is a degree of agreement about how they can be solved, and reference to an authority figure as being the ultimate arbiter, is not among them.[14] Not so in feng shui. Grandmaster Lin Yun, appointed his companion Her Holiness Khadro Crystal Chu Rinpoche to be the authoritative, and only, interpreter of Black Hat Sect teaching. This dependence on authority is characteristic of the worst of political and religious sects. It is another marker of pseudoscience. It is illustrative to juxtapose the supposedly scientific claims of Lin Yun and the qigong claims of Yan Xin detailed in Chapter 12, with Hansson's pseudoscience check list above: all the identifying 'boxes' for pseudoscience are ticked.

The central feng shui ontological entity, chi - its *sine qua non* as Stephen Field rightly called it (Guo 2001) – does not appear in any reputable physics research journal or book. Chi is not mentioned anywhere in the hugely-funded international search for new energy, renewable energy or clean energy. The *Science in Contemporary China* handbook (Orleans 1980) has chapters on all the Chinese natural, social and applied sciences, including biomedical sciences, but no chapter on either chi or feng shui. The only mention of either in the entire work is in discussion of acupuncture where the 'meridian' theory of freeing vital energy pathways, notionally 12 on either side of the body, by inserting needles into various of the 600+ meridian intersections (acupoints), is listed as the original explanation for the efficacy of acupuncture; but this is then passed over in favour of contemporary, routine physiological or psychological accounts (placebo) of the highly-debated effects of acupuncture, such as have been discussed in Chapter 5.

Yet forty years later, the CCP is making embracing chi-based TCM and qigong routine, and opening feng shui architectural programmes. Thousands of 'Health Qigong Management Centers' have been established under Ministry of Health authority. The fine

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[12] See https://www.fengshuitoday.com/feng-shui-of-the-hsbc-headquarters-building-in-hong-kong/

[13] See, https://redlotusletter.com/classical-feng-shui-and-western-black-feng-shui-the-6-critical-differences-confessions-of-a-former-black-hat-practitioner/

[14] See Engelhardt & Caplan (1987), Hellman (1998), and Machamer, Pera & Baltas 2000.

line for the CCP is to maintain its 'anti-superstition' campaign which provides cover-leaf justification for banning Falun Gong whilst maintaining that chi-medicine and exercise is not superstition. This is a philosophical/political issue for the CCP, and one that can readily be posed as a school exercise.

Ecology of Science and Pseudoscience

Science is not just the product of a thinking head, of a thoughtful and hard-working scientist. Science always occurs in a social-economic-technological context which has its own conceptual and philosophical characteristics. For Bunge, historical, sociological and philosophical studies of science show that it requires social and intellectual environs characterised by the following political, ethical and philosophical commitments. He usefully calls this the 'conceptual ecology of science' and represents it as a pentagram (Bunge 2012, chap. 2).

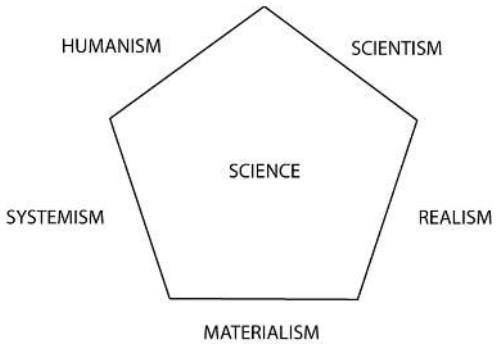

Fig. 13.2 Ecology for Scientific Progress (Bunge 2012, p.28)

Humanism/Commercialism. Scientists need to promote human welfare; not misery, business advancement or political advantage. The latter purposes more easily lead to corruption of science (witness Nazi Germany, Stalinist Russia or current 'big business' tobacco, oil and pharma science). But there are also less visible effects of commercialization on academic and industry research. These are effects that impact on directions of research, constriction of 'public knowledge' and access, the reward system in science and universities, communitarianism in science, and other considerations.[15] There can and should be applied science, but it ought be for human welfare and improvement.

Systemism/Compartmentalism. Competent well-informed scientists recognise that there are no isolated events, mechanisms, or problems in the world. Structures and events are parts of systematic causal wholes. John Donne famously wrote that 'no man is an island', so also no event, personal action or social movement is a causal island; and no science is an island. Consequently, good science generates cross-disciplinary research fields: geophysics, astrophysics, biochemistry, astrochemistry, social psychology, molecular biology, psycholinguists, economic history, political economy, and so on. Because they do not emerge from science, hybrids as astropsychology or creation science are just pseudolabels.

Materialism/Spiritualism. Scientists seek for causes and explanations in the kinds of things and mechanisms that are within the accepted ontology of science. A materialist

[15] On this see contributions to Irzik (2013).

ontology is informed by science, hence gravitational and electrical fields are material though not physical. *Methodological Naturalism* can satisfy this requirement, but evocation of *spiritualism, supernaturalism, occultism,* or *tradition-based* entities violates it. To the degree that a society believes that the gods, spirits or the occult are responsible for earthquakes, then money for geophysical research will be limited; to the degree that societies are fatalistic, believing that 'everything happens for the better', then prevention of disaster and remediation will not be undertaken; where illness is seen as spirit possession, then medical science does not develop, and so on.

Individuals can be spiritual without believing in or practising spiritualism; the latter involves belief in the intervention in worldly processes of spirits, supernatural entities, or the occult, and this impedes the growth of science. And as was indicated in Chapters 3 and 7, modern science was created by Christian believers much of whose work was dependent on achievements of Islamic science; and religious scientists of all faiths contribute to the advance of modern science. These contributions were dependent on adoption, explicitly or implicitly, of methodological naturalism. As explained in chapter 12, there is nothing *per se* about the chi construct that rules it out of science, it is just that as soon as it is examined its scientificity disappears; it cannot be 'nailed down', elusiveness is part of its nature.

Realism/Subjectivism. Scientists recognise that there is an external world independent of human consciousness or experience; science attempts to provide knowledge of such a world; and these attempts are partially successful. Our concepts and theories are human creations, but the reality they conceptualise or explain is not a human creation. The external world judges the efforts of scientists to understand it; good theorising is not just the prevailing of local or wider political power. Witness the ultimate collapse of Church-backed Ptolemaic astronomy, Nazi-backed German blood science, or Party-backed Soviet genetics.

Scientism/Irrationalism. Scientists believe that science is rational, indeed it provides a model for social rationality; further, Enlightenment-influenced scientists believe that scientific methods are applicable outside the laboratory and are the only way in which knowledge of the world and society is attained. Without this commitment, social and cultural problems are addressed in wholly ineffective ways: praying for the end of Middle East conflict can be a comforting cultural engagement, but it can shed no light on the conflict, its history, or its remediation. Prayer might motivate such investigation, but equally it can, and often does, by-pass a naturalistic and scientific investigation.

For any society, to the degree that the first member of the above couples is maximised, then science can flourish. To the degree that the second member is elevated, then the society allows and promotes the growth of pseudosciences. So we have:

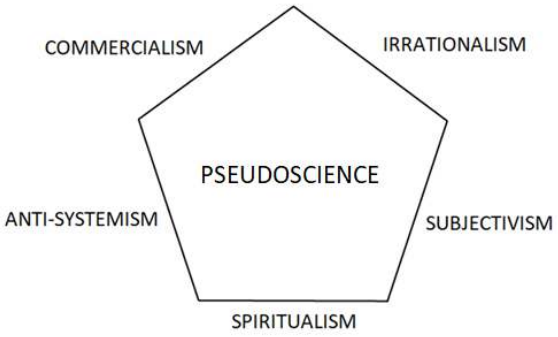

Fig. 13.3 Conceptual Ecology for Pseudoscience (Bunge 2012, p.33)

In societies and cultures where spiritualism, non-systematism, commercialism, irrationalism, and subjectivism (phenomenalism or instrumentalism) prevail, then science cannot thrive, but pseudoscience surely can and does.

Contemporary USA provides a case study for this claim. Spiritualism is pervasive. God and Gods are evoked everywhere, including on dollar bills; and for every purpose, including the killing of declared enemies, and the prevention of natural disasters and the amelioration of their effects. Megachurches, attended by tens of thousands of 'happy clapping' congregants, are common; televangelism, with in-studio and at-home miracles functions non-stop, 24/7, on TV and cable networks. Bookshop aisles and websites are filled with paranormal, alternative, and esoteric literatures.[16]

Anti-systematism is routine. Life is compartmentalised. A general or liberal education is progressively harder to get; specialisation is the academic norm; there are career, funding and disciplinary barriers to cross-disciplinary research. The much leapt-upon NOMA bandwagon launched by Stephen Jay Gould formalised the separation of science from other disciplines, specifically theology (Gould 1997). They cannot judge each other. But if theology makes claims about the world, then it can and needs be judged by science.

Commercialisation and money-making is a preoccupation of dominant US groups; if this was not their preoccupation they would not be dominant. Commercialisation is captured in everyone's image of Wall Street, where excess, self-interest and pursuit of the bottom line is just normal business activity. It is equally captured in the Walmarting of hundreds of towns where whole downtown business and residential communities have been destroyed by the Walton family's pursuit of extra millions of dollars being spent in their own edge-of-town megastores.[17] Powerful mining, agriculture, transport, tobacco and oil interests have always put commercial interest above community and environmental interest. President Trump rode US commercialisation all the way to the White House.

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[16] Kurt Andersen's *Fantasyland* (2017) provides extensive, if depressing, documentation of the 500-year history of what counts as spiritualism in the USA. Parts of the Roman Catholic and Protestant traditions do their best to separate themselves from this spiritualism which they see as commercialized, corrupt, and theologically terrible.

[17] Apart from numerous books, the Robert Greenwald documentary *The High Cost of Low Price* (2005) well captures the Walmarted experience of the USA.

The malignance of commercialisation goes beyond the elevation of profit over social interest; this is at least objective, public and debatable; worse, it is giving epistemological warrant to commercial interest. This is what was so depressing about the 'scientists for hire' and 'research for sale' realities in the tobacco and oil industries that was so well documented by Oreskes and Conway (2010). Truth is bent or just invented for commercial interest. This mirrors the same degrading of truth for political, party, ideological, and religious interests. If truth claims about the world are not settled by reference to the world, then obviously the claims can be settled by other considerations. American Pragmatism has something to answer for on this score.

Irrationalism is now a respected and examined subject in US universities.[18] Whole faculties and colleges have been given over to promotion of irrationality. Universalism is everywhere rejected in favour of gender-, race-, religious-, political-, sexual-, economic-, and cultural- localism. Supposedly, all truth is local, all rationality is local, all ethics are local. Anti-rationalism or postmodernism is the Philosophy Department, Cultural Studies Department, and College of Education norm. The tension, if not contradiction, between localism and rationalism is seldom explored; their consistency is assumed. But how local can rationality be before it becomes irrationality? And what features can be identified to define the local? Husserl, Kuhn, Feyerabend, Heidegger, Derrida, Latour, Lyotard, Irigaray, Barnes, Collins, Pinch, Harding, von Glasersfeld, Giroux, and others are among the most read and most cited authors in sociology, education, philosophy and humanities programmes. Senior figures in science education routinely advance outrageous, silly and discredited positions and are cheered and awarded for doing so.[19] What unites them all is the rejection of truth and the discounting of rationality. A steady diet of these authors does have an effect on education and most other things dependent on clear thinking and some appreciation of intellectual traditions. The enormity of the Sokal Hoax is testament to the diet's effect in academia (Sokal 2009). That the president of the United States can say that 'truth does not matter' and that his agents can say 'there are alternative realities' speaks to its down-stream effect in society and politics.[20]

Subjectivism and empiricism are also deeply entrenched in US culture and academies. Epistemologically these are the claim that the test of truth is how things appear to the individual; individual experience is the epistemological bottom line. Hence the intellectual ground is prepared for when President Trump says that no matter what his experts advise, he goes with his 'gut feelings'. Citizens nod their head on hearing this. In one book by a leading science educator, the personal pronoun occurs 96 times on one page, and it is not an autobiography. This level of narcissism and self-absorption flows easily from subjectivist and empiricist doctrine. The doctrine is profoundly anti-scientific. The whole history of instrumentation in science is the history of making inter-subjective appraisals of temperature, heat, speed, duration, pressure, pulse rate, rain fall, voltage, wind speed, weight, and so on (Crump 2001). Objective, impersonal, non-subjective measurement is a precondition for science. At every step, progress in science has meant the overcoming of everyday experience. When a dash of Kant is added to empiricism, then reality becomes the

[18] David Stove provides a nice, informed and witty introduction to how irrationalism took root in contemporary philosophy of science (Stove 1982).
[19] On the inroads, if not capture, of universities by irrationalism see contributions to Gross, Levitt & Lewis (1996), Koertge (1998), Kurtz & Madigan (1994).
[20] A good and informed account of the attack on truth in both the academy and society is *Respecting Truth* by philosopher and social scientist Lee McIntyre (2015).

unknowable 'thing in itself'. With just the slightest extra intellectual nudge, even this disappears, and we are left with ontological idealism: there is no reality, just our experience.

Subjectivism was turbo-charged in the 1920s by the common, but mistaken, philosophical interpretation of quantum theory; otherwise known as the Copenhagen Interpretation. Niels Bohr and Werner Heisenberg were among the first to bring the observer into measurement processes at the quantum level and thus to make physics subjective. Although rejected by Einstein, the Copenhagen Interpretation became for decades the norm in physics; it was advanced by von Neumann, Wigner and countless senior figures and textbook writers. In the Anglo-world it was popularised by two knighted physicists Sir James Jeans and Sir Arthur Eddington. Jeans, in a widely read and influential book, wrote:

> As the subject developed, it became clear that the phenomena of nature were determined by us and our experiences rather than by a mechanical universe outside us and independent of us. (Jeans 1948, p.294)

One can imagine the enthusiasm with which such claims were, and still are greeted. They gave a scientific green light for every imaginable brand of idealism, mysticism, obscurantism, and gender-, race-, class-, cultural-, localism. The philosopher David Mermin opined that quantum physics has taught us that 'the Moon is not there when nobody looks' (Mermin 1981, p.405). Copenhagen subjectivism, though in retreat among physicists and philosophers, is still being repeated at the highest levels in science education. So:

> science as public knowledge is not so much a "discovery" as a carefully checked "construction" … and that scientists construct theoretical entities (magnetic fields, genes, electron orbitals …) which in turn take on a "reality" (Driver 1988, p.137).

And:

> …For constructivists, observations, objects, events, data, laws, and theory do not exist independently of observers. The lawful and certain nature of natural phenomena are properties of us, those who describe, not of nature, that is described. (Staver 1998, p.503)

Such claims are made from the podium at international science education research conferences where they receive, if not standing ovations, then little critical comment.

But beginning with Einstein there has always been substantial scientific and philosophical opposition to this scientific epistemological and onotological subjectivism. Susan Stebbing was among the first philosophers to voice criticism (Stebbing 1937/1958). At the core of Mario Bunge's philosophical project has been the rejection of subjectivism, phenomenalism, instrumentalism, and positivism in physics, and counterwise the defense of realism. As he writes in his autobiography:

> I believe that my main contribution to physics has been my book *Foundations of Physics* (1967), which had a strong philosophical motivation. This was my attempt to prove, not just state, that quantum and relativistic theories are realistic (observer-free) and that their subjectivist (observer-centered) interpretations are illegitimate philosophical grafts. (Bunge 2016, p.406)

He points out that none of the founders of quantum mechanics practised the subjectivism they preached:

> In fact, when calculating energy levels, transition probabilities, scattering cross-sections, and the like, all quantum physicists assume tacitly that no reference to the measurement device, much less to the observers'mind, occurs in their calculations. (Bunge 2006, p.68)

Many philosophers and physicists share Bunge's critical estimation of both epistemological and ontological subjectivism in physics.

The foregoing elaborations of the ecological pentagram for science and pseudoscience can be made for all societies and nations. And more detailed mechanisms can be described for the effects of each of the five cultural factors in the pentagram. But the above should suffice to show that the movement up or down of each of the five factors influences the growth of science or supports the proliferation of pseudoscience.

Conclusion

To say that feng shui practitioners are engaged in and informed by 'unorthodox' or 'alternative' science is too generous. Too easily fung shui exponents resort to this 'mysterium' defence as is well illustrated by the following authors:

> Life is defined by *Qi* even though it is impossible to grasp, measure, quantify, see, or isolate. Immaterial yet essential, the material world is formed by it. (Beinfield & Korngold 1991, p.30)

And,

> To subject alternative therapies to sterile, impersonal double-blind conditions strips them of intrinsic qualities that are part of their power. (Sampson 1996, p.195)

The mysterium defense is ruled out of science. It might function as a short-term place holder, but it cannot be entrenched beyond that. Failure to find and measure chi in 3,000 years means it is a unscientific concept, yet it is the very heart of the whole feng shui enterprise.

Leaving aside philosophical considerations, on just sociological or externalist grounds alone, chi-based feng shui is not a science. It does not meet the criteria of 'playing the game'; practitioners might be playing *a* game, but it is not the *science* game. The situation is akin to a local rugby team saying they are playing 'alternative baseball' or 'unorthodox baseball'. For the latter names to be meaningful, there has to be an overlap in key elements with baseball. And the latter games cannot be called 'poor rugby' as that suggests that by incremental improvements baseball could become rugby. It cannot. Rugby is an alternative to baseball, it is not unorthodox baseball, or even neo-baseball.

Similarly, science and feng shui are not on a continuum; the difference is not like that between full-strength and lite beer. When the measurements, columns of numbers, experiments, journals, peer reviews, conferences, and the rest of feng shui's 'scientific' clothing, is examined, they all fall short of the standards of science. Charitably, this makes feng shui bad science. But historical, sociological, economic and psychological pespectives on feng shui show the whole belief system has been and is exploited for fraudulent purposes. as Ricci in the sixteenth century, Eital in the nineteenth century and Ch'en Duxiu at the beginning of the twentieth century so clearly stated, the whole system, by promising so much for so little, is tailor made for delusion and fraud. It is pseudoscience not science. Where, as

in Asia, the beliefs are commonplace, science students can usefully and with great benefit come to appreciate the inherent problems with the practice. Indeed, such examination should be seen as a professional obligation of science teachers and curriculum writers. Where feng shui is not commonplace, its examination is still educationally beneficial; it can be a case study that sheds light on important psychological, scientific, philosophical, and cultural dimensions of human life.