

## Abner Shimony: A Personal Appreciation

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Sadly on August 8<sup>th</sup> Abner Shimony (1928-2015) the former Boston University physicist and philosopher died at age 87 years.

His passing deserves notice as he was one of the most substantial figures in modern philosophy of science. He had the rare combination of competence in both physics and philosophy, and made substantial contributions to research in both fields.

Abner also had some important connections with the HPS&ST research community and debates occurring within it. His intellectual formation and achievements can be a lasting model for all those in the community promoting the mutually beneficial interconnection of science, philosophy, education and culture.

Along with Abner's immense scholarly accomplishments, his modest and kindly character was obvious to all who had dealings with him, from neighbours, to undergraduate students, to university administrators.

Olival Freire Jr., the Brazilian historian of physics and contributor to the HPS&ST community, expressed the view of many when he wrote on the *Boston Globe* obituary page (below) that: 'Abner was one of the kindest persons I've ever met.' At the same place Judith and Joseph Agassi, the latter a philosopher of science and one-time Boston University colleague, wrote: 'He was exceptional both as a brain and as a heart'.

### Abner's Life and Achievements

An overview of Abner's life and achievements can be read in the *Boston Globe* newspaper (August 11<sup>th</sup>, 2015) and is available online at:

<http://www.legacy.com/obituaries/bostonglobe/obituary.aspx?n=abner-eliezer-shimony&pid=175473099&>



The Wikipedia entry on ‘Abner Shimony’ is of value:

[https://en.wikipedia.org/wiki/Abner\\_Shimony](https://en.wikipedia.org/wiki/Abner_Shimony)

The Wikipedia entry leads to a valuable listing of the bulk of Abner’s publications in physics and philosophy that are available at the PhilPapers website where most are downloadable as pdf files.

[http://philpapers.org/asearch.pl?publishedOnly=&filterByAreas=&filterMode=authors&sqc=&onlineOnly=&hideAbstracts=&year=&showCategories=on&langFilter=&freeOnly=&categorizerOn=&sort=pubYear&newWindow=on&proOnly=on&searchStr=Shimony%2C+Abner&format=html&start=50&limit=&jlist=&ap\\_c1=&ap\\_c2=](http://philpapers.org/asearch.pl?publishedOnly=&filterByAreas=&filterMode=authors&sqc=&onlineOnly=&hideAbstracts=&year=&showCategories=on&langFilter=&freeOnly=&categorizerOn=&sort=pubYear&newWindow=on&proOnly=on&searchStr=Shimony%2C+Abner&format=html&start=50&limit=&jlist=&ap_c1=&ap_c2=)

Abner’s philosophy doctorate was awarded by Yale University in 1948 and overseen by Rudolf Carnap the prominent German philosopher-in-exile and member of the Vienna Circle. Abner was 19 years old when in 1947 his first publication appeared in *The Review of Metaphysics*. It dealt with an ‘Ontological Examination of Causation’ (Shimony 1947). His second publication was at age 20 years on ‘The Nature and Status of Essences’ (Shimony 1948). Abner was clearly a young and talented philosopher with metaphysical and scientific interests; with the passage of time he became an older and more thoughtful philosopher with the same concerns.

In his mature years he reflected that:

[as a student] I was curious about everything. How to satisfy all those curiosities? Somehow, philosophy seemed to be the best way of doing it. It isn’t. It isn’t by itself. It has to be done with something else, but I didn’t realise that right away. (Myvold & Christian 2009, p.447)

This conviction led him to ‘complement’ his philosophical training with in-depth study of physics. So in 1955 he began all over again as a physics student at Princeton studying with Eugene Wigner and there obtained his physics doctorate in 1962. Then began his many publications on the conceptual, experimental and philosophical dimensions of quantum mechanics; and also his important studies of inductive logic, Bayesianism, confirmation theory, perception, process philosophy, and the fundamentals of Darwinian natural selection theory.

His first physics publication appeared a year after the award of his PhD and had a title that pointed towards his life’s philosophical and scientific programme: ‘The Role of the Observer in Quantum Theory’ (Shimony 1963). It was concerned not with a lazy, detached or ‘philosophical’ observer but with an engaged, experimentalist endeavouring to procure measurements that reliably bore upon theoretical disputes.

Abner took very seriously the measurement problem in quantum physics, indeed at the 2006 conference mentioned below, he lists it as among the six to-be-solved problems that he bequeaths to colleagues and students. He states the problem, in brief, as:

An idealized scheme of measurement, when applied to an initial state of an object that is a superposition of eigenstates of the measured quantity, leads to the conclusion that there is no definite measurement result. ...

He lists possible ways out of the problem, including those pursued by himself and co-workers, but concludes:

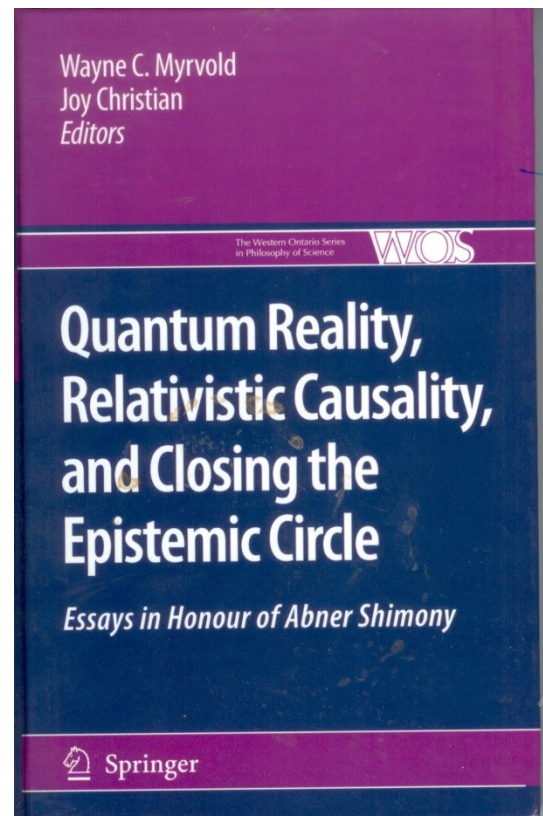
Hence a radical and apparently promising avenue towards a solution within the standard formalism of quantum mechanisms of the problem of 'obtaining definite measurement outcomes (which is also called 'the measurement problem' and 'the problem of the reduction of superpositions') would confront an impasse. (Myrvold & Christian 2009, pp.481-2)

There have been a number of collections devoted to the appraisal of Abner's work. One 1997 Festschrift being *Potentiality, Entanglement and Passion-at-a-Distance: Quantum Mechanical Studies for Abner Shimony* (Cohen, Horne & Stachel 1997).

In July 2006, a major international conference was held in Canada at the Perimeter Institute for Theoretical Physics, to celebrate and evaluate Abner's career and work. The resulting book contains 23 original essays and, most usefully contains a complete listing of his 166 published works spanning the years 1947-2008 (Myrvold & Christian 2009).

The anthology includes a very informative 30-page exchange between Abner and Lee Smolin a philosophically-minded theoretical physicist (Smolin 2013) about Abner's educational trajectory, the metaphysical implications he sees being occasioned by modern physics, and what Abner regards as some of the chief unsolved problems of physics.

This exchange (available as video on the web at: <http://www.pirsa.org/06070049>) is as close to an autobiographical essay as, I believe, Abner has left behind.



## The Interdependence of Physics and Philosophy

Although Abner's engagement in *both* physics and philosophy might seem unusual and even an indulgence, he was simply of the belief that one cannot be done without the other; or at least neither discipline can be properly advanced without the other. And, further that it is the responsibility of teachers to give students some inkling of this interdependence of the subjects they might separately be studying. On a number of occasions Abner cited Einstein's remark that 'a physicist is a philosopher in working man's clothes'. Lee Smolin, in the above exchange, notes that Abner begins with more than just speculative questions about higher-level physics, rather he 'starts with the ancient and deep philosophical questions about ontology, epistemology, [and] their relationship; he has an agenda ... a long-standing program in philosophy'.

This is hardly an aberrant position. Most of the major physicists of the nineteenth and twentieth centuries wrote books on philosophy and the engaging overlaps between science and philosophy. See for instance: Bohm (1957), Bohr (1958), Boltzmann (1905/1974), Born (1951, 1968), Duhem (1906/1954, 1908/1969), Eddington (1939), Einstein (1936/1979), Heisenberg (1962), Jeans (1943/1981), Mach (1883/1960), Planck (1936) and von Helmholtz (1995).

Many less well-known physicists also wrote such books teasing out relations between their scientific work and the ontology, epistemology, ethics and occasionally social theory that it presupposed and for which it had implications. See for instance Bridgman (1950), Bunge (1973, 1998a,b), Campbell (1921/1952), Chandrasekhar (1987), Cushing (1998), d'Espagnat (2006), Holton (1973), Margenau (1950, 1978), Rabi (1967), Rohrlich (1987) and Weinberg (2001).

Those denying that physics and philosophy can have a productive, much less necessary, interaction are faced with giving alternative explanations to the foregoing literature, and much more, on the subject generated by top-flight physicists. Was all of this simply an idle waste of their time? Not likely. And if the major physicists feel obliged to talk about philosophy – the ontology, epistemology and methodology of their craft – then surely teachers of physics might have some obligation to do so.

And of course conversely: philosophers can better articulate metaphysics and associated ontology if they appreciate physics and the entities and mechanisms that it stands upon; they can better develop epistemology and theory of knowledge if they understand the justification of scientific theory claims; they can better formulate canons of rational thinking if they understand the processes, constraints and outcomes of scientific thinking, and so on.

In the above exchange with Lee Smolin, Abner put the matter this way:

What I think was not fully realized [in the history of philosophy] ... is that you need some knowledge of the world in order to assess and refine epistemology. I think you will find in the history of philosophy more philosophers who consider epistemology to be autonomous, and ontology a derivative or an application of epistemology than you find people who thought the two need to be mutually supportive, mutually corrective. But I'm in the latter line of thought. (Myvold & Christian 2009, p.469)

And his respect for, or the 'weighting' of a physics-informed ontology, led him to a version of Whitehead's metaphysics; the 'philosophy of organism' (Whitehead 1925, 1929). Abner thought that a version of such metaphysics could accommodate the reality of consciousness, the fact of emergent properties in material things, and the confirmed findings of quantum physics. Abner's commitment to, and adjustment of, Whitehead's metaphysics characterises his own philosophical style or methodology. He provides a detailed list of Whitehead's commitments along with their complex mathematical formulation, and establishes that each of them are inconsistent with the confirmed results of quantum mechanics. Rather than blanket rejection he adjusts and modifies the metaphysics:

The discrepancies noted in Sect. III between Whiteheadian physics and current microphysics constitute strong disconfirmation of Whitehead's philosophy as a whole. The possibility remains, however, of constructing a philosophical system which would be Whiteheadian in its general conceptions though not in details, and which would accord with the fundamental

discoveries of science. A few tentative suggestions will be given here concerning the initiation of such a large philosophical undertaking. (Shimony 1965, p.323)

## **Personal Contact**

My own personal connection and great intellectual debt to Abner began in 1978 during a sabbatical leave spent at Boston University's marvellous Philosophy Department which at the time was chaired by Robert S. Cohen (who like Abner had a joint appointment in the Physics Department) and among its senior faculty were Michael Martin, Marx Wartofsky, Joseph Agassi, Alasdair McIntyre and John Finlay. That year, for my good fortune, Abner taught the graduate philosophy of science course.

### *Pedagogy*

Abner's pedagogical style was a revelation. The course was my introduction to the writings of Galileo, as for 12 weeks we students steadily read primarily only one book: Galileo's *Dialogues Concerning the Two Chief World Systems*. A simple point, but instead of reading about Galileo, Abner's students actually read Galileo. Too commonly philosophy students are reduced to being spectators in a game played between 'big name' philosophers. Philosophy of science courses amount to seeing how Kuhn, Feyerabend, Lakatos, Toulmin, Popper, Putnam, Laudan and others 'hit' interpretations of Galileo, Newton, Darwin, Planck back-and-forth across the net to each other.

Students are rightly impressed with how thoughtful and learned are the philosophers. But the students themselves do not have any grounding in the scientific texts that are being argued about; they are not in a position to seriously evaluate the arguments and identify what might be overlooked or misinterpreted by the philosophers. Participation in such 'spectator' philosopher does not much advance the philosophical education or competence of students.

Abner was a most sophisticated and up-to-date philosopher and physicist, but his graduate class was just a prolonged reading, with commentary, of a seventeenth-century book. Pedagogically it worked wonderfully. Of course, with Abner it was not just reading, as might be done in a history or literature course; the reading sought to identify and appraise the numerous philosophical (ontological, epistemological and methodological) points raised in Galileo's text.

This successful course seems characteristic of Abner's teaching. Ned Bloch, the philosopher and cognitive scientist, wrote in the above mentioned *Boston Globe* obituary page about a MIT quantum mechanics course he took with Abner, saying: 'he was a deep thinker who changed what would have been an ordinary course into a one-of-a-kind learning experience'.

With Abner's guidance the 1978 Boston University graduate class identified and discussed the philosophical warp and weave of Galileo's work; the concerns were with largely 'old fashioned' *internal* or *conceptual* issues in the text, not external or sociological questions about the text. Abner did not spend time looking for the patronage dimensions of Galileo's *Dialogues* – after making sure that everyone had noted Galileo's Dedication of the work to the Grand Duke of Tuscany, he was concerned that students understood the intellectual breakthroughs that separated Galileo's new science from that of the 'old' natural philosophy being pursued around him.

An enormous amount has been published on Galileo's philosophy, but one very useful work that concentrates on the philosophical and methodological content of the *Dialogues* is Maurice Finocchiaro's *Galileo and the Art of Reasoning* (Finocchiaro 1980). This page-by-page philosophical interrogation of the *Dialogues* is similar to Abner's classroom approach as I had the immense good fortune to experience in 1978.

Abner's course was an engaging entree into the rewarding questions concerning the interdependence of the history and the philosophy of science. This is a much-examined and long-standing question that was well-articulated by Imre Lakatos: 'Philosophy of science without history of science is empty; history of science without philosophy of science is blind,' (Lakatos 1978, p.102.). The literature is well-canvassed in contributions to a recent anthology on the subject (Mauskopf & Schmaltz 2012). The course experience moved me to put together a book of readings, *The Scientific Background to Modern Philosophy* (Matthews 1989) with the texts of early modern scientists to which the philosophers of the time were responding.

### *Galileo's Pendulum Analyses*

Of the numerous philosophical themes identified in the course, it was Galileo's recourse to idealisation in his mathematical analyses of the pendulum that especially caught my attention and on which I subsequently published a number of pieces and on which the large International Pendulum Project was based (Matthews 2000, 2014).

Galileo's new science was not going to chart how the world behaves but how it should behave; not *what* happens, but what *would* happen if certain conditions provided by his theory were to be met. A falling autumn leaf has a chaotic trajectory the charting of which would simply be a waste of time, a sign that you have not understood what science is about. Only under sophisticated laboratory conditions (experiments), does the falling leaf exemplify the law of free fall which was given by his theory. For the pendulum this meant: if the string were weightless, if the bob occasioned no air resistance, if the fulcrum were frictionless and so on. In controlled experiments some of these conditions can be met, but other conditions cannot, yet the procedure was crucial to Galileo's mechanics.

All of this has immediate implication for the better understanding of the success and failure of school laboratory practice where 'my experiment did not work' is a standard classroom refrain. It also has implications for understanding the inevitable 'gap' between scientific models, which by definition are idealised entities and the material and phenomenal targets of the models which by definition are raw, complex, and non-idealised. Philosophical awareness can bring some semblance of order to these educational discussions on experiment and models.

### **Abner's Education-Related Philosophy**

Abner wrote on a number of philosophical topics that are closely connected to debates in education: Kuhnian themes in epistemology, science and worldviews, rationality in ethics, and Enlightenment topics.

### *Kuhnian Themes*

Abner wrote on central Kuhnian themes that were sweeping through university departments including those of science education (Shimony 1976, 1977). He wrote of the key Kuhnian move of deriving methodological lessons from scientific practice that: 'His work deserves censure on this point whatever the answer might turn out to be, just because it treats central problems of methodology elliptically, ambiguously, and without the attention to details that is essential for controlled analysis' (Shimony 1976, p.582).

In an exchange about moral judgement mentioned below with Martin Eger, Abner remarks:

In summary I find a pervasive slovenliness of reasoning in the new [post-Kuhnian] philosophy of science. Its advocates have failed to use its excellent insights constructively by exploiting them for the refinement of scientific methodology and epistemology. This constructive enterprise requires hard work, which is evaded by their relativism and subjectivism. (Shimony 1991, p.97)

Thirty years later Abner returned to these themes, writing:

I am a fallibilist concerning the quest for knowledge. ... One can be a fallibilist and think that any proposition that we've committed to may be wrong, may be subject to correction, but one can be an *optimistic* fallibilist. I'm a *highly* optimistic fallibilist. This is something of an aside but not entirely, it's an historical remark: the twentieth century was a time when the best established physical theories were overturned. This has led sociologists of science and some historians of science to be very sceptical about any claim of approaching truth about the world. My feeling is that's an entirely wrong misreading of the scientific revolutions of the twentieth century, because the theories that were overthrown – like Newtonian mechanics, Newtonian space-time – the theories were retired, like presidents who have completed their terms honourably. They were not impeached. And of course Bohr's expression of a correspondence principle applies. The new theories do not discredit the old ones; they give the old theories their place as approximations. And this program that I've sketched of closing the circle of epistemology and ontology embraces the idea of approximation. Approximation fits in very naturally in such a view of the world. (Myvold & Christian 2009, pp.448-49)

As is well known, Kuhn subsequently came to agree with the kinds of criticism made by Abner and many others. He recognised that his own complete lack of any training in philosophy, and consequently of any 'internalisation' of proper philosophical standards and style, contributed immensely to the 'loose writing' and problems this writing generated. In Kuhn's 1991 Rothchild Lecture he was moved to say of the Sociology of Scientific Knowledge programme, the 'Strong Programme' of the Edinburgh School, that:

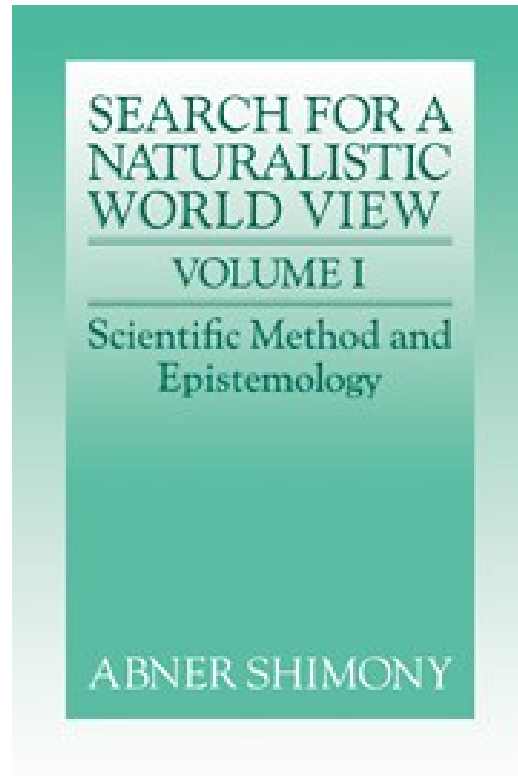
I am among those who have found the claims of the strong program absurd: an example of deconstruction gone mad. And the more qualified sociological and historical formulations that currently strive to replace it are, in my view, scarcely more satisfactory. (Conant & Haugeland 2000, p.110)

Kuhn went on to regret writing the 'purple passages' but by then the Kuhnian irrationalist, idealist and constructivist wave had carried much of the humanities academy before it, and a great deal of the science education community (Matthews 2004). A pity that the many considered and critical philosophical papers on Kuhn, such as Abner's, were not more widely read by educators. This is yet another reason why good philosophy courses should somehow be built into science teacher education programmes: without such courses, it is inevitable that 'half-baked' and populist philosophy or ideology occupies whatever 'theoretical' space is available.

## *Science and Worldviews*

From first to last Abner was committed to working out the elements of a coherent worldview that was informed by, consistent with, and supportive of science. Abner recognised that individuals and cultures need to formulate and live with worldviews or views about the world – accounts of the basic processes in the world, how we know of them and what is our own place in these processes.

The very idea of formulating such worldviews apart from, or in ignorance of, much less in conflict with science, was unimaginable to Abner. Thus the title of one of his articles is: ‘Search for a Worldview Which Can Accommodate Our Knowledge of Microphysics’ (Shimony 1989) and the two-volume collection of his philosophical essays is titled *Search for a Naturalistic World View* (Shimony 1993a,b).



This line of investigation clearly connects with important concerns in international science education. Nearly all national science curricular documents express the hope that the learning of science will inform students’ view of the world; and should contribute to their understanding of natural, social and cultural problems, as well as contribute to their own self-understanding. For understandable reasons, the documents do not much flesh out the details of this expectation, but equally understandably educational researchers have felt impelled to do so. This has led to a huge literature on ‘Science, Worldviews and Education’ (Matthews 2009) that can benefit from the kind of detailed studies undertaken by Abner.

## *Methodology in Science and in Ethics*

Abner wrote on the parallel debates about rationality in science and in ethics, and on the possibility of objective moral facts (Shimony 1991). On this topic he had an exchange with Martin Eger, a philosophical physicist who published a number of pieces on hermeneutics in the early volumes of *Science & Education* (Eger 1989, 1992, 1993a,b), and who participated in the first History, Philosophy and Science Teaching conference at Florida State University in 1987. In the exchange Abner presented:

a few considerations which should make one resist any simple conflation of the natural sciences and ethics and to distrust the claim that rational criteria are the same in both domains. (Shimony 1991, p.97)

Having said that, Abner does not believe that ethical or moral judgement is completely ungrounded or free-floating, nor can the philosophical debate be settled *a priori*:



Practical reason is not concerned with the aspects of the human mind which are genetically fixed, but rather with those which are plastic. Hence, the evidence which it must marshal has to be drawn from human history and from the experience of people who have struggled with concrete problems of life. (Shimony 1991, p.100)

Abner did military service 1953-55 and during the Vietnam War he was a member of Veterans Against the Vietnam War. He was comfortable in believing that there were material, social and cultural facts about the war that could be established, but he was equally comfortable in reckoning that moral judgements about these facts, and ethical responses to them, could be reasonably justified. Opposition to the war was not a free-floating, unanchored option the taking of which was a matter of hormones, gender, coin-tossing or feelings.

The exchange with Eger was reproduced, along with 18 other essays, in the very first of the contemporary HPS&ST anthologies that followed the 1989 Tallahassee IHPST conference (Matthews 1991).

After Eger's death, Abner edited an anthology of his work titled *Science, Understanding and Justice*, including the *Science & Education* essays (Shimony 2006). The anthology contains a 50-page wide-ranging dialogue between Abner and Eger on philosophical, educational and political topics, the last including discussion of Zionism and phony medical practice. At one point in this dialogue, Abner comments that:

From my naturalistic point of view – borrowing from Aristotle and Spinoza and from heroes of the Enlightenment like Diderot ... – the cultivation of virtues and the achievement of character convert the cacophony of competing and erratic desires into the harmony of a satisfying life. (Shimony 2006, p.456)

And he adds:

I am not very religious, and therefore what I desire in the long run is not 'the peace that passeth understanding' but the peace achieved by understanding. (ibid)

### *Defending the Enlightenment Tradition*

Abner was a defender of the much-maligned Enlightenment tradition in philosophy that grew directly from the work of the early modern natural philosophers (Shimony 1997). Thus his remark quoted above about 'I'm a *highly* optimistic fallibilist'. This stance, with lots of elaboration, characterises the Enlightenment tradition. Once again, Abner's sophisticated and informed writing on the subject can be a much-needed contribution to educational debate where currently any connection to, much less defence of, the Enlightenment is regarded with great suspicion. In his PSA Presidential Address Abner, in contrast, wrote:

My central conviction is the immense value of a mental outlook which can be called by the suggestive and historically recognized name Enlightenment ....My anxieties are that the cultivation and the influence of this mental outlook in our nation and in the world are threatened in various ways ...My central hope is that the Enlightenment will prevail despite these threats. (Shimony 1997, S1)

The Address went on to delineate ten philosophical and political claims that characterise the Enlightenment tradition, and to itemise the attacks that have been made on these positions and what the defensible responses to attacks might be. My own scribblings on the subject are deeply indebted to Abner's work (Matthews 2015, chap.2). Abner rightly draws attention to the connection between philosophy and politics; specifically between 'radical' philosophy and 'conservative' politics:

Why, for example, should public support be given to investigations of the effect of man-made pollutants on climate if any conclusion that is reached by such an investigation is underdetermined by the evidence? (Shimony 1997, S13)

Many have drawn attention to the succour that reactionary and conservative regimes draw from seriously relativist and sceptical philosophy: if every claim is underdetermined, dependent on the 'viewing lens', and changeable with the observer – then a ruling monarch, warlord or party can dismiss criticism by recourse to the 'that is just your opinion' defence. Relativism is the stand-by defence of Reaction.

### **Appreciation**

All who had the opportunity of knowing and learning from Abner recognise their good fortune. He was a wonderful and committed scholar and, as so many have remarked, a kind and generous man. This was my experience of him nearly 40 years ago, and continued to be so in subsequent personal and editorial dealings.

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