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The dialectic of politics and science from a post-truth standpoint*

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This chapter takes off from Max Weber's famous lectures on politics and science as 'vocations' to explore the concept of 'modal power', that is, the power to determine what is possible. Politics and science are complementarily concerned with modal power, in ways that go to the heart of Michael Dummett's influential metaphysical characterisation of the antirealism/realism distinction, which the chapter pursues across several philosophical fields, including logic, epistemology, jurisprudence and finally historiography. The chapter adopts a 'post-truth' perspective in the sense that modal power is treated from an 'antirealist' standpoint, in which 'the name of the game' is to expand one's own sphere of possible action while constraining that of the opponent. That world of constrained possibilities is the 'actual' world, whose relationship to other possible worlds fluctuates over time in ways that resemble quantum effects but are most clearly captured by 'revisionist' historiography. The chapter ends with a discussion of the contrasting attitudes to such historiography in politics and science.

Keywords: antirealism, Dummett, Kant, modal power, Plato, quantum, realism, revisionism, Spielraum, Weber

Диалектика политики и науки с точки зрения пост-правды

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Автор отталкивается от лекций М.Вебера о политике и науке как «призваниях и профессиях» для того, чтобы исследовать понятие «косвенного влияния» (modal power), определяющего границы возможного. Политика и наука связаны с «косвенным влиянием» и характер этой связи отсылает к метафизическому различению реализма и антиреализма, предложенному Майклом Даммитом. Автор исследует это различение в контексте некоторых областей философского знания (в частности, в логике и эпистемологии), а также в юриспруденции и историографии. Он использует концепт постправды для рассмотрения «косвенного влияния» с антиреалистских позиций, где целью является распространение собственной области возможного при ограничении соответствующей сферы для противника. Этот мир возможностей рассматривается как «реальный» мир, взаимодействия которого с другими возможными мирами подвержены флуктуациям, однако точно схвачены «ревизионистской» историографией. В заключении автор рассматривает противоположное отношение к такой историографии в политике и науке.

Ключевые слова: антиреализм, Даммит, Кант, косвенное влияние, Платон, квант, реализм, ревизионизм, Шпильраум, Вебер

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The Weberian Dialectic: Where Political Philosophy and Philosophy of Science Meet

The idea that science and politics are somehow metaphysically different has helped to keep politically oriented academic disciplines distinct from the actual politics. Max Weber had an especially influential way of making the point a century ago in a couple of lectures delivered to university students in Munich: 'Science as a Vocation' (1917) and 'Politics as a Vocation' (1919). Weber saw science as *wertrational* ('value-rational') and politics as *zweckrational* ('ends-rational') pursuits. To be sure, he claimed to be talking about what he called 'ideal types' of the scientist and the politician, but for us to call them 'stereotypes' would not be inappropriate.

The scientist is principled in her pursuit of the truth without necessarily knowing the end. She is a 'realist' in that peculiar post-Kantian sense of holding herself accountable to a standard over which she ultimately has no control. This sense of a 'mind-independent' reality is the secular residue of the transcendent Abrahamic deity. Thus, the ultimate truth of our knowledge claims is akin to the Final Judgement that God passes over our lives. Method in science functions as moral codes do in such religions – not as foolproof formulas to salvation but as heuristics whose value is always demonstrated indirectly. (No surprise perhaps that the person who coined 'heuristics' – who also coined 'scientist' to name a profession – was William Whewell, the nineteenth century's exemplar of the hybrid scientist-theologian.) Karl Popper's philosophy of science is based very clearly on this idea – that a positive outcome to an experiment does not outright confirm a hypothesis but simply fails to falsify it. Thus, the scientist is licenced to continue promoting the hypothesis, which in the long run may only have provided the scientist enough rope with which to hang herself.

In contrast, the politician is focused on 'the ends justifies the means', which can leave observers with the impression that the politician is unprincipled, even unscrupulous, in her dealings with others. However, the politician wishes to be seen as so convinced of the rightness of her vision that she will do whatever it takes to bring it about. The sheer expression of that conviction should attract enough followers to turn the vision into a reality, perhaps even in the manner of a self-fulfilling prophecy. This is quite recognizably an 'antirealist' position in the sense that was associated with 'constructivism' and 'decisionism' across a wide range of philosophical specialities from mathematical logic to legal theory in the twentieth century, all of which are concerned with the nature of *normativity* [Turner, 2010]. Unlike the scientist, who aims to provide a perspicuous representation of a reality that continues to exist even if she fails to represent it properly, the politician actively participates in producing the reality she wants, indeed

one which she would like others to think would not have come about without her intervention. This *modus operandi* captures what Max Weber christened as 'charisma' in politics.

What Weber identified here were not two completely separate world-views but two orthogonal ways of viewing the same world. In other words, 'realism' and 'antirealism' should not be seen as contradictory positions but as the same position looked at from two different angles. Here I take my cue from the late Oxford metaphysician, Michael Dummett (1978), who famously organized his philosophy around the idea that realism and antirealism differ over the 'determinacy' of truth and falsehood. Realists hold that there is a fact of the matter as to whether something is true or false, regardless of whether we know it. In that sense, a statement is always 'determinately' true or false. In contrast, antirealists deny that there is such a fact of the matter until we know it – or at least until we have a procedure that concludes with our knowing it. In that sense, a statement is 'indeterminately' true or false unless we have some way of settling the matter.

Perhaps the most intuitive way of characterising this difference in perspective – certainly one that appealed to both the logical positivists and the Popperians – is to say that realists start with the existence of a semantically closed language, in which each grammatical sentence is always already either true or false, the fact of which is determined by correspondence to a reality outside the given language. In contrast, antirealists start at the logically prior stage of having to decide which language to use. This 'metalinguistic' standpoint is ultimately a matter of 'convention', implying a free choice in terms of which way the world is to be semantically divided, and it is only once that decision is taken that the distinction between language and reality is in force. An updated version of this contrast for a generation reared on *The Matrix* appears in the media theorist Douglas Rushkoff's (2010) exhortation, 'Program or Be Programmed!' The former option captures the antirealist and the latter the realist sensibility.

Thomas Kuhn (1970) notoriously qualified the realist sensibility in a way that specifically applied to science, one which appealed more to the positivists (who published Kuhn's book as the final instalment of their encyclopaedia) than to the Popperians [Fuller, 2000, chap. 6]. The realism of science depends not only on scientists settling on a theoretical language to which they agree to be held accountable, but also that they all settle on *the same* such language. This speaks to the authoritarian character of the 'paradigm', which is underwritten by a regime of standardised training and peer review judgement. Here Kuhn was reflecting on the relatively short period required for the scientific community to rally around Newton's world-system. This had been hastened by the Charter of the Royal Society of London, whose prohibition of matters relating to politics, religion and morals was designed to minimize the often lethal tumult that had been

unleashed by the Protestant Reformation, during which the so-called 'Scientific Revolution' transpired. (In terms of the previous paragraph, the Reformation constituted the ultimate 'metalinguistic' struggle.) In contrast, the Popperians regarded Kuhn's insight as an overreaction, preferring many 'research programmes' – their rhetorically scaled-down version of 'paradigms' – to bloom as long as each conducted themselves in a methodologically rigorous fashion, as epitomised by the 'falsifiability principle'. In that case, external observers can draw their own conclusions with regard to their investments, allegiances and actions based on the track records of the various research programmes.

Latter-day analytic philosophers, who tend to be more scholastic than the Popperians or even the positivists ever were, have found it difficult to classify these precursors as realists or antirealists, as they tended to switch back and forth in perspective. This is epitomised in the ambiguous role played by *hypothesis* in both positivist and Popperian thought: 'Hypothesis' stands at once for a freely chosen principle to orient scientific inquiry (antirealist) and a testable claim about a reality that lies outside of inquiry (realist). Here one should not underestimate the significance of Gestalt psychology – not least the 'Gestalt switch' – in orienting this entire way of thinking. (Popper himself had been a student of Karl Bühler, one of the early Gestalt psychologists.) In effect, fallibility is the flipside of freedom, and in this way realism and antirealism are joined at the hip [Fuller, 2015, chap. 4].

But beyond these matters of philosophical self-positioning, the difference in perspective represented by realism and antirealism also helps to explain an important difference in the *modus operandi* of scientists and politicians – namely, the rigour of the former and the flexibility of the latter. From a logical point of view, politicians stand at a meta-level to scientists, which begins to give meaning to Bismarck's definition of politics as the art of the possible. Put another way, if you control the frame, you control the game. In the 1860s, this was described as the 'room to manoeuvre' (*Spielraum*), which the savvy politician tries to expand at the expense of opponents. By the 1960s, one would speak of 'the name of the game'. However, the consolation prize for the losers may be science, which aims to uncover the rules of the game, presumably in the hope that one may become a *magister ludi* in the future. This would amount to leveraging science to acquire political competence, something that taking the red pill is designed to achieve for the people living in the simulated world on which *The Matrix* is premised.

On Plato's telling, one would need to spend several decades in his Academy to acquire a comparable competence. But for the lawyer Francis Bacon, the generally acknowledged founder of the modern scientific method, this knowledge may be acquired by the 'experimental' study of nature, which he likened to an inquisitor's treatment of a hostile witness: Both nature and the witness need to submit to abnormal conditions

('extreme experience' is close to the original meaning of 'experiment'), since neither is inclined to reveal her secrets easily, as that would remove whatever power she has over her investigator [Fuller, 2017a]. The basic idea is that different forms of torture might reveal different responses, which leaves it up to the inquisitor to determine the truth. Of course, in strictly theological terms, both 'science' and 'politics' in this sense are pursuits that easily court blasphemy for their god-like aspirations. On the one hand, scientists follow in Bacon's footsteps in their aggressive pursuit of God's exact identity by stripping away the deity's earthly guise as 'Nature', while on the other politicians such as Bismarck more simply aim to approximate God's capacity to conjure with alternative courses of action, the decision among which ideally leaves their opponents at bay.

Yet, even in a more democratised political environment, Spielraum reigns supreme. Popper (1957) brought the idea down to earth as the 'logic of the situation', while Weber tried to forge a concept of 'objective possibility' as the scientific correlate to Spielraum [Turner and Factor, 1994: chap. 6; Neumann, 2006]. Implied here is the idea of Realpolitik, which conceptualises politics in the business of reality construction, a competitive field in which possibilities expand and contract as an emergent effect of the actions taken by the relevant players [Bew, 2016]. The name of the game, then, is getting the opponent to play by your rules, so as to increase your own room to manoeuvre. In the modern world, the party-based struggles that characterise modern parliamentary democracies come closest to formalizing this modus operandi within nation-states. Internationally the comparable field of play is more ambiguously defined, but 'balance of power' among nations – a strategy actively pursued by Bismarck – captures the sense of equilibrium toward which this essentially anarchic situation ideally gravitates.

Modal Power and the Fine Art of Actualising the Possible

At stake in both politics and science – and central to the idea of *Spielraum* – is what I have called *modal power* [Fuller, 2017b]. Modal power consists in the capacity to decide what is and is not possible. It is the basis for the philosopher-king's authority in Plato's *Republic*. He possesses the alchemy that turns politics into science by converting his own will into a law that is binding on others and perhaps even himself. Weberian charisma is often crucial to make this alchemy work. What from the philosopher-king's standpoint is only one among many possibilities that he could have enacted becomes a necessary condition for the action of his subjects. It was for this reason that playwrights, who conjure up

alternative possible worlds for entertainment, are enemy number one in the Platonic polity, as a well-acted performance can leave audiences confused about what is and is not permitted in their society. Thus, partly to assuage his teacher's concerns, Aristotle influentially argued that a well-made drama must resolve all the plot elements, thereby clearly signalling that what the audience had witnessed on stage was a pure fiction that would not be continued outside of the theatre.

Aristotle went further. He invented the concept of contingency (*endechomenon*) to capture the idea that claims about the future are neither true nor false before the fact but will become true or false, depending on what happens. However, this concept, which aims to be faithful to how we experience the future, occludes the question of who controls the scope of the possible, in terms of which something turns out to happen or not happen. It would seem that the intellectual price that Aristotle was willing to pay to enforce a strong fact/fiction distinction was to abandon the idea of responsible power by portraying the future as inherently indeterminate in a way that the past is not. Thus, his conception of the possible ultimately resorts to a pre-agential notion of potency (*dynamos*), the basis of both the modern concept of energy and its removal from the realm of responsibility.

An early opponent of Aristotle on this point was the Alexandrian philosopher Diodorus Cronus, who presented himself as a more faithful follower of Plato and is now regarded as a proto-Stoic and an ancient precursor of modal logic. He argued that the future is either impossible or necessary, given that the future seems indeterminate only because we do not know whether it will play by the same rules of the game that we currently do. Thus, a vision of the future may appear impossible if we do not know the rules that would make it possible, while that same vision may appear necessary if we think we do know the rules. Diodorus assumed that the difference between these two starkly contrasting judgements of the future depends on whether we think the rules of the game will remain *constant* over time. However, the 'necessary' judgement may be based on our thinking we know that a *specifically different* set of rules will be in effect – and hence we commit to play by them in advance of their formal ratification.

This risky modal strategy, which lay behind, say, Pascal's Wager for the existence of God and the self-fulfilling prophecy, is 'performative', in the broad sense that has become popular in the wake of various creative extensions of J.L. Austin's speech act theory over the past thirty years, from Judith Butler on gender to Michel Callon on the economy. In all these rather different cases, one acts 'as if' some desired regime is already in place so that it might come into place. Austin (1960) believed that this capacity to convert the possible into the actual was inherent in the semantics of natural languages. His own examples tended to come from quasi-legal contexts, such as promising, in which an entire moral regime is brought into existence through a single utterance.

The theological benchmark for this way of understanding the power of language is, of course, the Abrahamic conception of the deity who creates by pronouncing things into being (*logos*). But it can also be found in the various philosophical conceptions of 'self-legislation', from the Stoics to Kant. Here the actualisers of the possible are self-consciously finite beings who possess a moral psychology whereby one must remain steadfast in the face of a recalcitrant environment. 'Perseverance', a word favoured by Spinoza, Hobbes and the Puritan founders of America, covered this attitude, but nowadays 'resilience' is the word of choice. All these cases preserve, in increasingly secular guise, the original sense of 'belief' as implying unconditional loyalty, which remains in the Christian sense of 'faith', itself derived from the Latin *fides*, the word used to capture the appropriate attitude of the soldier to the commander in the Roman army [Fuller, 1988, chap. 2].

Jon Elster (1979, 2000) has interestingly framed this entire orientation to the world in broadly utilitarian terms as 'precommitment', whereby one freely decides to act as if the world were governed in some alternative way in order to receive the corresponding benefits. This was arguably Galileo's strategy when he made evidential claims on the basis of the telescope, even though the methodology for assessing telescopic observations had yet to be agreed. Thus, at the time of his Papal inquisition, Galileo was fairly seen as a prevaricator [Feyerabend, 1975]. While Galileo was presuming (correctly) that the optics of the telescope would be eventually validated, his particular telescope was at best a pimped toy whose enhanced powers were based on no more than a speculative understanding of the gadget. Not surprisingly, Galileo failed to impress his inquisitors in the terms on which he was offering his knowledge claims. Nevertheless, his actions served to inspire others to play by his presumed rules – and so we say he won that argument *post mortem*. For this to happen, both the craft and the optics of the telescope had to be developed so as to open up the horizon of possibilities which Galileo had adumbrated.

The difference between Aristotle and Diodorus raised earlier highlights a more general feature in the history of humanity's attempts to come to grips with rationality in both its political and scientific guises. Perhaps the most important metaphysical difference between Aristotle's syllogistic logic and modern symbolic logic is that the former assumes that the truth values of particular statements are already known, whereas the latter – more in the spirit of Diodorus – assumes only knowledge of the conditions under which such statements might be true and what would thereby follow. The clearest way to see this is that Aristotelian syllogisms are normally expressed as a series of assertions (e.g. 'All men are mortal, Socrates is a man, Socrates is mortal'), whereas symbolic logic recasts the very same set of propositions in a hypothetical mode that is indifferent to the truth-value of each proposition (e.g. 'If p then q, p, q').

This shift in perspective puts one in a post-truth frame of mind. It sees the actual world as just one of many possible worlds, any of which might be actionable under the right conditions. In the language of symbolic logic, the range of these possible worlds is captured in a set of algebraic equations that need to be solved simultaneously. When economists talk about 'jointly maximising' various desirable properties, this is the frame of mind that they are in. Each such equation consists of 'variables' (e.g. 'p' and 'q') that are related in terms of a 'function', which is a property that a possible world might have. In that case, the 'values' taken by the variables define that state of that world. In short, s/he who defines the terms of the equation defines out the structure of the world. Or, as the most influential analytic philosopher of the second half of the twentieth century, Willard Quine, put it, 'To be is to be the value of a variable'.

The bottom line of this perspective, which is common to both modern scientific and political rationality, is that reality is something that is decided, not given. When God decides, the result is the best possible principles for ordering the universe; when humans do it, the result is no more than a risky hypothesis that can be falsified by subsequent events. This way of seeing things is ultimately due to *theodicy*, the branch of theology concerned with explaining and justifying how a perfect deity could create such a seemingly imperfect world. The idea is that divine judgement is ultimately about the harmonious resolution of countervailing forces, the optimality of which is seen only upon its completion. While this occurs instantaneously in God's mind as the logic of creation (or *logos*), for humans it is extended over time, with politics and science operating as alternating horizons for understanding the process, albeit fallibly, perhaps corrigibly, but in any case with much damage done along the way. This general mode of reasoning – and all the moral qualms attached to it – is usually attributed to Leibniz, who coined 'theodicy' in 1710, only to have the very idea ridiculed as 'panglossian' by Voltaire in *Candide*. But theodicy was soon resurrected and historicized in Hegel's 'dialectical' philosophy of history, in which from the human standpoint each moment of optimality is only temporary and indeed provides the ground for its own subsequent subversion [Elster, 1978].

'As If': The Politics and Science of the Fact-Fiction Distinction

The specific 'as if' formulation of actualising the possible, the performative expression of modal power, is due to Hans Vaihinger, who in the early twentieth century invented Kant scholarship as we know it today. He built an entire philosophy around this turn of phrase (*als ob*) that Kant frequently used to discuss our attitude to reality [Vaihinger, 1924]. Vaihinger lived

during a time when the fact-fiction distinction that Plato had done so much to emblazon in the Western mind was put under serious strain. Like Marx and Nietzsche before him, Vaihinger was strongly influenced by the demystified readings of the Bible advanced by the 'historico-critical' school of theologians who veered towards treating Jesus as more 'symbol' than deity. Two other late nineteenth century secular trends contributed to this blurring of fact and fiction. One was the rise of 'conventionalism' in mathematics and physics, which allowed for the postulation of unprovable assumptions if they generated a logically coherent world-system, which in turn might model the workings of our own. 'Non-Euclidean geometry' had been invented in just this manner, which only later was shown to provide the mathematical infrastructure for Einstein's revolution in physics. The other was the rise of the naturalistic or, as Emile Zola said, 'experimental' novel, which played out in considerable detail versions of what social reformers had imagined and sometimes witnessed to transpire in parts of society lacking any official documentation. Wolf Lepenies (1988) has shown how this development played into the early writing style of academic sociology staking out a claim 'between literature and science'.

An interesting feature in all these 'as if' cases is a general distrust of the self-certifying character of official records, whether encoded in Biblical sayings, geometric axioms or national statistics. Behind the realism of the text there is always the 'irrealism' of the will that brings them into being [cf. Goodman, 1978]. In this context, 'irreal' should be understood in the same spirit as 'irrational' in mathematics: Irrational numbers appear to exist but they cannot be captured as a ratio of two integers, the numbers that are normally used for counting and measuring. Perhaps the most famous of such numbers is π ('pi', the ratio of a circle's circumference to its diameter). More generally, these numbers are called 'transcendental' because they cannot be exactly specified, which means that they somehow escape the normal way in which mathematical objects are produced and ordered. Considerable debate in nineteenth century mathematics focussed on whether such numbers actually exist, with the founders of modern analytic and continental philosophy – Gottlob Frege and Edmund Husserl – playing support roles in the drama [Collins, 1998, chap. 13]. At stake here was the existence of a 'meta-mathematical' realm, one incommensurable with the normal range of mathematical entities but at the same time necessary – if not responsible – for the existence of those entities.

In the end, the mathematics community largely conceded that such a meta-mathematical realm was needed to explain normal mathematical entities. The insights nowadays attributed to Kurt Gödel's two 'incompleteness' theorems flow from this concession. However, Vaihinger had from the start realized that this mode of thinking has more general applicability, not least in the law. Two of the most important movements in twentieth century jurisprudence – *legal positivism* and *legal realism* – may

be understood as having picked up on complementary features of the 'as if' approach. In terms of the politics/science distinction, the former encodes the 'politics' and the latter the 'science' pole.

On the one hand, legal positivism picked up on what Vaihinger called 'fictions', which he understood as pragmatically interpreting Kant's own 'transcendental' mode of philosophizing. Thus, for the legal positivist the legitimacy of particular laws rests on their derivability from what Hans Kelsen called the *Grundnorm*, which may be interpreted as the Ten Commandments, the Constitution or the social contract. The *Grundnorm* is itself 'necessary' because without it none of the other laws would acquire legitimacy [Turner, 2010, chap. 3]. This 'antirealist' approach sees the legal system from the standpoint of the legislator who – as absolute ruler, sovereign parliament or general will – has the power to turn any pronouncement into law. In contrast, the legal realist operates from within the system and treats such legislative pronouncements and their various statutory derivations and interpretations as hypotheses to be tested against its effects on the population to which it is applied. Thus, legal realism from its early twentieth century US roots in the 'sociological jurisprudence' of Oliver Wendell Holmes Jr. and Roscoe Pound has been associated with 'judicial activism' because its adherents quite openly declare that certain laws do not work or need to be revised substantially in order to bring about 'Progressive' policy reform [White, 1949, chaps. 5-7].

It is worth observing that both legal positivism and legal realism are often seen as 'revisionary' approaches to the law because practicing lawyers – including judges – do not normally register such a heightened sense of the power dynamics involved in maintaining the integrity of the law as a closed system. In this respect, these two schools of jurisprudence – notwithstanding their *prima facie* divergence in approach – operate within a 'post-truth' horizon, one that presumes what Paul Ricoeur (1970) famously called a 'hermeneutics of suspicion' with regard to seemingly established 'black letter' issues of the law, which once again recalls the original spirit of Vaihinger's 'as if' philosophy, albeit in this case one where players on *both* sides of *The Matrix* take the red pill.

The Quantum Nature of Modal Power

Our failure to register modal power means that we tend to have a flat-footed understanding of how history works. For example, much is made of the predictive failures of Marxism, starting with Marx's own failure to predict that the first revolution done in his name would occur not in the country with the best organized industrial labour force (Germany) but in a country with a largely disorganized and pre-industrial labour force

(Russia). Yet this way of putting matters gives the misleading impression that Marxists and their opponents were simply spectators to history, when in fact they were anything but that. Indeed, the phrases 'self-fulfilling' and 'self-defeating prophecies' were coined in the twentieth century to cover the peculiar forms of success and failure to which not only socialists but also capitalists – in terms of investor confidence in the market – have been prone in the modern era. People deliberately act to both increase and decrease the probability that specific predictions come true. The resulting phenomena are often discussed as the 'interactive' effects of 'observer' and 'observed, a distinction that after Bohr, Heisenberg and Schrödinger is associated with the workings of quantum reality.

The most natural way to interpret the mathematics of quantum mechanics is that it envisages reality as a possibility space, in which the actual world consists in the ubiquitous collapsing of this space into moments, which provide portals to understand what is possible in both the past and the future. These 'portals' are what we normally call the 'present', the arena in which cause and effect is most clearly played out. But as the content of the present changes, so too does our sense of what has been and will be possible. In that respect, nothing need be forever impossible because the right event could alter the possibility space decisively. But similarly, something that had been possible may subsequently become impossible. To be sure, my characterisation is much too crude for a physicist. Nevertheless, even this crude account may offer insight to theorists of politics and science, at least in terms of how to conceptualise possibility and temporality, the two foundational categories of historiography. Thus, in what follow, I will not delve into the mysteries of 'quantum causation' (aka action at a distance), let alone how a vision of reality that was designed to understand the smallest of events can be scaled up so easily to make sense of normal-sized events and even overarching tendencies. However, Alexander Wendt (2015) has done much of the necessary spade work to theorize credibly about politics while taking the technicalities of quantum mechanics seriously.

The idea that events determine the course of history is a commonplace – albeit a contested one among philosophers of history. This idea is normally understood either in terms of a 'founding moment' or a 'turning point'. In the former, the past appears as a chaotic field, which the founders bring into some sort of lasting order; in the latter, the past is presented as a default pattern which the turning point upends and redirects. Kuhn's (1970) famous theory of scientific change combines the two as alternating phases of 'normal' and 'revolutionary' science. But common to both versions of the idea, seen as either distinct or complementary historical horizons, is that the 'stuff of history' is better captured – at least metaphorically – as transformations of matter than the reconstitution of possibility space. An example of the difference is the common sense proscriptions against

'affecting' let alone 'changing' the past, even though we seem to have no problem talking about 'affecting' and even 'changing' the future. Our intuitions about time having a direction are grounded in this observation. In contrast, taking the 'quantum turn' in the sense promoted here would entail recognizing every event as potentially altering both the past and future at once.

The asymmetry in our default judgements of temporality suggests that our ordinary intuitions about the nature of causation are incoherent, which in turn may reflect an excessively underdetermined conception of free will [Dummett, 1978, chaps. 18-21]. In other words, when we talk about 'changing the future', we imagine giving shape to something that remains unformed at the time of our action, full stop. Yet, it is only in retrospect – that is, once that 'something' has been given shape – that we can judge our action's efficacy in turning what had been a possible future into the actual present. We think we made a difference because the difference we see is one which we see ourselves as having made. (This is the problem that the law faces when trying to determine who should 'take responsibility' for action during a trial.) In short, our understandings of the past and the future are formed simultaneously. Indeed, the 'present' may be defined as the site where a 'possible future located in the past' is converted into the 'necessary ground for constructing the future'.

What applies as a principle of our own mental equilibrium extends to our judgements of history as a whole. For example, to claim that Isaac Newton and Henry Ford 'changed the course of history' presupposes a correspondence between what we take them to have wanted to achieve and what we take them to have achieved. It strikes a cognitive balance between the future they were projecting from the past and the present that we project into the future. Understood as an economic exchange, we forfeit a measure of our free will by letting Newton and Ford set the initial conditions by which we are able to act, but in return we acquire a sense of the direction of travel, in terms of which we can exercise our own free will in a way (we bet) that will be appreciated by future observers. In quantum terms, we concede position to receive momentum. The easiest way to see this point is in terms of our ability to insert Newton or Ford into our own world by casting what we are now trying to do in terms of something they too were trying to do. That's the concession. But that concession then enables us to claim that we are doing things that they were unable to do. This is the power we receive from the concession, which turns the future into a field of realizable prospects.

A crucial feature of this arrangement is that we do *not* say that we are now doing things that Newton or Ford could not have imagined or recognised as part of some project they were pursuing. Were that the case, it would be difficult to credit them with having changed the course of *our* history. They might still be, in some sense, 'great' or 'interesting' figures –

but not of 'our' world. Indeed, there are many such figures who are, so to speak, 'marooned' on the shores of history because they fail to offer us existential leverage. This is normally what we mean when we say they have been 'forgotten'. Yet these figures always remain to be appropriated to construct the basis on which we might move into the future. When Kuhn described the history of science's default self-understanding as 'Orwellian', he had something like this in mind [Kuhn, 1970, p. 167]. Put more explicitly, scientists don't normally realize how the significance of past research and researchers is routinely tweaked, if not airbrushed, to motivate current inquiries. During a 'scientific revolution', certain researchers and/or research may be added or subtracted altogether. For historians of science this *modus operandi* does a gross injustice to the past, but for working scientists it is an acceptable price to pay for whatever new findings might result. It involves the sort of ruthlessness that would meet with Marxist approval, as I shall suggest below.

Conclusion: Prolegomena to a Quantum Historiography of Modal Power

For the past fifty years or so, it has been common for historians to enjoy the moral high ground in this particular disagreement. In other words, scientists generally understand that the versions of the history of science that are purveyed in science textbooks or popular science writings do not primarily perform the function of saying what happened in the past. In practice, the scientist cedes jurisdiction to the historian for deciding what is true or false about whatPr those accounts say. In return, the historian refrains from pronouncing over the truth or falsehood of what scientists say about the future. To be sure, this division of labour – or *cordon sanitaire* – is not strictly observed, but it captures the normative expectation of the world in which we live.

In contrast, political history is much more self-consciously 'quantum', in that professional historians do not generally enjoy the same privilege in framing the terms in which claims about the past are validated. The Holocaust is an interesting exception – a major political event in which professional historical judgement rules, perhaps most dramatically in the 1996 UK court case, *David Irving v. Penguin Books Ltd*. But that may be simply because no major political party finds it in its interest to capitalise on the Holocaust by linking it to events with which it wishes to be associated. Thus, the Holocaust exists as a self-contained moment surgically separated from the field of political play. Otherwise, as George Orwell declared in the 4 February 1944 edition of the UK democratic socialist magazine, *Tribune*, 'History is written

by the winners'. Little surprise, then, that the most self-consciously 'revolutionary' movement of the modern era, Marxism, has been always susceptible to bouts of 'historical revisionism', when attempts are made by more learned partisans to re-direct the future by re-focusing the past. Revisionism is perhaps most sympathetically seen as a more economical means of achieving what might normally require bloodshed, namely, what Leon Trotsky called a 'permanent revolution'. The politics of 'permanent revolution' amounts to a quantum approach to history.

Interestingly, in his famous 1965 debate with Kuhn, Karl Popper (1981) also spoke of his own falsifiability criterion as licensing a 'permanent revolution' in science. The analogy can be understood as follows. A common stock of knowledge can be extended in many different, even contradictory directions, depending on which bit of it is put at risk in an experiment. Popper argued that science advances only when such risks are taken, the inevitable consequence of which is that scientists discard – or at least radically reinterpret – what they previously held to be true in order to enter the horizon of possibilities opened up by the experimental outcome. Popper always had in the back of his mind Einstein's move to interpret time not as universally constant but relative to an inertial frame of reference, given the outcome of the Michelson-Morley experiment. This move did not merely overturn Newton's hegemony in physics, but it transformed Newton's dogged opponents over the previous two centuries, such early advocates of relational theories of time as Gottfried von Leibniz and Ernst Mach, from cranks and sore losers to heroic and prescient figures whose works were subsequently re-read for clues as to what might follow in the wake of the Einsteinian revolution [Feuer, 1974].

The difference between Kuhn and Popper on the role of revolutions in science can be summarised in terms of their contrasting approaches to time: *chronos* versus *kairos*, the two Greek words that Christian theologians sometimes use to contrast the narrative construction of the Old and the New Testament. In *chronos*, genealogical succession drives the narrative flow, with revolutions providing temporary ruptures which are quickly repaired to resume the flow. Thus, the order of the books of the Old Testament follow the order of patriarchs and dynasts. This is also the spirit in which Kuhn's historiography of science proceeds – that is, according to paradigms that generate normal science, occasionally punctuated by a self-inflicted crisis that precipitates revolution, the outcome of which serves to restore the natural order. In contrast, in *kairos*, there are recurrent figures who constitute the narrative but no default narrative flow, as the world order is potentially created anew from moment to moment. Thus, the New Testament begins four times with the varying Gospel accounts of the rupture that was Jesus, with all but the final book presenting various roughly contemporaneous directions in which Jesus' teachings were taken after his death, virtually all

adumbrating more ruptures in the future. This is more in the Popperian spirit of presenting science as a sensibility that can be actualised at any moment to reconfigure all that had preceded and will succeed it.

The *chronos* approach clearly corresponds to the linear time of classical physics, and the *kairos* approach to the more ecstatic conception of time afforded by quantum physics. However, in conclusion, it is worth mentioning an in-between position, especially given its salience in the history of international relations. It is the idea of *perpetuity*, especially as understood in early modern philosophy to refer to the choice that God always has whether to continue or alter the universe from moment to moment. It was designed to get around a concern introduced by Aristotle's main Muslim interpreter, Averroes, that in creating a world governed by natural law, God forfeits his own free will. This would seem to imply that natural law exists 'eternally' without divine intervention. In contrast, the 'perpetualist' says that God actively maintains – or not – the law. As a conception of divine agency championed by the likes of Descartes, perpetuity did not survive the Newtonian revolution in physics. However, it persisted in political debates concerning human self-governance, especially with regard to the duration of any social contract that is struck between free agents. The idea of regular elections is perhaps the principal legacy of the 'perpetualist' mind-set, reminding citizens that ultimately they are free to decide (collectively) whether or not to carry on with the current regime. More ambitious thinkers, not least Immanuel Kant, believed that if all regimes were of this sort, then perpetualism could be scaled up as a principle of world governance, resulting in what he dubbed 'perpetual peace', one of the inspirations for the United Nations.

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