History and philosophy of science as the science of becoming human

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INTRODUCTION

My Ph.D. is in a field that once took the process of becoming human as its distinctive subject matter. It is called 'history and philosophy of science' or 'HPS'. Nowadays the 'H' and the 'P' live a 'separate but equal' existence in HPS, both in more-or-less respectful distance from the 'S'. But it wasn't always like that. For most of the 19th and 20th centuries, HPS was the field whose wisdom would be sought to plot something worthy of the title 'human futures'. It took seriously Lord Bolingbroke's (1752) definition of history as philosophy teaching by examples, but specifically in the cause of providing direction to science as the vehicle by which that upright ape, *Homo sapiens*, might become fully 'human'. The exact meaning of 'human' in the various formulations of HPS varied but all were designed to do things: on the one hand, to create maximum distance between us and the other apes (without entirely denying our animal nature) and, on the other, to portray our own creative potential as approximating that of the biblical deity (but without triggering charges of blasphemy). Words like 'rational', 'self-conscious', and even 'meaningful' were invoked as the *je ne sais quoi* of humanity.

In the 19th century, HPS threw up three possible normative horizons within which the task of 'becoming human' might be achieved, each associated with a national tradition: English, German and French. I shall review each briefly because remnants of them survive today. The three normative horizons may be epitomized as follows:

- *English:* Unity of science through theology, as exemplified by Newton.
    - HPS makes science teachable (how to do normal science)
- *German:* Unity of science through self-realization, as exemplified by Goethe.
    - HPS makes science projectible (how to do revolutionary science)
- *French:* Unity of science through technocracy, as exemplified by Napoleon.
    - HPS makes science implementable (how to govern society)

1 THREE WAYS TO BECOME HUMAN: 19TH CENTURY HPS

The English tradition stems from the polymathic natural philosopher and theologian William Whewell, Master of Trinity College Cambridge and founder of the British Association for the Advancement of Science. Whewell saw the advancement of science as the literal extension of humanity's biblical entitlement. As beings created in the image and likeness of God, we are destined to fathom the intelligent design of the universe. Indeed, science as a lifelong pursuit – in Whewell's original coinage, the vocation of the 'scientist' -- would not make sense if we did not presume reality to be 'intelligible', that is, tractable of our modes of understanding (Fuller, 2007b, chaps 1-2; Fuller, 2008a, chap. 2). And why would such an assumption bear so much insight and benefit, if it did not reflect a genuine relationship between the structure of our own mind and that of the divine creator? However one ultimately judges this argument as a defense of God's existence, it has long been a potent

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background argument in attempts to justify science as the preferred route to human apotheosis (Noble, 1997).

However, in keeping with his clerical office, Whewell interpreted our biblical entitlement to know in rather deferential terms, the secular descendant of which is Thomas Kuhn's (1962) idea of 'normal science', the workaday puzzle-solving that characterizes most actual scientific work, which presupposes a dominant paradigm that provides an overarching explanatory theory and methods of investigation that have already provided exemplary solutions to standing problems. The paradigm provides scientists with their sense of discipline, not unlike monastic training, from which they rarely if ever deviate in the course of their careers. Whereas Kuhn held that every true science was governed by a single paradigm at a given time, Whewell believed that science itself had only one paradigm, whose founder was Isaac Newton. Newton unified the disparate claims and evidence concerning physical phenomena, both on earth and in the heavens, into a universal theory of matter and motion. For Whewell, everyone who heeds the calling of the scientist follows in Newton's footsteps, filling in the gaps of his mechanical world-view, the completion of which will enable us to comprehend the divine plan. It would not be far-fetched to liken this vision of Newton's significance to the second coming of Jesus, in terms of science providing greater specification and power to the original Christian message – an interpretation fuelled in Newton's own day by the fact that December 25th marked his birthday on the Julian Calendar.

Not surprisingly, Whewell opposed those who promoted science outside an explicitly Christian context, ranging from secular humanists like John Stuart Mill to more explicitly anti-theistic thinkers like Herbert Spencer and Charles Darwin. This perhaps makes Whewell irreconcilable to today's intellectual sensibilities. He thought of science without the benefit of religious guidance in much the same way as the Church thought about magic and alchemy, both of which involved arrogating to oneself powers that only God could bestow, typically with the help of his licensed clerical mediators. While it is easy to dismiss Whewell's overall perspective as warmed-over salvationism, most of it has survived without the theological overlay. For Whewell himself, it provided the basis for advocating - much against the wishes of his equally religious colleagues in the liberal arts - the centrality of the natural sciences to the university's concerns. He was also responsible for the presentation of 'the scientific method' in both philosophical and popular texts as a generalization of the method of Newtonian mechanics. Indeed, as science has become seen as having a diverse nature, and Newton's exemplary status has declined, the idea of science as the crowning achievement of humanity has also faded.

Turning to the German tradition, Whewell is replaced by the great Prussian education minister and founder of the modern university, Wilhelm von Humboldt, whose exemplary human was not the formidably technical Newton but the broadly accomplished Goethe, who made significant contributions to poetry and optics, while advising heads of state. The difference also reflects a shift in Christian sensibility from 'Catholic' to 'Protestant'. Thus, the future of humanity is less about trying to complete a mission started by superior beings than acquiring for ourselves their superior qualities. On this view, we do not merely follow in Christ's footsteps but we come to live Christ's life. The appeal of this option rests on an implicit understanding that, by virtue of his material character, Jesus is an enhanced, not diminished, version of the divine creator. The alchemical magician roundly condemned by the medieval church is resurrected and tentatively embraced as Faust. Goethe stands out here for his explicit challenge to Newton's singularity as a theorist of unified science. He claimed to have recovered the experiential dimension of nature that Newton simply discarded merely because it failed to fit his framework.

At stake here was a fundamental disagreement over the appropriate sense of the divine to which humans should benchmark their progress. Newtonian mechanics strikingly postulated counter-intuitive laws bolstered by abstract mathematics, as the basis for predicting and controlling nature. It left the impression that we would come closer to God by creating distance from our subjective experience so as to acquire, in Thomas Nagel's (1986) memorable phrase, 'the view from nowhere'. It was precisely that

which Goethe denied. He treated the experiences that Newton discarded as signs of our hidden potential still waiting to be exploited. In this spirit, the German tradition equated the unification of science with human self-realization itself. Thus, we draw upon all the branches of organized learning (*Wissenschaften*) to enhance our natural capacities. From today's perspective, education offers a relatively drawn out, low-tech solution to problems for which people increasingly turn to a regimen of drugs, surgery, gene therapy and prosthetic extensions. However, in both cases, the future human looks more like a superman than a free-floating spirit. Friedrich Nietzsche forged a great philosophical career by creatively degenerating in the face of these alternatives.

Finally, the French HPS tradition, which Karl Marx found so inspirational in his formulation of scientific socialism, is best seen as trying to combine the best and discard the worst of the English and German traditions. The main French theorist was someone whose powers of neologism matched Whewell's: Auguste Comte, the man responsible for both 'positivism', his name for the project of humanity, and 'sociology', the academic field that would finally make it a reality. In Comte's hands, science acquired ambitions that went beyond the completion of the divine plan or even the exploitation of human potential. It encompassed the rational reorganization of the planet that would result in a secular high-tech (at least by early 19th century standards) version of the 'heaven on earth' that had animated successive generations of radical Christians, starting with the medieval peasant revolts.

For Comte, the progress of humanity was marked by the enhancement of our cognitive powers through the advance of science, which in turn enabled the technological extension of our physical capacities, resulting in a restructuring of social relations that, in turn, expanded our horizons to achieve still more. The policy precedent for Comte's positivism was an 1814 work of his mentor Henri de Saint-Simon *The Reorganization of European Society*. This pamphlet is eerily prescient of the recent European Union interest in 'shaping the future of human societies' through the regulated introduction of 'converging technologies' (Nordmann, 2004). Saint-Simon had argued that Napoleon, prior to his ignominious personal end, had succeeded in consolidating Europe as a political idea that could now be taken forward as one grand corporate entity, a true *universitas*, to be managed by a scientifically trained cadre modeled on the civil engineers at the *École Polytéchnique*.[1]

The shift from Newton and Goethe to Napoleon as the exemplary human – the first proper European – highlighted his ability to rise above lowly parochial origins to give purpose to a higher-order entity with an indefinite life expectancy. The focus on Napoleon, a resolute man of action, underscored the physicalistic construal of this sense of purposefulness. Comte and Saint-Simon deplored slavery in pre-scientific societies only because, as we would say today, it underutilized human capital. The slave owners lacked the knowledge and the imagination to get the most out of their slaves' bodies. Under the circumstances, emancipation marginally improved productivity by opening labour to a variety of disciplinary regimes. However, in a fully scientised society, each person's productivity would be of concern to everyone, with social engineers best placed to determine how any given individual's labour might be most productively engaged for the greater good of all. These public servants would literally give meaning to people's lives by telling them what they are good for – on the basis of tests for intelligence, for instance.

In the early 19th century, this general sensibility was associated with the organization of social life around specially constructed physical spaces, like factories, hospitals, schools and prisons, each subject to their own forms of surveillance and accountancy that together shaped the body into an efficient piece of social machinery. While these spaces remain very much with us, they have been supplemented – and sometimes supplanted – by the re-engineering of what the great medical professor at the Sorbonne, Claude Bernard called the '*milieu intérieur*', his vivid expression for our physiology that stressed its ongoing struggle to maintain health in the face of multiple threats from the external environment.

[1] For a famous trenchantly negative assessment of Comte and Saint-Simon, see Hayek, 1952, chaps. 12-16.

It would be hard to overestimate the normative significance of Bernard's perspective for the conduct of medicine, which over the 19th century came to shift its research and practice from, on the one hand, preparing the patient to undergo a variety of natural processes eventuating in the body's complete re-absorption into nature through death to, on the other, the indefinite postponement, if not definitive overcoming, of disability and death. Indeed, as long as the French model of HPS has prevailed, and the social sciences were understood as the reflexive application of the natural sciences to the human condition, medicine competed on equal footing with economics and psychology for providing the foundations for social life. Indeed, their boundaries were often not clearly distinguished. Thus, the discipline that Emile Durkheim re-christened in 1895 as 'sociology' staked its distinctiveness on the existence of society as a literal 'social organism' whose skin corresponded to national borders and whose health could be gauged by diagnosing 'deviant' behaviours, based on official statistics that functioned as vital indicators to which bureaucrats, as society's physicians, could then administer. Unsurprisingly Durkheim was politically aligned with the *solidaristes*, the advocates of a French welfare state (Fuller, 2006, pp. 82-83).

2 HPS IN THE 21ST CENTURY: BACK TO SARTON?

An interesting account has yet to be given of how the three strands of HPS came to lose their respective backstories about the advancement of science that originally legitimated the particular futures that they projected for humanity. In the 20th century, images of future humans as technical specialists (UK), enhanced supermen (Germany) or efficient functionaries (France) acquired lives of their own in popular culture, eventually erasing any trace of their specific philosophical, let alone theological, origins.

However, one last effort was made by the Belgian positivist George Sarton in the aftermath of World War I to establish a 'New Humanism' that would aim to confer a unified sense of purpose for humanity across the increasingly divergent sciences of his own day and, more interestingly, across different periods in the history of science. The former project was, of course, taken up immediately and with gusto by the logical positivists in the Vienna Circle, who went on to establish the philosophy of science as a discipline in the English-speaking world. However, the latter project received only muted expression in *Isis*, the world's premier history of science journal, which Sarton had founded in 1912.

A presupposition of Sarton's (1924) New Humanist historiography is worth recalling when evaluating human futures: *If a proposed future is meant to contribute to a common project of humanity, then denizens of the past whom we would count as our progenitors must be able to see us as their legitimate heirs.* This is not so different from a venerable interpretive principle in US constitutional law that would have judges ask themselves: 'What would the founding fathers have made of this case?' Needless to say, no simple fact can settle this matter once and for all. Rather, we need to imagine ourselves in continual counterfactual negotiation, always trying to imagine how to persuade those in the past that our sense of a desirable future is one that they too would have found desirable, or at least a responsible extension of their legacy. This implies that, as we alter our sense of where want to go, we need also to alter our sense of where we have come from. One might think of this imaginative exercise in co-producing the past and the future as humanity's way of simulating God's 'timeless present'.

Perhaps the most challenging feature of this exercise is that we must start from the assumptions of our would-be ancestors and then try to show through a series of steps, each of which they would find reasonable, that our envisioned future is one worthy of their approval (Fuller 2008b). Whatever obstacles we face along the way might hint at some fundamental difference in orientation to reality. Could I persuade, say, Aristotle that avatars in the virtual world of 'Second Life' pass his definition of humans as 'political animal'? From a strict Darwinian standpoint, there is no reason to presume that the answer is yes: After all, both Aristotle and I are creatures adapted to our respective times and places – and to no other. I would probably struggle even to get Aristotle to admit women as fully human, in which case we might be forced to conclude that our notions of species are, as Kuhn would say,

'incommensurable'. Thus, if we wish to count women, let alone avatars, as human, we would need to abandon Aristotle as a resource for legitimizing today's practices and aspirations – unless we could conjure up the arguments to persuade him of their reasonableness. Several resolutions of this problem are possible: One could renounce Aristotle, renounce women and/or avatars (highly unlikely) or re-negotiate our understanding of Aristotle vis-à-vis women and/or avatars. Whatever the outcome in particular cases, the task suggests an empirically rich and intellectually adventurous future for HPS in the 21st century.

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