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The Crises of the Sciences and Skills and Objects Themselves

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ABSTRACT

For Edmund Husserl, the crisis of the modern sciences consists in the reduction of beings and the world to the mathematically measurable. Yet the lifeworld with its things that we fashion and use with our hands is no less real than the objects of science, and the scientific attitude is always nested within this lived world. Martin Heidegger by contrast finds the major source of our crisis in the Cartesian conception of subject and world. This has culminated in Nietzschean theory of the will to power, which in its unity with technology has despoiled our environment. In all of this Heidegger retains a tenderness for the small-scale products of human handiwork, which are preferable to machines and machine tools. In his own philosophy of technology Gilbert Simondon shares some of these concerns, whilst contending that technological objects have untapped potentials in relation to those who invent, use and develop them. Common to all these philosophies is a worry about abstract theory and mechanization reducing our direct engagement with things. This worry is compounded by a sociocultural tendency identified by Matthew Crawford, a tendency to denigrate a career in the practical trades. Drawing on Crawford's experience of manual engagement in the world, I argue that a revalorization of such skilled work and of caring and repairing would help to ameliorate the climate and pollution crises and improve our lives. Many of our problems come from the discarding of things through our carelessness or through planned obsolescence by their makers.

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Intruduction

The idea of a crisis that is inherent in contemporary thought and practice has gained extensive currency since the posthumous publication of Edmund Husserl's last great work, *The Crisis of the European Sciences and Transcendental Phenomenology*. Here as so often elsewhere Husserl is careful to stress that the idealism implied in his transcendental approach is of the epistemological variety and is reconcilable with a robust ontological realism. And early on in his transcendental period he sets out an object-sensitive phenomenology in which the givenness of worldly things is prescribed by these things themselves. In *The Crisis*, his most prescient of writings, he goes on to sketch out the crisis of the modern sciences, with their reduction of beings and of the world to the mathematically determinable and hence the measurable. In the same work and in an essay in the appendix entitled 'The Origin of Geometry as an Intentional Historical Problem,' he foregrounds the constitutive contribution of the lived and skilled body to the pre-scientific and practical senses of things, without which the natural sciences could never have been born. The lifeworld with its things of use and beauty that we fashion and take up to use with our hands is no less real than atomic and subatomic reality, and the scientific attitude is always and everywhere nested within this lived world.

Martin Heidegger by contrast finds the major source of our contemporary crisis in the Cartesian conceptualization of subject and world. This has found its final manifestation in the Nietzschean theory of the will to power, which in its intimate unity with technology has led to the despoilation of the natural environment. Even the objective character of things has been effaced in the framing of the world as raw material for technological exploitation. In all of this Heidegger retains a tenderness for the small-scale products of human handiwork, which are preferable to machines and the products of machine tools. The first work with natural entities, reworking and reshaping what has already come to be, whereas the second are used to cut into and across nature to dominate it. In his own philosophy of technology Gilbert Simondon shares some of these concerns, whilst contending that technological objects or products are not closed systems; instead, these are open ones with untapped potentials in relation to those who invent, use and develop them. A grave danger is that networks of machines will come to succeed our use of tools, such as to supplant human activity rather than extend it.

What is common to and notable in all of these philosophies is a worry about abstract theory on the one hand and mechanization on the other reducing our direct engagement with things, contracting our practical world and draining it of its force and vivacity. On my view this worry is only compounded by a sociocultural tendency that has manifested itself in the Western world over the last fifty years. Identified by Matthew Crawford, it has ensued in a crisis of practical skills accompanying that of the sciences. This is the tendency - most usually articulated by the expanding middle classes up to recent times - to denigrate and avoid a life in the practical trades, those that gear their practitioners into the material rather than office or digital world, albeit a world in which precision is unavoidable. Drawing

extensively on the lived experience of being manually engaged in the world as expounded by Crawford, I argue that a revalorization of such skilled work would help to ameliorate the climate and pollution crises as well as improving many of our lives. A focus on the maintenance and repair of our machines and other implements would better preserve the energy that is embodied within them. Many of our contemporary problems come from the discarding of things through carelessness on the part of their users or planned obsolescence on the part of their makers.

I

The crisis of the sciences identified by Husserl is multifaceted. We are naturally ignorant of the hidden anonymous life of embodied consciousness, of constituting and transcendental subjectivity and intersubjectivity and the subconscious, passively synthesizing awareness that is prior to subjectivity in general (Husserl, 1960, 152-3). But such ignorance was compounded by the early modern collapse of the world into a mathematical manifold of primary qualities. Throwing a garb of ideas over the lifeworld, Galileo contended that the real is the measurable. Stripped of humans and animals, on his view, the true world is no longer saddled with the ephemeral phenomena of colors and sounds and tastes and smells. Thrown out with the secondary qualities, notes Husserl, were all investigations into the meaning and value of life, from which the natural sciences explicitly prescinded. Their realism was from the outset a scientific realism or objectivism. Hence the crisis of the sciences *as* sciences, which do not address the deepest questions of existence because they are not equipped to do so (Husserl, 1970, 6-7, 43-59).

Husserl will never cease to stress that all the positive sciences have their origins in the prescientific lifeworld, the collective world in which we actually live. The lifeworld is at once our background and our horizon. As our background environment it is our sociocultural and material world of shared values and activities, though it is articulated differently from age to age and culture to culture. As our horizon it is the world in which we take things to be accessible to all in fact or in principle, as the realm in and through which possibilities can become real. About it we all agree (Husserl, 1970, 142-7). So deep and pervasive is our natural attitude of world belief that other attitudes including the scientific one take place within it and can never overthrow it. Even the teaching physicist in the laboratory who is discussing the structure and components of the atom has no doubt about the existence of the equipment for determining atomic weight, the presence of the students and the reasons for their attendance (Husserl, 1997, 3-4). In a similar manner the surgeon trusts and depends on the surrounding team in the course of an operation. All these callings, moreover, are founded on millennia of practical accomplishments.

In this vein Husserl draws on his earlier work on the role of the lived and motile body. Without swiveling eyes, he had argued, we could never have a lateral manifold of tracking. Without changing posture, we could never have a cyclical manifold of turning, and without locomotion correlated with the inconstant expansion of visual figures as we get closer to them, we could never have a linear manifold of depth, of things seen as nearer to or further

away from us. All these kinaestheses or felt powers of movement constitute the three-dimensional spatiality that would be systematically idealized by Euclid and eventually taken up by Galileo in his thought experiments (Husserl, 1970, 161-3; Husserl, 1997, 102-223). In 'The Origin of Geometry,' Husserl shows how our practical dealings with things allowed for such idealisation. Our ancestors foregrounded and took up certain things for practical purposes, notably those that were sharp, straight and flat. They then discovered ways of making smoother the surfaces of the said things to optimize their utility, through cutting and paring and polishing. When our forebears combined these practical skills with the arithmetic that had originated in the social need for just distribution, according to Husserl, they were able to develop measuring techniques for surveying areas of land and for constructing sturdy buildings and pathways. Only through these founding achievements could the theoretical and imaginative leap be made to the ideal space of geometry, a space in which no position or orientation has any privilege over any other one (Husserl, 1970, 375-8).

The understanding of the proofs in the geometry of antiquity demanded the visual traversal of the figures that were drawn out for students. In *The Elements* Euclid divided geometrical figures into segments to demonstrate equalities, most notably in his proof of the Pythagorean Theorem. One had to perceive the separated and unfolded pieces in his diagram and then add their areas together to establish this for oneself. With the advent of the coordinate geometry pioneered by Descartes, notes Husserl, proofs could be offered in algebraic formulae without any perceptual illustration, the formulae used in subsequent geometry and further developed in physics right up to the present day. Science became ever more distant from the sensible milieu, which made it easier to hold that the scientific universe is the true world. But this is a metaphysical construction in which we cannot live (Husserl, 1970, 43-8, 127-9). Furthermore, the things of nature that we apprehend within the lifeworld have their own dignity. Their rough and morphological essences should not be seen as inferior to the exact and ideal essences of geometry, as deviations from how things should be according to this science. In this sense we could better describe then as anexact and not inexact, since they are essentially the way that they are (Husserl, 1970, 24-8; Husserl, 1982, 166). Each type of being has its own modes of givenness, and it would be countersensical 'to treat their essential peculiarities as deficiencies' (Husserl, 1982, 187).

All of this being said, the technological passage to ever greater precision in our lifeworld is unproblematic when it is not allied to naturalistic and scientistic presumptions and when we remain in touch with the objects of use and beauty that have enhanced our everyday existence. Husserl maintains a preference for direct contact with the things themselves and a worry about 'the seduction of language,' the unfortunate tendency to accept propositions about states of affairs that are reported *to* us without having been evidentially established as true *by* us. It is with our hands that we first fashioned things in the pre-scientific lifeworld and evaluated them as better or worse for this or that task or project, and we can only ever recognize things for use and delight because the relevant horizons of expectation were opened up through our manual activities in infancy and childhood (Husserl, 1970, 362-4; Husserl, 1989, 193, 197-9).

From the outset Martin Heidegger shows the same distrust in naturalism and scientism as Husserl, his last and greatest mentor. But already in *Being and Time* his chief target is Descartes rather than Galileo, since it is the former who definitively reduces the world to a plenum characterized by extension in length and breadth and depth, such that we would exist along with it in a side-by-side manner rather than being involved with it from the outset (Heidegger, 1962, 129-133). In the work following his so-called 'turn,' Heidegger contends that the Cartesian Cogito and what is deduced from it inaugurates the modern age of representation and modern philosophy of the thinking and willing subject. To represent something is to reduce it to an object standing before the cogitating subject, and in Descartes' scheme of things, anything represented as a genuine object must be known with absolute certainty. It must conform to a mathematical standard of clarity and distinctness laid down by this selfsame subject, now become the measure of all the things that populate the material world (Heidegger, 1977, 149-151; Descartes, 1986, 27, 63). And when I reflect on my will, states Descartes, I realize that this faculty of affirming or denying and pursuing or avoiding makes me closest to God, since it is not determined by any external force (Descartes, 1986, 45-6).

In Heidegger's story this concept of the subject culminates in Nietzsche's doctrine of the will to power as the essence of Being (Heidegger, 1973, 89; Heidegger, 1977, 83). The primary drive in life is not self-preservation but the will to appropriate and dominate. All willing is in the final analysis the will to power, which is 'willing to be stronger, willing to grow - and in addition, willing the means to this' (Nietzsche, 1968, 356, 367-8). Because the drive to become stronger is ongoing, according to Heidegger, a higher level of power is only sought so as to proceed to a level that is higher again. The will to power is a will to will in that it wills more will *ad infinitum*. The subject is revealed as a being that wills its own increase and nothing else. And because this subject can never attain a point of satisfaction, always wanting to go beyond itself so as to enhance its being, it is primarily concerned with means rather than with ends. In Nietzsche's doctrine the striving human is not only the centre of every relation but is explicitly characterized as such, with everything ultimately justified in terms of the will to will. The modern philosophy of the subject has reached its zenith, and philosophy finally collapses into anthropology (Heidegger, 1973, 99-100; Heidegger, 1977, 80-81).

For Heidegger the subject's absorption into anthropology does not amount to its disappearance. He claims that in its completed form it provides 'the scaffolding for an order of the earth' (Heidegger, 1973, 95). The effects of the completed concept of the subject are not confined to theory and have carried over into practice to such a degree that it now falls into line with the concept. The way the world is now being treated, in other words, is indissociable from the subjectivisation of Being that was accomplished at the theoretical level. We saw that with the birth of the Cartesian subject everything becomes determined in relation to it. All things are reduced to fixed representations. When one moves within such an interpretation, maintains Heidegger, the world comes to taken as the sum total of actual or possible representations. It is conceived and grasped as a picture. Once understood in this

manner it is regarded as amenable to scientific calculation and technological exploitation, and it is treated as such because of the subject's drive to enhance its being. The contemporary form of the will to will in the affluent world is the desire for ever more possessions, effecting a spiral of consumption for the sake of consumption. We are left with a situation where the earth has been environmentally devastated and stands on the brink of complete collapse (Heidegger, 1973, 86, 107).

In this narrative Heidegger gives numerous examples of the changes that have been wrought with the development and employment of large machines. In industrial agriculture some are used to sow and harvest plants and enlarge fields and meadows. Others are used to cut ever further and deeper into the earth to extract ore and minerals. Others again are used to generate electricity from large rivers that have been diverted or dammed:

> The hydroelectric plant is set into the current of the Rhine. It sets the Rhine to supplying its hydraulic pressure, which then sets the turbines turning…[t]he hydroelectric plant is not built into the Rhine River as was the old wooden bridge that joined bank to bank for hundreds of years. Rather the river is dammed up into the power plant…the energy concealed in nature is unlocked, what is unlocked is transformed, what is transformed is stored up, what is stored up is in turn distributed, and what is distributed is switched about ever anew…Everything everywhere is ordered to stand by, to be immediately at hand, indeed to stand there just so that it may be on call for a further ordering (Heidegger, 1977, 16-17).

Nature is challenged in that it is subjected to the demand that it incessantly yields energy to be stored for monotonous mass production and for the multiplicity of systems that enable mechanized transportation for distribution and ultimate consumption. Under the force of such technological production even the objective character of the world fades away. It comes to be seen as a standing-reserve or reservoir of raw materials, with all of these standing against us as use-values rather than as objects. This view nurtures the conceit of the mastery or total command of nature. All these transformed materials stand at a far remove from the artefacts made by hand that work with nature, made from natural materials that have already emerged into their full actuality (Heidegger, 1977, 14-17). Only through our hands we are in touch with others and things, for the hand does not just grasp and catch or push and pull. It receives and extends and welcomes, and it designs and signifies beyond itself in and through its movements inhabited by language and thought, which is why we are right to speak of handicrafts (Heidegger, 1968, 16).

In the final analysis Heidegger provides us with a grand narrative about the philosophy of the subject and its intimate relationship with technology, one which is of itself a linear representation of a complex and multifaceted philosophical tradition. And it is arguable that he draws too sharp a boundary between the things wrought by hand and those produced by machines, and that he passes over the variegated character of machines themselves and their relations with human beings. Some of Heidegger's concerns are shared by Gilbert

Simondon, who is likewise concerned by the will to power and the conquest of the world conceived and grasped as a picture (Simondon, 1980, 8). Yet the latter provides a far more qualified philosophy of technology. He stresses that the human relationship with the natural world has always been mediated by technology, which is even more primitive than religion in the sense that it is oriented towards the elaboration and satisfaction of biological needs and desires (Simondon, 2010, 229).

For Simondon, a technical object or machine is one whose parts all have positive roles, and in the abstract form of such an object it is constituted as a closed and finished system in order to function. It can be removed from the time and place of its design and construction, but each part has a single and strictly defined function that is not regarded as amenable to substantive alteration. An abstract technical object exhibits disparities, for example between the combustion and water-cooling systems of an engine. Working together they constitute an overly complex object (dependent on the drive from the crankshaft to turn the pump that circulates the coolant through a fragile radiator). The development of the air-cooled engine resolves this disparity, resulting in a simpler and more integrated system. The ribs of cooling fins in the cylinder block and head serve to strengthen as well as cool them, so that structural integrity is preserved with the use of less metal. The progression from a more complex and disparate system to a simpler and more integrated one is at once the move from a more abstract to a more concrete technical object with multi-functional parts (Simondon, 1980, 14, 31).

Though every type of technical object can be traced in fact or in principle back to an original inventor, the progression towards concretization on the part of that inventor and subsequent engineers and mechanics is a dialectical process of co-creation, since the existing technical object in its use spurs new ideas about how to refine it and attain greater simplicity and efficiency. In this progression, as Simon Mills has put it, inventions do not for the most part operate quite as expected, but reveal new material potentials that can be folded back into the inventive process (Mills, 2016, 109). In this way the technical object is the theatre of multiple relationships of reciprocal causality, and what was an obstacle can become a means of achievement. The process of concretization can for all of that be obstructed and even reversed, and Simondon is scathing when he discusses the complex and needless sub-systems that are added to cars and other machines at the behest of sales and marketing personnel (Simondon, 1980, 21).

When the process of concretization proceeds successfully and the technical object becomes simpler and more robust, it will usually be able to operate in a wider variety of environmental conditions. It will move further away from the original and abstract state and gain a closer resemblance to a natural object. Because the mode of existence of the concrete technical object can be understood by analogy with a spontaneously generated natural object, moreover, it can legitimately be considered as a natural object in so far as it amenable to the inductive study of its material potentials. Somewhat ironically, the plants that have been genetically manipulated to yield more grain and fruit have become more abstract, since their natural robustness is almost always compromised through such manipulation. Hence

the need for constant intervention to protect them from what have now become more threatening environments, though the vital order is never to be confused with the artificiality of the technical object (Simondon, 1980, 46-48; Mills, 2016, 112-13).

I remarked above that Simondon shares some of Heidegger's concerns about the will to power and the conquest of the world conceived and grasped as a picture. He also shares the former's worries - and indeed some of Husserl's - about our loss of direct contact with things and the concomitant destruction and diminution of manual skills or handicrafts through mechanized production. Some skills have been lost almost completely because machines have rendered them obsolete. Others have been diminished because many of not all of the steps needed for production have become automated. The experience of working directly with tools is no longer commonplace. We have moved from small and local workshops to large factories and from there to automated networks of communication and distribution that are governed and exacerbated by an exclusively technocratic rationality. Human activity may come to be supplanted by technology rather than extended by it (Simondon, 1980, 7-8; Mills 2016, 129-30). It strikes me, however, that neither Heidegger nor Simondon pay much attention to the embodied energy of technical objects, to the materials extracted, processing and finished in their production and to the power that is consumed through these phases. When such an object wears out or is discarded prematurely, this is a waste of its embodied energy. It also strikes me that Simondon tends to overplay the concretization of the technical object. However simplified and integrated its parts may be, it will still require regular servicing to function optimally for longer and to survive for longer. It is a further and lamentable fact that our technical objects have become more disparate and abstract in the electronic era, and the people who work on them fewer and more specialized, with narrower ranges of skills that are not easily transferable. Here we can speak of crises of skills and of the objects themselves. This is made worse again by the increase in some countries of sedentary office work and online screentime, the latter leading to a decline in fine motor skills in children. The material side of the lifeworld is more distant and less real to us because we are less and less geared into it practically.

II

The foregoing worries bring me to the work of Matthew Crawford, to which I give sustained attention for several reasons. Firstly, Crawford has identified a turn for the worse in Western education over the last 50 years. Shop class or vocational education in the manual trades has been devalued whilst college education has been favoured. The gnawing fear for middle-class parents and students is that acquiring the specific skill set that makes up a trade will mean that one's life is henceforth *determined*. As a handworker one will be locked into a grimy and paltry life, so confined by the trade as to become ever narrower and more ingrown. In sharp contrast, a college or university education is regarded as the ticket to an *open* or unscripted future. The idealized image of the graduate is of someone who can remake themselves and their career over and again, giving up established realities to create new ones. Such an existentialist Einstein is the perfect fit for an insecure job, precisely

because such a person is only let go or laid off to find new and exciting opportunities and forge novel and 'impactful' realities. Yet it is the management consultant more than anyone else who exemplifies high-altitude thinking and freedom, taken to see this whole picture of an enterprise and now that one, in a succession of expansive views that are supposedly unfettered by specialization (Crawford, 2009, 11-12, 19-20, 47-9). Firms are reformed and resized before the overman moves elsewhere.

Secondly, Crawford has shown that taking up a trade is anything but cramping in intellectual terms. In our cultural iconography we are given the muscled arm and the sleeve rolled up, but no signs of thought bright behind the eye, no image of the cognitions that link hand and brain. Yet skilled handwork requires a systematic encounter with the realm of materials. It also requires a wide knowledge of the ways of natural and synthetic materials, their load bearing and water resistance, their expansion and contraction and so forth. The judgements that are made are simultaneously technical *and* deliberative. Repairers in particular need to get out of their own heads and notice things, making the correct diagnoses before embarking on cures. Whether shaping materials or parts, reworking them or replacing them, they are gearing into the real world (Crawford, 2009, 21-2, 25, 206). They are perceiving features of things that must be accommodated to in being appropriated, whose modes of givenness and essential peculiarities, as Husserl would put it, are not be treated as deficiencies.

The experienced tradesperson can well appreciate Maurice Merleau-Ponty's contention that our hold on a thing is never complete, and that we are destined to a world that we neither encompass nor possess (Merleau-Ponty, 2012, 311, 426). Fixing things can be even harder than building them from scratch, since we are confronted with things that are not of our own making and that we can only come to comprehend practically through making mistakes. These are what mechanics as well as doctors experience every other day. Multiple failures temper the conceit of mastery, since they foreground the independence of things and the ways that they often resist our best laid plans. Failure is one possible cure for narcissism, since it foregrounds the difference between the self and the non-self. The aforementioned kinds of pursuits are described by Aristotle as stochastic, since they are subject to random and unpredictable variables. Getting things right for the most part demands that one be attentive in the manner of an open conversation rather than assertive in the manner of a mathematical demonstration (Crawford, 2009, 80-82).

Crawford notes that builders, plumbers, mechanics, carpenters, seamsters and tailors encounter different circumstances every day. These require situational discriminations and adaptability. The greater one's repertoire of tacit knowledge, the more likely that one will get things right the first-time round. If a person *does* go to college, it still pays to get some familiarity with a trade in the summers (if at all possible). Even being able to do some basic repairs will make one feel better about oneself. Crawford remarks that the kind of self-reliance he has in mind differs from the modern cult of the sovereign self. It is directed towards goods that are not arbitrary or private, but laid down by the things themselves. This being said, skilled tradespeople will put their stamps on their jobs. Their individual styles

are compatible with their efforts and realized through them. And amidst many a task there is a progressive realization of how to better achieve the desired outcome (Crawford, 2009, 204-7).

What is enjoined here is a kind of sociable individuality. Tradespeople tend to have an acute appreciation of their dependence on others for materials and recommendations. There is a deep satisfaction in returning to customer's things that are now working properly, and a deep satisfaction in seeing them work well if one has made them in the first place. Marx famously argues that one of the core ways in which labor is alienated is when it is appropriated by others, when workers' products are torn away from them. But this only really holds for factory products where the profiteers and the consumers are distant in place and status. Crawford points out that the use of one's product by others need not be alienating:

> If I am a furniture builder, for example, what am I going to do with a hundred chairs? After all, I want to *see them in use*; this completes my activity of making them, and gives it social reality. It makes me feel I have contributed to the common good…When the maker's (or fixer's) activity is immediately situated within a community of use, it can be enlivened by this kind of direct perception. Then the social character of his work isn't separate from its internal or "engineering" standards; the work is improved *through* relationships with others. It may even be the case that what these standards *are*, what perfection consists of, is something that comes to light only through these iterated exchanges with others who use the product, as well as other craftsmen in the same trade. Through work that has this social character, some shared conception of the good is lit up, and becomes concrete (Crawford, 2009, 186-87).

People in trades are also likely to have well-developed senses of solidarity when working on large jobs, quite distinct from the phony (and invariably dreary and dispiriting) exercises of team-building imposed by managers. Those who are poor depend far more regularly on such people, and if they are comparatively expensive it is sometimes because there are too few of them and they have to travel far. The lives of tradespeople are not becoming easier, as Crawford is well aware. Powered tools are increasingly overlaid with needless electronics. There is more to go wrong and more diagnostic kits to be purchased. Implements like cars and washing machines are becoming more and more inaccessible. Things are deliberately made difficult for the freelance repairer, not just the DIY person (Crawford, 2009, 1-7, 172-75, 186-87). The concrete technical object is regressing towards the abstract one. And in the supply depots, simpler components are becoming unavailable. One is compelled to buy a washing basket bearing or an exhaust recycling valve *together* with its larger housing.

The reliability of cars should improve somewhat because of electric motors, powered by batteries or by hydrogen catalyzed with oxygen, the latter best produced and stored through photovoltaic solar power (not all forms of generation, storage and release have to involve

the challenging of nature decried by Heidegger). But we may still be burdened with much of the planned obsolescence and exponential multiplication of waste identified so acutely by Vance Packard over 60 years ago (Packard, 1960, passim). These problems have contributed to our living in a socio-cultural world that in several respects stands on a knife edge. Even prior to the hot conflicts in Africa, Eastern Europe and the Middle East, Covid-19 exposed the fragility of our supply chains, fragile because far too long and far too complex. Spare parts are less and less interchangeable within brands as well as between them. Food reserves in shops and warehouses can only bridge short interruptions. Water treatment plants and electricity control centres are ever more devoid of manual backups, and those with the ability to operate them have few successors to train because there is little equipment left to train them on.

Crawford observes that we in the West have arranged out institutions to prevent the concentration of political power. We have largely separated the legislative, executive and judicial powers. But we have failed utterly to prevent the concentration of economic power. Facilitating this is the long-standing confusion of private property with corporate property. Conservatives who defend the former usually become apologists for the latter and for a greater concentration of capital. The result is that opportunities for self-reliance and local employment are pre-empted by distant forces (Crawford, 2009, 208-10). To better protect others and our natural environment, I would add, we need to foster a mass culture of looking after things, of building them to last and of making them easily accessible. There is of course a danger of taking the 'we' in the East and West and the Global South as the populace in general. Life in an apartment will more often narrow down quite drastically the range of skills one can deploy. Furthermore, those of a certain age and education who have the opportunity to take up a trade or to learn the basics of one in their spare time are already comparatively privileged. Hence the prerequisites of a career trade or of an extra-vocational repertoire of practical skills should be put in place as far and as early as possible in both public and private education.

If we do foster the aforementioned culture of looking after things, there will be less cutting into and across the natural world, which is to say less mining and blasting, less processing, less chemical ponds and less waste and pollution. Care, repair and repairables will leave more room for renewables and recyclables, reducing what Heidegger calls the spiral of consumption for the sake of consumption. This would require a massive change of corporate culture and power, the kind that multinational companies and their financial sponsors will be loath to agree to. It was not for nothing that executives and marketeers in an oil company dreamt up the idea of the carbon footprint left by each and every consumer. It is a clever strategy to dump most of the responsibility and guilt onto the little people. This is why activists should be very selective in choosing their targets. Blocking roads may frustrate already harassed truckers and commuters, but will scarcely impinge on the rich and powerful. And it is not the best way to win friends and influence people. Better to protest at the headquarters and factories of those making large and inefficient vehicles. Those companies most notorious for fracking and oil spillage require even more attention. And

this is before we consider the vast power and reach of the military-industrial complex in and between nations.

On the smaller scale, we must be attentive to the danger of idealisation, of casting the tradesperson as a kind of secular saint. We have all encountered the individual who does not show up or even make contact when one has eaten into one's reservoir of holiday time. We have all encountered the one who is proficient but who charges an extortionate price, and the one who is incompetent and shoddy yet still very expensive. Crawford is familiar with these types, and knows that they will always be with us. Here he rightly sees moral and cognitive failures, namely, those of being greedy and careless and insufficiently attentive to the forms or contours of what one is working on (Crawford, 2009, 98-101). But none of this takes away from his contention that a trade is at least as good a route to a happier and more fulfilling life as a college education. Those in fortunate circumstances and with the aptitudes for situated cognition *and* highly abstract work can have both, though rarely at the same time (most of us do not have the range of practical skills and theoretical knowledge manifested in abundance by G.W. Leibniz, Hedy Lamarr and Ludwig Wittgenstein). What we need to recognise over and again, however, is the fact that some very smart people are suited neither to higher education nor to the kind of work that you are supposed to do after you have gained a degree (Crawford, 2009, 143).

A notable objection is that we should not valorize those whose skills will soon be obsolete because of the major advances in artificial intelligence and robotics. Putting it starkly, clever machines will soon supplant tradespeople. On this technocratic view of things, it is the high-tech researchers and engineers who should be commended. They will open the way to the restoration of the earth and the climate. But it can be retorted that supposedly intelligent robots are still heavily specialized. Multi-tasking in multiple and changing contexts does not appear to be a realistic prospect in the proximate future. In dirty and gritty field conditions, moreover, robots that could actually build things would be high maintenance systems. Each one would require a dedicated squad of human beings to keep it operational. And these human maintainers and repairers would still need to be provisioned and sheltered and rested. In terms of sheer economies of scale, it makes far more sense to have skilled human beings interact directly with the world using relatively simple tools. And it is a sad reality that artificial intelligence and robotics research is funded mainly for surveillance and warfare. Climate change is not yet general enough and severe enough across the planet for the rich and powerful to lose their obsession with face and with upgrading weapons production for imperial adventures and colonial expansion. And all this is before we consider the prodigious electricity consumption of artificial intelligence systems, which demand the provision of ever more data centres and which ensue in more stain on domestic supply.

It is a truism that our contemporary situation can tend to leave a person overwhelmed psychologically, or at the very least demoralized. The narratives of crisis and destruction outlined by Husserl and Heidegger are not conducive to optimism and a strong sense of agency. Simondon's account of concretization and Crawford's defense of the manual trades

can nonetheless be inspirational if we focus on that small corner of the world that each of us inhabits and that we can help to improve. Though we may find it hard to avoid thinking pessimistically, we can train ourselves to devote more time and energy to acting locally. If we do everything that we can to re-valorize the trades and crafts and engage in some of them, even at a more elementary level, we will find our corner of the world more interesting, as well as doing something to combat climate change and pollution, and for that matter the throwaway culture of consumerism. We are still likely to be demoralized at times by the large-scale crises, but we would do well to recall the words attributed to Edmund Burke. Nobody made a greater mistake than he who did nothing because he could do only a little.

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