This model complements the "four stages of competence" (often attributed to Abraham Maslow), which describes the path from Unconscious Incompetence via Conscious Incompetence, then to Conscious Competence to Unconscious Competence. Again, from a baseline of lack of ability, and even a lack of awareness of inability, there is a trajectory towards competency becoming innate. It becomes embodied not just in the mind, but absorbed into a whole sense of self such that the delivery of expertise is often described as the expert having an intuitive *feeling* for the right thing to do.

Experience is thus key to transcending the application of rigid rules-based approaches and to developing craft, skills and expertise.
It is also the domain of art and creative practices.
This amounts to another order of knowledge that Michael Polanyi called "tacit knowledge". It is not the procedural, codifiable, step by step, "explicit knowledge" that calculation and computation are so excellent at, but something transmitted through experience itself so that the learner eventually acquires the ability to *judge* what is right to do. Not simply a linear problem-solving trajectory, but a holistic *awareness* of the whole problem or task. It is committed and informed, acquired by desire and often with passion and with care – a praxis established through dialogue and reciprocal exchange.

A Calculation is Not a Judgement

Being relational, it is a foundation for cooperation and collaboration.

> "*While tacit knowledge can be possessed by itself, explicit knowledge must rely on being tacitly understood and applied. Hence all knowledge is either tacit or rooted in tacit knowledge. A wholly explicit knowledge is unthinkable.*"
> *Michael Polanyi, Knowing and Being (1969)*

Irrational Logics

The Judgement of Solomon (Hebrew Bible/Old Testament 1 Kings 3: 16-28) offers a classic example of wisdom in a judgement. It realises justice not through a direct procedure, but through what could be described as an irrational logical path. The story tells of King Solomon called to rule which of two women is the true mother of a baby, each claiming it as their own. No witnesses can say who the true mother is. With no other way to tell between them, Solomon's perverse solution is to propose cutting the baby in half, dividing it equally between them. The story presents his wisdom as the insight that when one woman then gives up her claim to save the life of the child, she is revealed as the true mother – concerned more for the child's welfare than her own rights or sense of property.

A Calculation is Not a Judgement

When human judgement is drained from a system and reductionist rules are applied to complex situations, the results can lead to terrible injustices and harms. If we privilege the procedural outcomes of artificial systems over the importance of humanity, life and experience and the more-than-human world, we will likely face a self-reinforcing feedback loop of such effects, not unlike the existential threat of runaway climate change.

I wish to advance a proposition… a distinction. Namely, that there is a significant gulf between the mathematical operation by which a *calculation* can be arrived at, and the emergent processes of evaluation by which a *judgement* is made. I think this is an important distinction for our times, because it describes the difference between a procedure of mathematical abstraction and a process of *conscious* deliberation.

A calculation can be determined by a non-sentient entity following a series of steps to accomplish an end (such as an algorithm). Humans have created machines that can do this at scales and speeds far beyond our own individual capabilities. A judgement, however, requires a sentient being, imbued with consciousness and the capacity to

exercise discernment and perception, to arrive at an authoritative opinion.
And time.
It takes time to absorb and reflect, to ruminate and pass judgement. What I hope to argue here is that consciousness itself is an irreducible constant fundamental to fair and trustworthy judgement.

I am, perhaps, re-treading old ground: the argument between quantitative and qualitative methods has rolled on for at least two centuries – rooted in the slow rise to dominance of a kind of *scientism* as the prevailing order of knowledge and worldview. Both methods have merits, and their integration or synthesis can lead to remarkable achievements. Both are rooted in very human beliefs and traditions of how knowledge comes about. Wielded together, they stimulate extraordinary benefits but, when asymmetrical in influence and power, the drawbacks are considerable.

We now live in a world where the quantitative has achieved ascendancy in almost all areas of life, where computations and automated decision-making affect the everyday lives of billions of people. Tremendous advantages in speed, efficiency and technical capabilities across the panoply of human activity have resulted. But they also *amplify* injustices and inequalities, or compound

The Uses of Not

Thirty spokes
meet in the hub.
Where the wheel isn't
is where it's useful.

Hollowed out,
clay makes a pot.
Where the pot's not,
is where it's useful.

Cut doors and windows
to make a room.
Where the room isn't,
there's room for you.

So the profit in what is
is in the use of what isn't.

Lao Tzu, from Tao Te Ching: a book about the way and the power of the way
(a new English version by Ursula K. Le Guin, 1997)

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A Calculation is Not a Judgement

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environmental and ecological over-exploitation and destruction. In doing so their scale and speed disempower and degrade the intrinsic agency of human beings in favour of inflexible and *unfeeling* systems. It is crucial to see that it is a deliberate choice to quantify and to sort the world in this way, and that it is not an impartial effect of some immutable logic that cannot, itself, be challenged.

As Oscar Wilde might have framed the distinction, the difference is one of knowing "the price of everything and the value of nothing" (from *The Picture of Dorian Gray*). It is a trivial operation to calculate the price of something according to a formula of tangible inputs and costs; yet it is far more elusive to judge its value. Such a judgement demands a broader spectrum of parameters, such as context, emotion, culture and other intangibles. Our human fallibilities lead us to both extremes. Judgements, too, can be unsound. – influenced by bias, or unfair prejudices or even untrustworthy motivations. Intention and ethos determine how and why a person will adopt a particular trajectory – as much as their adherence to one method or another; one disciplinary process or another; one set of values or another.

The predicaments outlined above are, I believe, at the very root of the proliferating existential dilemmas which humans, indeed all life, now face. The stabilities of our ways

of living are being challenged everywhere by changes in natural forces we have clearly, recklessly, contributed to – possibly beyond our capability to re-balance, notwithstanding an irrevocable and devastating loss of biodiversity. I believe that the over-exploitation of the natural world, of other creatures and lifeforms has been facilitated by precisely the *unfeeling* calculation of systems based on abstracting life into discrete parts that can be separated from a complex whole and used indiscriminately without repercussion. It is a brutal and destructive alienation that does not factor in to its calculation of profit and loss the consequences and costs of its atomistic unravelling of mutual interdependence. It ignores the fundamental connectedness that unites all matter in the universe, the forces which bind all things together.

We see the results of this alienation across the planet in the systematic extraction of specific resources causing catastrophic loss of entire environments and ecologies surrounding them. There is no doubt that this can only persist for so long, and that that timeframe is rapidly collapsing in on itself.

We also see this alienation in the human sphere when bureaucratic systems over-emphasise adherence to rules above consideration of individual, or even collective, circumstances. One of the most appalling examples in

the extremes it is possible for static rules to operate seamlessly, but in the elastic middle we need flow and dynamism. As atoms themselves are held together by the forces, or relations, between electrons, protons and neutrons, so all of matter and reality are bound by the multifarious forces and relations that govern the natures of different entities. To overlook the reality of our relational existence and to reduce everything down to inert and unconnected bits is, inevitably, to be missing a key part of a whole equation – a series of calculations that will never completely add up. Connection, interdependence, reciprocities are the fundamental forces that bind and make whole the matter of life.

We will need *all* of humanity's diverse knowledges and skills, from poetry, art and music together with mathematics, physics and many others, to find the necessary paths to a fair future for all life on the planet. We shall need the ability to calculate and build machines that can help us sort and make sense of vast amounts of data, whilst simultaneously we must retain our independent, fluent, human capability to judge – soundly – what decisions are most appropriate for each circumstance we encounter and must respond to.

London, July 2019

to context and situation also shrugs responsibility, and provides an effective insulation against culpability.

Witness the degeneration of our politicians and political system – how lies, deceit and incompetence have become normalised, even venerated, without meaningful consequence.

I perceive there to be a parallel between the political imposition of strict rules and the mechanistic fallacy of atomising everything into discrete parts without perceiving the crucial balance of relations between them. They both ignore the basic truth of life that, while everything is indeed made up of the same elementary particles, their unique composition into the infinite variety of matter and life is absolutely particular. Local specificity is a feature of life's mutability – how everything is in constant flux and adaptation in relation to its local context and environment. Scale seems to be a crucial issue here – universal laws function well at the atomic (micro) level and at the cosmic (macro), but clearly not so unambiguously at the *meso* scales we inhabit as lived reality. There, diversity and locality are contingent on achieving any effective equilibrium.

Complex living systems just don't seem to obey laws and rules that are based on reductionist concepts. Perhaps at

recent years has been the terrible injustices and harms inflicted on the Windrush Generation by Theresa May and the UK Home Office's "Hostile environment" policy. Or the shocking percentages of automated administrative decisions in the benefits system being overturned on appeal. Or anecdotally from friends and family, in the number of long-established EU citizens resident in the UK seemingly routinely denied "settled status" on their first attempt using the government's automated system.

And these are just the most visible examples of intentional applications of the technology of bureaucracy, and its component methods and tools, to harm the vulnerable. They are almost certainly intended more as a distraction, or sleight of hand, whilst other yet more egregious activities are kept in the shadows. It seems to me that much of this is being done as a climactic frenzy of industrial capitalism – to squeeze every last drop of advantage from a system that is so weighty with its own entropy that it cannot possibly endure indefinitely. Banking the last pennies to hedge against an uncertain future where, it is assumed, the wealthiest will command the most safety, luxury and authority.

However, I doubt this trajectory will go the way anyone currently anticipates. The speed of environmental and ecological transformation – which we are now

experiencing as increasingly extreme climate impacts – is already confounding the most accurate models and projections that have been achieved so far, since none can reliably forecast the full range of interdependent, interwoven elemental forces and factors we have interrupted with our industry and massive emissions of carbon into the atmosphere over the past few centuries.

I sincerely doubt the wisdom of focusing our civilisation's faith too closely on systems that use automated, statistical calculation of probabilities to make future-facing decisions on our behalf, let alone in the here-and-now. It would itself be a further profound disconnection from our very humanity to hope that such technologies will 'save' us from the profound disconnection of the human from the *more-than-human* natural world. This has been gathering pace for hundreds of years, since at least the initial European colonisation of the Americas and the growth of modern industry and global capitalism. Our technologies are reflections of our cultures and societies, not simply neutral, inevitable outcomes of rational enquiry and engineering. They arise out of our cultures, beliefs, behaviours – they are value-driven… the products of choices, whether intentional or unconscious.

Evidence is growing (as documented by ProPublica among others) that demonstrates how algorithmic decision-

has been to invigorate both chess and go with new approaches and strategies, enhancing the potential and pleasure of the process of playing. The successes of these systems have not diminished either game, but suggested new possibilities. And here there may be a lesson in determining the difference between the experience of a sentient player with consciousness for whom the playing itself may be the point, and a procedural system wholly focused on achieving a finite goal: winning. By focussing on the objective of an end as the goal, those seeking to train "artificial intelligences" might be missing the fundamental point – and value – of playing; that is, the sensations it provides a sentient being of *being alive* and of existing *in relation to* something other than themself.
A continuity of consciousness.

A deeper question to be addressed is *cui bono?* Who ultimately benefits from the increasing automation of aspects of our society? Just as the Industrial Revolution and factory production reduced the independence and skills of many craftspeople, so too the automation of everyday life is removing ordinary people from participating in decision-making. It places the definition of how parameters are set higher and higher within a social hierarchy increasingly isolated and removed from the experience of living among ordinary people. Such a rarefied extraction of authority without direct connection

distrust. Thus it appears that consciousness is also a necessary factor in experiencing fairness and trust, just as I reckon it is for arriving at a judgement. And, since feeling is such an important aspect of both fairness and trust, it could be that these two conditions, like our human intelligence, are bound up not only in the mind and thinking, but are co-located and co-created in our *embodied* experience of knowing. Perhaps neither are at all suitable for programmatic calculation.

What then, drives some people persist in trying to automate trust and fairness in an effort to remove the human from the loop in deciding what is fair or trustworthy? It seems perverse to me to be using such technologies to replace the human, instead of defining alternatives that could *enhance* our understanding and judgement by doing what computers and systems do best – classify, sort and order huge quantities of information to reveal patterns that are not immediately obvious. The analysis and calculation of data could then *inform* human-derived judgements that encompass broader contexts and situations including mitigating factors and contradictory states not suited to binary classifications. Better together, one might say.

The upshot of the successes of Deep Blue against Gary Kasparov in 1997 and AlphaGo against Lee Seedol in 2016

making has a tendency to amplify existing biases leading to exacerbated injustices and inequalities, as well as other pernicious effects. Instead of the promise of impartiality that has justified an increasingly reliance on both bureaucracy and algorithmic systems, we have come to realise that they have all of our human fallibilities coded in, but with the additional twin enhancements of speed and scale – rippling the effects out further and faster. Now would be an apposite time to check the headlong rush to automate how we manage our societies and everyday lives, especially as we must shift our economies and industries from extractive and destructive activities to ones which preserve and maintain life and ecologies.

The two are inextricably linked.

> *"… some are already engaged in experiments that try to make the possibility of a future that isn't barbaric, now. Those who have chosen to desert, to flee this "dirty" economic war, but who, in "fleeing, seek a weapon," as Deleuze said. And seeking, here, means, in the first place, creating, creating a life "after economic growth," a life that explores connections with new powers of acting, feeling, imagining, and thinking."*
> *Isabelle Stengers, In Catastrophic Times (2015)*

Knowledge, Skill Acquisition & Competence

Stuart and Hubert Dreyfus' model of skill acquisition is a useful guide in discerning the distinction between a calculation and a judgement. We can trace a path from novice via advanced beginner, competent, proficient through to expert. The model describes how, in the early stages, the novice must learn the rules and understand how to use them. As their experience grows (and presumably confidence in their ability to apply the 'right' skills), they rely less on formal analytical application of the rules and more on their intuitive knowledge of what will work best in the given situation.

> *"Dreyfus and Dreyfus' essential point is to assert that analytical thinking and intuition are not two mutually conflicting ways of understanding or of making judgements. Rather they are seen to be complementary factors which work together but with growing importance centred on intuition when the skilled performer becomes more experienced. Highly experienced people seem to be able to recognise whole scenarios without decomposing them into elements or separate features."*
> *Mike Cooley, Architect or Bee? The Human Price of Technology (1980)*

Our entire mode of existence and civilisation now hinges on dilemmas as, or even more, knotty and seemingly irreconcilable as the problem faced by Solomon. We are going to need the wisdom of irrational logics and unfettered imaginations to devise visionary, engaging and realistic ways to resolve them.

> *"Hard times are coming, when we'll be wanting the voices of writers who can see alternatives to how we live now, can see through our fear-stricken society and its obsessive technologies to other ways of being, and even imagine real grounds for hope. We'll need writers who can remember freedom – poets, visionaries – realists of a larger reality."*
> *Ursula K. Le Guin, 'Freedom' in Words Are My Matter (2016)*

The story is of a classic type that has parallels in the literatures and storytelling traditions of other cultures., like the tradition of Sufi teaching stories. Such stories illustrate how, sometimes, there is no rational path to truth or a just decision but, instead, an irrational, *counter-intuitive* approach can reveal it in unexpected ways. It is imaginative and transgressive, employing techniques familiar in creative, artistic practices – excessive, surreal and disturbing. These are not quantities but *qualities* of imagination. It may be perfectly possible to compose a fiction or a piece of music or an artwork to order, by following rules and formulae (for instance the 'police procedural' novel or many a three minute pop song). Yet something else is needed for it to become art or literature that transcends the skeleton of its construction and rises above hackneyed cliché and routine prosaicness.

Beyond Measurement: the incalculable heart of humanity

Fairness and trust are both *qualities* or *conditions* of human experience rather than fixed rules that can be applied indiscriminately. Neither are particularly amenable to formulaic measurement, indeed they are often critiqued precisely because they are almost impossible to quantify. In the context of automated algorithmic decision-making systems (e.g. in Artificial Intelligence and Machine Learning) this lack of fixity and highly subjective nature is frequently alluded to. The lack of stable frames of reference for what is at any one time fair, is a feature of its contingent nature. Likewise with trust – what constitutes the nature of trust in any given situation is highly contingent and almost impossible to codify into a stable or transferable matrix of elements and factors.

Yet we instinctively know what *feels* fair or unfair, and what trust feels like, as equally, when it switches to