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EDITORIAL

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Satinder P. Gill[1]

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Part I: Special Issue—Tacit Knowledge-Shaping AI Futures

Editorial Part 1—Tacit Knowledge-Shaping AI Futures

In 2019, The conference on Tacit Engagement in the Digital Age (Re-Network CRASSH and Music Faculty, Cambridge) challenged a supposed neutrality associated with technology, evidenced in the idea that human 'intelligence' can, in the absence of 'person', be artificially re-presented, re-constructed and re-produced through computation (AI). The conference explored different ways in which the interplay of the arts and sciences is questioning what an 'intelligence' that is 'artificial' might be resituating the purpose and possibilities of the technologies we are creating as above all, human phenomena. Some of the questions posed included:

- How can we reconceive the self as interaction in a digital age?
- Can performance be a paradigm of knowledge?
- How can we reconsider the relation between a person and a collective intelligence?
- How is it possible to trust in the shadows of machine thinking?
- What alternative models might allow humans to better engage with technology?

These are issues that come up more and more with the growing virtual worlds we inhabit with others, with constant movement between physical and online presence, particularly the limits of AI, and the design of 'collective intelligence'. NESTA's CEO at the time, Geoff Mulgan (see recording at https://www.crassh.cam.ac.uk/events/28385/), opened the conference discussion asking '*How can Collective Intelligence Orchestrate Tacit Knowledge of Different Kinds?',* reflecting that the deepest form of tacit is *wisdom*. This echoes Mike Cooley's idea in *Architect or Bee? The Human Price of Technology* (1987), where wisdom is a prerequisite for positive action: 'Data suitably organised and acted upon may become information, and information that is absorbed, understood and applied by people may become knowledge. Knowledge frequently applied in a domain may become wisdom, and wisdom the basis for [normative] positive action.'[1]

The poster for the conference 'Tacit Engagement in the Digital Age' (Fig. 1) based on designer Michael Byrne's research on ageing dancers reminds us that a key way knowledge is mediated is via the body. When an elderly prima ballerina demonstrates a step to a younger prima ballerina, the older woman's movements appear more subtly communicative and graceful than the younger dancer's, which, although as skillful in technique, are not as personally inhabited.

The conference brought together people from the arts, performance arts, humanities, as well as sciences and AI, and we will discuss some of the ideas from the conference and papers resulting from it in this special issues. From dance, Ghislaine Boddington (this volume), in her paper on *The Internet of Bodies*, explores how to bring the body into digitally disembodied interaction addressing concerns with how the body is being mined as a source of data, e.g., via apps and implants. The difference between our physical and data selves is 'liveness': as live beings we are always "on", yet technology has an "off" button. However, as we connect, comment, click 'like', request, and receive in virtual networks, we become addicted to our 'hyper-sensory selves' and 'forget' that we can turn the digital off. Could blending virtual and physical presence as collective action help us manage ourselves and avoid this addiction? This is explored in a discussion on participatory installations which only come alive with the physical togetherness of participants. Artists are challenging the mining of our body as data, re-appropriating our relationship to our personal body data, questioning who owns it, has rights to use it, and

✉ Satinder P. Gill
spg12@cam.ac.uk

[1] Managing Editor, AI & Society, Centre for Music and Science, Faculty of Music, University of Cambridge, Cambridge, UK

[1] Cooley, M. (1987a), Architect or Bee. Hogarth Press [new edition], p11. cf. cybernetics, see Wiener (1949).

Fig. 1 Poster design by Michael Byrne, whilst he was a Performance and Technology Research Fellow, Cornell University

who controls that usage; issues now at the forefront of the data ethics debate. In the UK, our experience of COVID-19 contact-tracing apps raised public awareness of how our personal body data are attached to our identity, raising non-transparency issues on its usage.

Such virtual physical blended presence with others may be considered a form of relational interaction. In his paper on *Writing on Water*, Sha Xin-Wei (this volume) discusses how much of contemporary AI systems are based on an abstract information-theoretic view of communication as transmission and the universal machine of discrete states and discrete rules. Human experience is reduced to fit this view, with consciousness reduced to cognition and cognition reduced to problem solving; in sum, man's behaviour becomes a physical symbol system. This leads to interfaces needing to define a-priori (that which pre-exists the event) schemas, e.g., categories of gestures according to which some gesture or movement is acceptable for the interface (e.g., gesture interface) to function. What might 'relation' and 'interaction' mean if instead of defining schemas of objects in the world (including gestures, vocal sounds, speech patterns, etc.), one thinks of the world as consisting in 'dense responsive media', e.g., a field of sound—sound permeates all space, and can be treated as extended. A responsive field of time-based media can vary according to the activity of entities (people, plants, objects, etc.) immersed in or engaged with the field. As Sha says (in this volume), the water in a pool (field of sound) does its thing no matter how you wriggle your fingers, or what you use to stir it. This ensemble approach to relation between human and machine allows for emergence of forms of tacit engagement between participants.

Another approach from the arts is the Internet of Living Things. In their paper on *Art, Technology and Living Things*, Vibeke Sorensen and Stephen Lansing (this volume) discuss how we are now transitioning from the Internet of Things to the Internet of Living Things where ethics and aesthetics and empathy are deeply entwined. This is enacted through their installations that investigate and engage us using technology in the arts to reflect on our shifting cultures and our impacts on the natural world. For example, an Internet of living things garment, the Tree Dress, consists of digital panoramic photographs of a living tropical tree in Singapore which are printed onto sustainable silk, wearable technology, and embedded systems. LEDs and circuits are inserted into the dress, displaying the continuous measurement of the O2/CO2, temperature, humidity, and light conditions of the tree in real time. An app allows the wearer and networked participants to track the data, and be constantly aware of the tree's condition. This work communicates real-time scientific data and translates it into a poetic representation through wrapping onto the human body. It was intended to catalyse empathy with human beings and the trees they depend upon, and to help bring attention to this delicate and crucial relationship.

These are some of the examples of works presented at the conference that brought the arts, science, and technologies together as ensembles of humans, the digital, and our environment, reframing what technology means and its purpose for a more humane, sustainable, and empathic co-existence that affords a tacit engagement that is ethic and aesthetic, and dynamic.

The arts themselves, e.g., Music, may be considered as forms of intuitive technology, where imagination is crucial, and may themselves be reconsidered as essential laboratories for exploring and understanding our own present and future relationships with technology (See Jonathan Impett's article on *Music, Discourse and Intuitive Technology*—this volume). For example, in networked music making, most notably during the pandemic lockdowns, musicians have had to handle and harness digitally mediated networks even when they are out of sync due to latency and the uncertainty that comes with this, and performing in multi-located spaces with multiple authors performing together. Rebecca Wilson (this volume) discusses this in her paper, *Becoming Latency Native: Strategies for Networked Music Performance*, and how this has lead her to formulate a new aesthetics to support networked music making. Such discussion from the arts can inform all spheres of networked communication.

A common theme emerging from the performing arts is that their creative process is a social endeavour and this participatory quality is a challenge to their datafication and commodification. Stamatia Portanova (this volume) in her

paper on *Wonderland* discusses examples of Artists who are also challenging the self-automation that is occurring when we have to use automated systems, e.g., New Aestheticists who seek to blur the human and machine and expropriate the control of data.

As for designing automated systems, the assumption of perfect information when discussing moral dilemmas is not achievable, e.g., take the case of the automated car. In *Towards and Epistemics of Autonomous Systems*, Mihaly Heder (this volume) argues that this problem arises, because automated technology itself becomes opaque to any one designer in a design team due to great complexity and it is not possible to design decisions to respond to all possible human behaviour, e.g., in response to a moving car. Is it possible to have epistemic transparency of autonomous systems? Heder (this volume) proposes that rather than providing ever more details of the design, we may just test systems with human participation to see which systems the users feel they can predict. This shifts the problem to an entirely new level that takes into account the tacit knowledge of the humans involved. The idea resonates with Sha's idea of responsive media, mentioned earlier.

Autonomy also assumes that causal reasoning can be automated, and this was addressed with scepticism by philosopher Melvin Chen (this volume), at the conference and in his paper on *Causal Reasoning and Meno's Paradox.* We rely on tacit knowledge, as might be constituted by or derived from the epistemic faculty virtues and abilities of the causal reasoner, the value systems and character traits of the causal reasoner, the implicit knowledge base available to the causal reasoner, and the habits that sustain our causal reasoning practises. In the event of confusion and uncertainty (e.g., when dealing with complex cases), any final appeal should be made to our traditional storehouses of tacit knowledge: the domain experts themselves.

An outcome of reasoning is the judgement or decision. In everyday life, we make judgments in which we trust our instinct, and instinct is developed through experience. Bo Goranzon (this volume), in *Dialogue and Certainty*, asks if we are still able to do so when we engage with the 'certainty' of the machine? It was proposed that it is only our experience of the world that allows us to perceive the objects in it, but if we are always measuring the world, our senses would rely on this and never develop the skill of making judgements with certainty. Wittgenstein said of certainty of action in a practise, 'when I know how to act in every particular case, this means that I can act without hesitation, it is self-evident to me….. I can give no reason.'

But making judgements requires reflection and imagination. Garibaldo (this volume), in *If I Cannot Move Heaven, I Will Move Hell* (from Virgil's Aeneid, VII, 312), addresses how with the digital, the force of measurement, commodification, datafication and increasing individuation is fracturing the social fabric of life and impacting our experience of time. Time is becoming more dense, with lean production, and value for money, to the point where even walking back and forth to pick up parts to be assembled in a work place is 'wasted' time to be eliminated. Such transformation of time reduces the subjectively useful time needed for imagination and creativity. This in its turn creates a form of psychosis. Yet, humans have deeply rooted mechanisms of resistance and rebellion by virtue of the process of growing up and becoming independent. This requires growth of awareness, so his challenge is how can society pursue the goal of making us aware and foster these deep-rooted mechanisms.

From a human centred perspective, Ignacio Nieto and Marcelo Velasco's paper (this volume) on *Tacit Engagement, Using Tablet-Mediated Learning For Social Good*, powerfully shows how mediated communication can bring together people with mental health conditions, who are otherwise socially isolated, with geographically distributed family and those in the environment around them, to form a community. Mental health issues they propose are a community issue. This project blended online interaction with physically present communication, working with women with psychiatric conditions in a psychiatric institution and students at the local school next to the institution. Collectiveness, external environments and responsibility are separated from the possible social fabric of people with mental health problems. It is only by creating community that is inclusive can this gap be overcome and mental health alleviated. Could machine learning devices replace or be used in the place of a 'person' to perform this? They are sceptical about this as evolving a community is a collective, co-adaptive process, and it is risky for the vulnerable person who is expecting support or attachment.

Being in community is also vital for us as social beings and it allows us to be both interconnected and to be in disagreement. There is a growing movement of artists and scientists creating labs, with the example of Marleen Wynants (this volume) *Swamplab* that brings together people from across the artistic practises and disciplines to wonder together and be open to listen and reflect, play around, tinker, and be messy. All this is key to cracking resistance to hear other view points and engage with different behaviours and re-appropriate our futures.

Satinder P Gill.