Chapter 5 Tacit Engagement: Betwixt and Inbetween

This chapter brings the discussion from the previous four chapters together and develops it further. Firstly, it summarises what has been learned about the conception of an interactive and mediating interface, irrespective of specific contexts and technologies. The chapter ties together theory and practice across the various contexts to identify the foundational elements of a personal act of knowing within human relations. It looks to the future at what we need to consider as the foundations for human – technology relations for developing the relational interface, extending this discussion with fundamental philosophical and artistic questions being raised by the arts/performance arts about the relational in performance and human connectivity. A theoretical introduction is followed by a discussion of eight projects of artistic and design research, in which a new scientific paradigm is explored. The result is the formulation of the concept of 'tacit engagement'.

Introduction – The relational interface

This book explores whether the concept of the *interface* can be located in *dialogue, performance*, and the *tacit dimension of knowledge* within the human system, and thereby expand possibilities for what it could then mean as technology. For this to be possible, I ask what would we need for an interface to support how we relate to each other, in particular, what Polanyi (1966) called our *personal act of knowing.*

The discussion is set against a background of historical concepts of data, efficiency, utility, and automation, which have permeated the idea of the interface. This is facing challenges, for example, with the problems of bottlenecks of vast quantities of data and how to relate them (expert systems, data bases, big data), and how to support our relations with each other and share and enable us to impart knowledge and skills when we are distributed in space via various mediating interfaces (e.g. Facebook, Skype, video conferences, and other forms of tangible and interactive interfaces). Yet, what does it mean to mediate? What is the difference in the processes of mediation when we are engaged in embodied co-present interaction, and when we are communicating via digital means? What then is the relation between mediation and interface?

The measurement of time and human skilled action in the design of automata and for maximum utility in the workplace has been part of a belief in societal progress (Schaffer 1999), and instrumental in the evolution of the concept of the interface. In the 20th and 21st Century the idea that computational artificial agents can replace humans, for example, as companions for the elderly, and will be more

effective than humans, for example, as a culturally adaptable teacher or an anonymous therapist, continues this belief. The examples just mentioned are of projects where the intentions are for the social good and to improve people's lives. Yet, as with all *naturoids* (Negrotti 2012) where one reduces the complexity of the natural object, there is the argument that reproduction takes on its own complexity and the further is it improved and developed upon, the further removed it is from its natural counterpart, and our relationships with such technologies will affect our relationships with them and each other and nature in ways that are beyond prediction. (Negrotti op cit.).

This relates to a problem that is often spoken of, of the sum of the parts failing to make the whole. Polanyi in discussion with Carl Rogers states, "There are limits for making something more explicit than it has been, and the mere effort of going in that direction may be destructive. The problem arises in analyzing and trying to put together explicitly a thing which has been broken down into parts. The tragic thing about it is, analyzing and putting together is the most powerful way of getting truth. I mean our whole biology almost exists in analyzing and putting things together. So that we are in difficulty because nobody can tell us whether what we have spilt up can be put together again or not; and if we build up a culture recklessly on the assumption that only things are valid which can be broken into parts – and that putting together will take care of itself – we may be quite mistaken, and all kinds of things may follow." (Kirschenbaum and Henderson 1989, Polanyi in conversation on the topic of "Knowledge or Science?" p.164). The arts (this includes the performance arts) also investigate truth, for example, in the case of dance (Noh, Ikuta 1988) they do break movements into parts and in creating the whole they discover this possibility by immersing their whole person and making a movement part of their self. In this newly established self where the parts have become whole, trust and truth is are established between dancers and with the audience. In art, *authenticity* creates trust between performer/artist and the performer and the audience/viewer. Truth lies in a personal act of knowing which is *relational*. This is distinct from truth acquired through data and logic.

The paradigm of data (of parts) and utility gives primacy to *transactional information* over that which is *relational*. The concepts relational and transactional have been adapted from a comparison made between music and language (Cross (2012), where music is necessarily relational (rhythm, pitch, melodic) and language is primarily transactional (semantics and grammar). In the project Touching Sound[1], to create an interface to support cooperative musical behavior, this comparison made it clear that a conceptual shift from the transactional towards the relational in human-computer interaction needs to be drawn for the case of musical interaction. The primacy of the transactional permeates the analysis of human interaction and human cognition and the design of virtual agents, intelligent interactive technologies, gesture interfaces, tele-communication, etc. It can be argued that

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[1] http://rhoadley.net/research/touching/index.php. See also Aaron, Barnard, Cross, Gill, Himberg, Hoadley, Odell-Miller, Toulson (2013)

without the balance of the relational (tacit, personal, experiential, ethical, aesthetic), a focus on the transactional in any domain may lead to inflexible systems that are less likely to be able to handle the unexpected and breakdowns.

Technologies of data and utility presume to represent and provide certainty and in the case of expertise this can cause experienced professionals to lose confidence in their ability to doubt (Goranzon 1988, 1992) and thereby in their confidence to make judgements, as the ability to doubt is fundamental to our capacity to judge with confidence. As a result, workers are not encouraged to judge but to accept what output the computer provides them with and may potentially lose their critical capacities over time. The certainty of data abstracted from our experience has implications for a range of interactive technologies that represent human behaviours, including gesture and emotion, and ideas about how we think. These implications have been addressed within a rich discussion on human skill (Goranzon op cit.; Rosenbrock 1988, 1990; Cooley 1987, 2007; Rauner 1988, Smith 1992, Gill KS 1996, Schaffer op cit.). Putting technology aside, such abstraction can lead to serious errors in judgment, as in the case of the pediatrician who administered a fatal dose of 15 mg instead of .15 mg to a baby despite being warned by the experienced nurse that this was incorrect (Cooley 2007). A problem of abstract data, of the explicit, is a notion of *the one best way* (Cooley 1987), and this can affect what is perceived as relevant information or pathways for decision-making (GillSP 1995). Abstract ideas of relevance and decision making processes cannot completely capture the complexity of decision making in every day life, including professional practices (Chapter Four), and this lead to designs of decision-making technologies that, in turn, impact on the ways we think about solving problems and making judgements.

In the discussion in this book, I have extended the relational-transactional comparison between music and language to an analysis of mediation and the tacit dimension in human interaction. It is mistaken to believe that knowledge is either tacit or explicit, rather the explicit always has a tacit dimension (Rosenbrock 1988, Wittgenstein 1958), and the tacit can be shared in silence with someone who understands us very well, where you become one, a state of I Thou (Buber 1923), or where you share the same background of knowledge where the utterance of a seeming 'explicit representation' says it all. It is not always the case that a narrative style will convey information in a clearly understandable way, in fact, it may sometimes fail to do so. What is clear is that we can better understand what makes for success if we consider how knowledge is performed in our daily lives with others, i.e. knowledge as skilled embodied performance. It is proposed that the key to success is the process of mediation which is a collective act between the participants engaged in it: in the case of an expert and an apprentice architect (see Chapter four), mediation is not of an individual's body movement and voice but lies within a collective act, whereby the expert recognises the apprentice's idea as he moves with it, evident in his response of accepting it. In another example of a design team of 'experts' (Chapter four) "Mediation is not an individual's action (be this a gesture or/and an utterance), but a collective moment between the mediator

and the expert (i.e. two or more persons), and once the expert recognizes the mediator in his/her response, the whole group also understands that the source of the problem has been identified." At any time in a meeting, any person can become a mediator and for any mediator, there will be an expert who recognizes they have mediated something that the expert can do something about. It is often thought that experts identity the source of problems in which they have expertise, however, it is often what I call a 'mediator' who identifies the key to a problem, but it is only the expert who can recognize the key and solve the problem. In the collective moment of mediation, we express our 'know how', that we 'know that', and critically, that we 'know when', simultaneously. Hence abstracting the complexity of the 'personal act of knowing' from ourselves is to presume such abstraction represents how we make decisions but fails to do so.

The concept of intersubjectivity (Husserl 1931) is sometimes considered for developing systems that are more 'friendly', more 'understanding', more empathetic. This is a concept based on the projection of the self, of placing ourselves in the other's shoes and understanding how we would react were we him/her. Concepts of sympathy and empathy tend to be rooted in this *identity transference* (Hall 1976) that assumes or necessitates a sameness of culture. This is natural to assume, as we move with the rhythms of our cultures in learning the dance of life with others around us, and we fail to be sympathetic or empathetic when someone does not behave as we expect them to and we are offended. The problem with identifying transference is that we may fail to see that the problem lies within us. This is detrimental to developing relations and is highly problematic in the cross-cultural situation. Hall suggests that we need to make culture (our own) explicit so that we can know where we are misunderstanding, i.e. to make ourselves conscious of our own cultural behaviours, and that failure to do so will lead to serious breakdowns in cross-cultural collaborations. In a sense, we need to become apprentices in the cross-cultural situation we seek to become skilled in (Collins 2013).

In conclusion, it is arguable that any interface that seeks to engage with our personal act of knowing needs to be able to afford us our relational dimension in balance with transaction. There is now a slow but growing shift from some thinkers towards the relational, both from within the field of human computer interaction with discussions on action versus cognition (Dourish 2004; 'Tangible Media, MIT Media Lab[2]) and most notably from the convergences of the arts (Vesna 2012, Nevejan 2007), performance arts (e.g. dance, Boddington 2012; dance and music, Fluxustree[3], Barnard and deLahunta) and humanities and science (Sha 2013) with digital technology. Some of the most reflective work on the balance between the relational and transactional is coming from artists joining hands with scientists and technologists to find alternative ways to investigate the relation between human and the digital and the mediated human, beyond the dominant con-

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[2] http://www.media.mit.edu/research/groups/tangible-media
[3] http://rhoadley.net/comp/fluxustree/

cepts of technology as a transactional conduit. This is a shift in paradigm towards what I will term the *relational interface*.

Art and Science: betwixt and in between

Some of the innovative work in the convergence of art, science and technology that addresses the balance between the relational and the transactional is shifting the position of the human from the center of a picture of progress to being part of nature and being material, where cosmological qualities of *energy* and *matter* become salient. This reflects an increasing need for meaning in a world that is becoming more explicitly about quantification, objectivity, and utility. This shift is reminiscent of a questioning by writers, artists and philosophers at the turn of the 20th century, for example, Henri Bergson whose 'process philosophy' of experience and intuition, time, and Creative Evolution (1911) is a poetic expression of human life, value, and purpose. In the turn of the 20th Century Bergson is questioning the rationalistic and utilitarian approach to knowledge as being about causality and objects, by using poetic expression to explore our creative intuition and draw together our life energy and life energy in our environment as a common force of survival and evolution. Remarkably he was awarded the Nobel prize for literature for his work on Creative Evolution in 1924, demonstrating that a synergy of art and science can open alternative ways of thinking and of expressing knowledge that transcend either of their boundaries.

Such thinkers and artists laid the ground for a paradigm shift in philosophy in the 20th Century with the emergence of concepts of intersubjectivity (Husserl 1937), questioning of the idea of 'certainty' (Wittgenstein 1969), and positing the body as the source of knowledge (Merleau Ponty 1945).[4] In the 21st Century this questioning is re-emerging in a cross-disciplinary dialogue between art and science and technology, where design is a part of this dialogue rather than being the focus of its attention. This is clearly visible in the collaboration between the artist Victoria Vesna and the neuroscientist Grimzewski, where new art and scientific discoveries are made through a natural process of sharing ideas without a clear idea of where the dialogue might take them but trusting it. This way of working together is reflected throughout the projects presented here. The idea of what constitutes an experiment is itself a philosophical project for the scientist and mathematician Sha XinWei, that he explores in dialogue and practice with dancers and choreographers, historians and philosophers of science, artists, and technologists. The shift is towards what may be described as a balance between an aesthetic, ethic, social, and spiritual *purpose*. For example, Caroline Nevejan's work on Witnessed Presence is rooted in Buber's I-Thou (Buber op cit.) and the international convention of human rights, and her work with artists investigates what happens

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[4] See chapter one for a fuller discussion.

to ethical behavior and trust as we become less present to each other in distributed space. The projects are also an expression of an ongoing tension between forces that constrain and bound human freedom and those that seek to free the human spirit. We see this in Kristina Andersen's work on intimacy where she asks people to play and imagine and feel magic using every day materials in experiments that engage their emotions, and she does so in order to think about what an interface would need to be like to facilitate this. Maja Kazmanovic and the FOaM lab's moto, 'Grow your own worlds', is inclusive and invites the public, the community, to partake in the lab discussions, and they have created a free space to develop projects that address the contemporary issues facing society.

In all the projects selected for discussion below, developments in science and technology are motivated by and shaped with the arts and the humanities and social sciences, where each inspires the other and together they seek to engage us at a personal level of commitment. That is, they whether intending to or not, are significant for my questions about whether an interface can facilitate the personal act of knowing of the kind that we are able to achieve with another person and that enables us to understand and live in sustainable ways with nature. These projects or 'designs' are not, as Sha would say 'definitive answers', rather they are investigations where the process itself is deeply important.

The architect Cecil Balmond (2002) described design as an intervention, a 'local forcing move', a 'juxtaposition that stresses rhythm', or 'two or more events mixing to reveal hybrid natures.' There is no hierarchy, only interdependence in this 'template' of the Informal. The *informal* shares qualities with the *tacit in dialogue*, and architects, artists, dancers, choreographers, musicians and researchers and practitioners working at the edges of disciplines may recognize themselves in this realm of emergence. It is no accident that recurring thoughts expressed by those involved in the collaborations of arts with the sciences and the digital world include the following:

<div align="center">

In Between
Betwixt and In Between
Betweeness

Hybrid
Transitional
Liminal
Transcendent

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Are these the qualities of the tacit, of mediation, in dialogue? What are the salient factors that need to be considered for bridging the relational gap in the interface, and what may be the limits to achieving this? The arts necessarily deal with the relational level of human engagement and hence are essential for any discussion on what it means to be human, on how we engage with each other, and on the technologies that increasingly form part of our everyday lives.

Art@Science: 8 Projects

I see these projects as having two kinds of emphases, one being the need to develop philosophies or conceptual frameworks and the other, the need for methodologies. Neither of them focus on a product or a specific design as their objective, and arrive at these as grounded outcomes of a process. Sha, Vesna, Kuzmanovic, Nevejan, Ishii, and Balmond are providing us with philosophies and conceptual frameworks, whilst Boddington and Andersen are developing methodologies. Together they represent the spectrum of art, science, social science, performance, and technology, and they share fundamental ideas about how we need to think about the place and purpose of technology in our lives to meet our need for authenticity, trust, coherent identity, a fairer and inclusive society, continuity between being human and being part of nature, and that our embodied awareness is central for any future interface to support these needs.

Betweeness – 'A de-anthropocentrizing phenomenology' (Topological Media Lab, Sponge)

In the first of these examples, I take the work of Sha Xin-Wei whom I came to know whilst at Stanford University, where I spent three years with the Centre for the Study of Language and Information. One day, in 2001, whilst I was working on a experiment with the Interactive Workspaces lab, Terry Winograd (Prof Computer science, Stanford University) walked in for a meeting accompanied by someone, and just as they were walking past, Terry stopped and quickly introduced us saying he thought we might have shared interests and it would be good for us to know of each other. He was right. Xin-Wei and I did meet and the dialogue has never stopped.

Sha currently heads the School of Arts, Media and Engineering of the ASU Herberger Institute for Design and the Arts, and is the Founder and Director of the Topological Media Lab. His work is on the architecture of responsive media spaces that involves the critical study of media arts and sciences. He is concerned with the phenomenology of performance, phenomenology of differential geometry, and technologies of performance. He applies the idea of topology to media, to create what he calls, pliant computational matter, and this involves the study of issues related to gesture and performance, sensors and active fabrics, temporal patterns, computer-mediated interaction, geometrical visualisation, and writing systems. He collaborates with artists, performance artists, philosophers, designers, computer scientists, musicians, actors, historians and philosophers of science, to address these issues, create topological media, and develop performances, and all the while, working on a phenomenology that is not anthropocentric. Technology is part of the philosophical investigation.

He describes his work as lying between art and philosophy, where "*the betweenness is most essential*." It is in this betweenness that he is developing his 'de-anthropocentrizing phenomenology' and embeds it in a cosmology where materiality is 'inspired from continuity, field, and philosophy of process', based on 'ethico-aesthetic' as well as technoscientific grounds. What does he mean by this? He tells of how he asks his students and colleagues, "why do you do what you do?" which for him is related to the question, "Why do we live?", that in turn concerns 'how we live'. Hence he is asking us about the quality of life rather than its meaning, which is 'more enamored of epistemology'. He avoids framing these questions as phenomenological ones about our 'experience' of life. Instead, reminiscent of Bergson, he is finding "*a poetic way*" to explore ideas about matter and practice a process philosophy, within the context of contemporary and emerging technologies of performance. Just as Bergson questioned our perception of the world as consisting of objects and asked us to think of it as consisting in matter and continuity, so does Sha. This alters how we can consider how we relate within the world, without ego and with a greater chance of achieving mutual respect for each other, and it requires a rethink of what technology could be about.

Sha approaches the *continuous* as *topological*, and investigates the topology of media and matter by creating installation-events. He draws on studies of science and technology to consider the ethico-aesthetic[5] consequences of this approach to performance and computational media. This leads him to posit technology as a philosophical question to "accommodate value", exploring notions of interaction, responsive media, and performativity. I find it interesting that he is creating a genealogy of topological media that "*produce matters of value* as well as matters of fact": Topology is about the continuous, about proximity and connectedness without "metric quantity", "immeasurably richer than the graphs and networks favored by engineers and their social scientists!" For Sha, topological media is a set of working concepts, a simple set of material and embodied articulations or expressions that allows us to engage in speculative engineering or philosophy as art, and "to slip the leg irons and manacles of grammar, syntax, finite symbol systems, information and informatics, database schemas, rules and procedures. …. [it] permits us to relinquish a priori objects, subjects, and egos and yet constitute value and novelty." For him, the Topological Media Lab is an art practice, deeply informed by practices of engineering, mathematics, and philosophy to support 'experientially rich, improvisational activity'.

Movement and gesture are explored as the 'formation of subjective experience' but posited within what he calls 'substrate matter' rather than in cognition. He is critical of the dominant model of interaction of 'humans and their proxies engaging in an action-reaction ping-pong.', where interaction design, "even in its most enlightened mood, has been centered on the human (viz.

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[5] Sha refers to Guattari 's work, Chaosmosis: an ethico-aesthetic paradigm (1992).

"human-centered design"), as if we knew what a human was, and where a human being ends and the rest of the world begins." When I asked Xin-Wei about this, he explained that he would rather we be more modest in assuming that we know what a human "is", more modest about any metaphysical or scientific claims about what any entity "is." "I very much respect and desire and participate in talking about human experience, and what humans ought to do with what they take to be other humans, but also, and more profoundly with the rest of the world beyond one's own ego. I just urge us to do that with a lot more humility -- to slow down and stammer, as Isabelle Stengers urged so colourfully"

The implications of the action-reaction human-centred design approach is illustrated in this excerpt from his recent book on Poesis and Enchantment in Topological Matter (2013):

"A set of pedestrians' or dancers' limbs moving in tandem could form a body, as could a group of voices momentarily syncopated. What we ought not assume, however, is an invariant deterministic mapping from physiological data to metaphor. Although an invariant mapping may be a necessary working notion for neurologists and linguists and engineers, we need not and should not, as poets or as phenomenological experimentalists, assume a discernible deterministic relation between physiological data like heartbeat, galvanic skin response, or breathing rate and macroscopic aspects of a performative event, like emotion, mood, or narrative entity. Pragmatically, what we learn from neurophysiology and the principled scientific study of neural phenomena is that the data are simply too complex and polyvalent to plausibly map to any simple linguistic token of an emotion or some human behavioral state. A smile could correlate with amusement, embarrassment, confusion, or the rictus of death. A spike in the nervous signal of a muscle could correlate with an equally great variety of putative "causes." But beyond such pragmatic concerns, there is a more fundamental conceptual issue. Such a mapping would be merely a trace of the physical other, which is not identical and may have only accidental relation to the embodied phenomenal experience."

This is a critical point for me and relates to the concerns addressed in the four chapters in this book, that breaking down the body into constituent parts that correlate with particular effects in us or rather our experience, not only presumes cause and effect, but also prescribes to us how we ought to move/vocalise and respond, and in so doing, conditions our behaviour. This is a point to reflect on as we increasingly use gaming technologies that are based on this premise.

His topological approach to design is "a way to imagine and think about living in the world, how to shape experience, a disposition with respect to the world, rather than a methodology or a technology." It is about spontaneous engagement:

"… an artistically compelling experience in a responsive environment … should not induce puzzle-solving behavior. The mechanism should be completely obvious, or completely transparent. puzzle solving is a poor substitute for theater or any thick form of life and ferociously reinscribes only cognitive acts, and a particularly reduced set of such acts at that."

To illustrate what he means by 'transparency', Sha pointed me to the Bunraku puppet theatre (see Fig 1.).

Fig. 1 Transparency: Visible-Invisible. This picture is from the first scene in the Bunraku play, Musume Kagekiyo Yashima Nikki (written in 1760). The story – *"A procurer of prostitutes tries to sell a teenage girl Itotaki to a brothel, but they complain the girl has no official papers signed by her parents (many children from poor families agree to a period of servitude to make money for their parents, but the parents must give permission) so are reluctant to buy her".* (photo and description, *Bunraku-Japanese-puppet-theatre, 2010*).

The picture (Fig. 1) shows an exchange of presents towards the end of the scene. Bunraku puppet theatre presents a complex idea of transparency and visibility; the master puppeteers are visible and their activity is transparent, yet we attend to their mastery and to the puppet which is imbued with life. There is a vast literature on puppets and they play an important part in ancient traditions of story telling, originally as hidden behind screens, as shadow puppets. At some point, some argue with the advent of realism, the puppet and the puppet master become visible. This example is given for reflecting beyond the current discussion on transparency and visibility in the design of computational artifacts, agents, and robots.

The issue of transparency is also debated in interaction design (Dourish op cit.) for a range of interactive technologies, where the issue is about how far the computation should be transparent to us, and how far it should be invisible. However, this debate may be seen as an evolution of discussions about whether the workings of the automaton (Schaffer op cit.) should be visible or invisible, now applied to the computation, for example of our every day objects such as the fridge in the kitchen, the kettle, the lights in the house, i.e. smart technologies, etc. In contrast, one could say that the Bunraku theatre presents a different idea, where the transparency of the puppet is about the transparency of ourselves in relation to the puppet and through it. Sha's second point about the problem of puzzle solving hindering spontaneous engagement is shared with other projects presented in this chapter, where spontaneity in engagement is a fundamental element of co-presence, of sharing intimacy, of playing together, etc.

T-Garden – Movement Analysis (3 Experiments)

The T-Garden is a concept that emerged out of a dialogue between two labs, FoAM[6] (lead by Maja Kuzmanovic) and Sponge (lead by Sha Xin-Wei). Kuzmanovic and her colleagues at FoAM (Brussels) sought to explore how the movement of the body could write, and this aligned with Sha and his colleagues' interest in the body and world as continuous matter. After the two labs collaborated in designing the initial T-Garden, FoAM went on to produce further evolutions of the concept over the next few years, and one these was with choreographer and dancer Ghislaine Boddington.

The T-Garden is like a black box, where light is projected down onto the floor from the ceiling, and where participants moving in this space wear sensors and clothing that is deliberately outside our normal experience. The clothing is of light and unusual textures, and the designs are playful and exaggerated so that one feels one is wearing a disguise, and can be free to imagine themselves as someone or something else for a while. The T-Garden is described as being a 'responsive environment', as body sensors feedback information about the person's movement and properties in the environment such as energy levels, feeding back sounds into the space, and projecting moving colours and textures from overhead. My interest lay in it being a space in which "people can playfully improvise gestures, and collectively or individually create affective or symbolically charged patterns out of fields of varying light, sound, fabric, or body" (Sha and Gill 2005). In 2004, I collaborated with Xin-Wei to apply the work on Body Moves (Chapter Four) to videos of the activity in the T-Garden to find out whether the dynamics of the Engagement Space, particularly salient rhythms, observed in the col-

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[6] http://fo.am/

laborative sketching activities of architects and between pairs of students, might occur in a T-Garden (Sha et al. op cit. 2005).

"The idea of an *engagement space* or composite body field of engagement allows the spatial, sensory, temporal, and affective dimensions of coordinated activity to become part of a consideration of what is dialogue. Movement and touch are being thought of as part of a continuum, rather than as distinct. Engagement is a variable space as bodies are constantly negotiating and reforming their fields and their degrees of commitment to the situation (relation with the other person(s))" (see Chapter Four, herein).

It seemed a good fit for our philosophical explorations, myself on the tacit dimension of knowledge, and Sha on art and philosophy, and our shared interest in spontaneity, movement, sensory awareness, and fields, albeit from different disciplinary origins. Perhaps unsurprisingly, we found that salient rhythms do occur within the substrate of the combined activity in the T-Garden, indicating particular resonances as body fields move in response to each other and simultaneously. In later discussion with Kuzmanovic (FoAM) she and I realized that mapping Body Moves to the T-Garden made sense given that the origins of former lay in the movement of the body in drawing, and their inspiration for the T-Garden lay in the movement of the body as 'writing'. I will present some examples, (from Sha et al. op cit.) that span how an individual and a group are coupled with the TGarden environment.

As each person enters the TGarden and moves around in the space, they experience sounds and textures of colours and lines moving on the floor, and they may notice that if they move or gesture in a certain way they get a particular response, and they explore what the relationship between their movements to these responses might be. Whilst each person tries to understand their own relationship to this responsive environment, they find that some of these sounds and visual textures are connecting them to each other. The feeling of being connected the environment is due its inbuilt idea of a 'characteristic time' of response. If the characteristic time is too long, the environment begins to feel decoupled from the person and if it is too short the environment responds as a simple discrete series of stimulus-response events. With just the right characteristic time of response, the player imputes a strong sense of *elasticity* to projected, structured light shining on a hard floor, i.e. the player feels that the environment is actually related to them (concurrent). The TGarden is engineered with low latencies to produce computed media that the human perceives as *concurrent* with his or her activity, and interprets the computed response as a *tangible* quality. Concurrency is a crucial aspect of the TGarden's field-based computationally mediated experience as it enables people to become coupled with the room and with one another. In the hop-skip example, this tangible quality derives from the micro-physics of the body intertwined with the synthesized dynamics of the visual texture and the rhythmic sound. Within the concept of the engagement space, touch and movement are connected and form part of a spectrum. The T-Garden seemed to make that connection visible.

Hop-Skip

This example illustrates how the T-Garden environment responds to the movement of the person (via information from sensors) and triggers further spontaneous responsive behaviours, and how the energies of the human and the system feed each other.

In this example, a person is hopping up and down periodically every 8 or 9 beats to sound patterns. The strong beats in the musical textures in this Hop-skip environment elevate the overall excitement in the room. At 3 beats after the third hop, the person leaves their position and begins to hop and skip around over the floor space. During the third hop there is a white flash on the floor (see Figure 2, first picture). Just following the hop, the flash re-emerges and moves across under the feet space and shadow of the person (Figure 2, second picture), after which they begin to hop and skip across the floor (Figure 2, third picture).
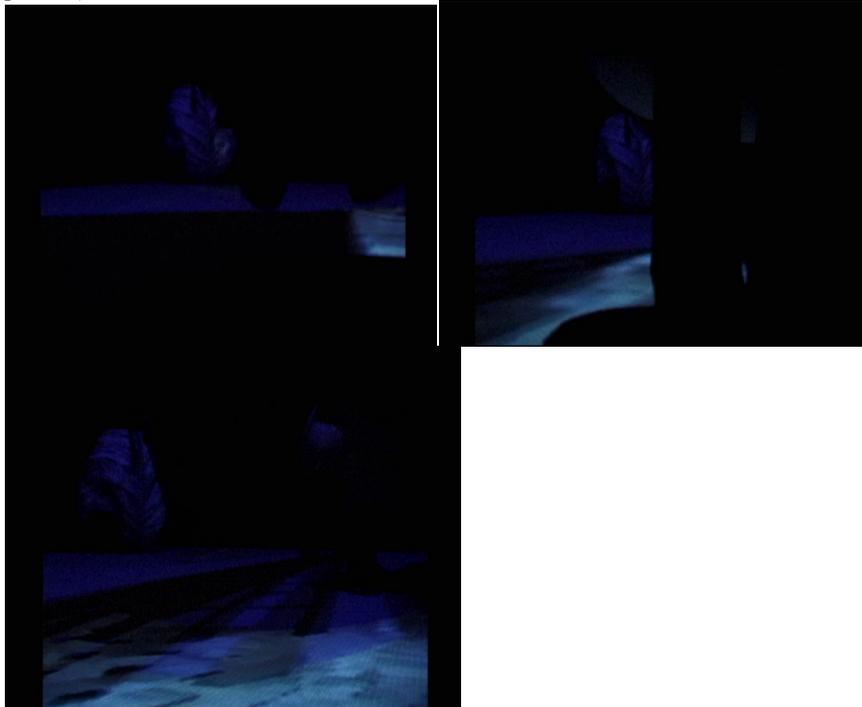
Figure 2. Hop-skip. A person hops, and a white flash emerges, moving under the feet, and the person hops and skips as it moves away.

This responsive change in the environment cues the response of the person hopping. Why does the flash re-emerge? The 3D graphics is filled in with a 'texture map' and this texture of pale light colour is filled by using two rules: a)

it is triggered by the person's hop (using movement sensors), and b) it is interpolated such that its echo, the echo of the person's hop, goes on in the echo of the flash. In other words, the texture map is a continuous function of *both* the internal clock of the machine, *as well as* the rich real-time data from the human body's ongoing physical movement. The responsivity in the T-Garden arises from both software dynamics and body dynamics, the intertwining between simulated physics and material physics or body physics.

Dancers

In this example, 'TGarden V2 dancers', four professional dancers walk into the space and as they find positions for themselves, the textures and colours on the floor move with them and connect together. Once positioned, the dancers being to warm up in an improvised rehearsal, sensuously moving with sounds and colours. The shifting shapes on the floor occasionally and momentarily detach from a dancer who then reaches out and regains contact. As they move in the space the dancers quickly find resonant connections with each other as *an engagement field*, as we see happening in Figure 3, where you can see the textures on the floor linking all the dancers.

Figure 3. Finding connections – dancers discovering how they can connect with each other via the environment.

By the end of their performance, they are fully rhythmically coordinated. This

is enabled through grounding their coordinations with the environment and each other during discovery and improvisation as seen in Figure 3, where two dancers move freely together for a brief moment in rhythmic synchrony.

Figure 3. Swaying together in aligned synchrony (2 min 11 sec) - a simultaneous moment of coordinated rhythmic synchrony.

Slo-mo

This next example, 'Slo-mo', illustrates how the participants' body movement fields can be altered by objects in their environment. About 41 seconds into the action, there is a scene where four dancers converge around the centre of the play space and move with four large balls. As they do so, there is a change in their rhythmic coordination. Their dynamics and tempo shift from a smoothly coordinated rhythm to a seemingly staccato random tempo, affected by their individual movement with the balls and the physical contact between bodies that comes with rolling the balls to each other. The rhythm alters again as they disperse and *their body fields engage* in smoother coordinated autonomous choreographies (Figure 4).

**Figure 4. Slo-mo. Converging on balls – staccato tempo – the objects frag-
ment the flow of movement.**

A core concept for the TGarden is the 'substrate', which is a way of looking

at the entire room as a continuous distribution of, for example, sound, light, fabrics, costumes and bodies, and more abstractly, gestures, and fields of speech or attention. Considering the changes in the distribution over time of fields is a dynamic approach that lends itself to notions such as waves and rhythms. By 'substrate' we mean the union of all these continuous, time-varying distributions.

In this collaborative analysis of the TGarden, Sha and I applied the concept of the body field of engagement (Gill, Kawamori, Katagiri, Shimojima 2000) to the activity of players within this responsive environment. The concept allows for the spatial, sensory, temporal and affective dimensions of coordinated activity to be considered as part of dialogue. In applying it to the TGarden, we extended the idea of the engagement space and body field of engagement from the context of dialogue to include the resonant performance of the environment. This enabled us to consider how players in a TGarden form tacit awareness in overlapping and autonomous space and gauge elements and patterns of connectivity, and through this tacit learning, shape the media space and are concurrently shaped by it.

'Grow your own worlds' - At the interstices of disciplines and worldviews (FoAM)

The second example is of Maja Kuzmanovic who co-founded the FoAM lab in Brussels for fostering the development of art-science projects. FoAM has now become a global network of small 'transdisciplinary labs for speculative culture'. I first learnt of Maja and met her through Sha Xin-Wei, and have been interested by her approach to exploring the conjunction of art and science and society. Over the years, FoAM has offered a free thinking space to people from a range of backgrounds, including artists, scientists, designers, computer scientists, biotechnologists, anthropologists, etc. It has an inclusive approach to involving the public in their work, and holds a regular weekly event on all manner of thought provoking topics. Kuzmanovic's organic approach to developing research around people and technology won her the Young Global Leader award by the World Economic Forum in 2006. Before creating FoAM she worked in mixed reality interfaces and virtual reality and collaborated with technological arts and has a background in design forecasting and interactive media. Her own interests are in story telling, patabotany, integrative medicine, cultural and personal resilience, speculative culture, and technical-social aspects of food and food systems.

The group FoAM describe themselves as a *cultural laboratory*, '*a generalists' community of practice working at the interstices of contrasting disciplines and worldviews*' consisting of people from arts, science, technology, entrepreneurship, cooking, design and gardening. On visiting their lab I found an open yet grounded exploration of fundamental problems and challenges facing our societies and our planet, and their use of technology as part of this exploration for a bal-

anced future life': 'Guided by our motto "grow your own worlds," we study and prototype possible futures, while remaining firmly rooted in cultural traditions. We speculate about the future by modelling it in artistic experiments that allow alternative perspectives to emerge. By conducting these experiments in the public sphere, we invite conversations and participation of people from diverse walks of life.'

This public engagement is core to their identity, opening the lab to the public each week and welcoming people with food they have cooked, and food is itself an exploration as it is what gives life, energy, health, well being; it is culturally diverse, has powerful economics, affects the ecology of our planet, as well as being socially bonding (Kuzmanovic, Engelen, Chipperfield 2009). Amongst the various arts-science groups, FoAM directly questions the current and future state of society, for example, in addressing 'climate chaos', 'rampant consumerism', and xenophobia. It describes itself as,

> 'a haven for people who are unafraid to ask the question: "What If?" and "How could it be otherwise?" Instead of dismissing possible futures because of their improbability, we speculate: What if we see plants as organisational principles for human society? What if lack of fossil fuels turns jet-setting artists into slow cultural pilgrims? What if market capitalism collapsed? By rehearsing for a range of different scenarios, we can cultivate behaviours that make us more resilient to whatever the future holds. This is why we encourage FoAM's activities to explore the breadth of themes and methods – from robotics to permaculture, tinkering to meditation….. FoAM's activities uphold the values of complexity and whole systems thinking, pollinated by the transdisciplinarity of our teams." (

They liken themselves to a mass of bubbles (hence the acronym FoAM), a dynamic entity that can change shape and scale as required: 'a transdisciplinary organisation in the morning, a tightly knit family at lunchtime, a learning facility in the afternoon, a loose bunch of philosophers in the evening and a dedicated designers' collective by night.' Most of FoAM's activities occur in their studios which they describe as being hybrids between laboratories, ateliers and living rooms. The studios are designed to encourage a reciprocal exchange of ideas, techniques and experiences, reflecting the group's integrated approach to dialogue where the structure and aesthetics of the physical space itself is part of the process. As FoAM grows as a global distributed network of small labs, its coherent identity is sustained by Kuzmanovic and co-director Nik Gafney making regular visits to each lab. The labs collaborate with people (individuals and organisations) from many sectors: arts and culture, science and technology, academia, policy, business, and civil society. For example, the T-Garden was inspired by FoAM's interest in exploring body movement as writing in a responsive environment, and after the initial T-Garden development with Sha, they continued to evolve the concept with two further designs, one of which is with the London based choreographer Ghislaine Boddington.

The T-Garden is part of their work on responsive environments, which includes the project on transient realities [TRG] (Time's Up and FoAM 2006), that they describe as an exercise in world building:

"worlds that you could see, hear, touch and be absorbed in. Worlds aware of your caressing, stepping, talking, twisting or simply moving through. The worlds that would engage with you, as animals would – mimicking your actions, translating them into something that made sense to their internal logic. They are worlds where skin-tight clothing and voluminous architectures communicated with abstract creatures in digital landscapes, in an attempt to stretch your perception of reality. Questioning your certainty of what is commonly understood as 'real'…. For something to be considered real, a continuum of space and time is implied." What they find is that mixed reality is a fragmented field that lacks its own continuum, so a challenge is to create such a continuum to pass seamlessly through it. But their focus is not on the technology, but on the impact of mixed realities at the scale of cities and eco-systems, on 'our urban and biological habitats'. They think aloud about 'origami-like foldable houses for nomadic youth. Buildings with walls acting as cellular membranes. Zoo-morphic subways to make Calabu and Yau smile. Such visions continue to entice us from the periphery and will certainly become a part of our future endeavours.' (Time's Up and FoAM op cit. p.020)

FoAM seeks to balance art, spirituality, and science, and has a pragmatic character. For example, in their work on *prehearsing* the future, they state there is nothing wrong with representation – "if we had to learn everything we know through direct experience it would take many lifetimes. However, there are some things that remain ungraspable unless we experience them with our own skin. One of these things is the present moment, beginning its life as an unknowable future. We can try to predict or calculate how we may experience a certain moment, but when it arrives it often differs from our expectations. … in mindfulness[2] and other meditative practices we learn that our experience of the present moment is largely coloured by our attitudes, grounded in the past and influenced by speculations about the future. We can practice to let go of the past (as we can't change it any-way), but the future is a different thing: we can influence what happens next."

Members of FoAM reflect on how hard it is to say in a nutshell what they are as they will alter their description depending on whom they are speaking with. Yet on meeting them, I came away with a clear identity of people who believe that things can be changed for a better life and a better world and that this can be achieved in collaboration with the various sectors in society and by keeping the dialogue open.

In between – 'Energy at the edge of art and science'

 "Once an artist takes on the challenge of making the invisible visible, or the inaudible audible, he/she is almost immediately thrown into the realm of energy at the edge of art and science. The established art world based on visual culture finds it difficult to place this kind of work. The scientific community, used to working in this realm in a reductionist way, finds it hard to comprehend. Yet, the public seems to be drawn to artwork residing "in between," and there seems to be a universal need for a connection to the spiritual realm beyond what established religions offer." Victoria Vesna – Artist (2012)

Victoria Vesna is a creative media artist and Professor at UCLA's department of Design|Media Arts and Director of the Art|Sci Centre at the School of the Arts and California Nanosystems Institute. I met Victoria via her work with the AI&Society Journal, of which she is the North American Editor, and find her a creative artist who has a way of exploring issues around technology and society that touch fundamental human experience, such as time, stillness, reflection, well being, beauty. Her projects are art, yet they are also science.

Over the years she has collaborated with scientists from across the spectrum (Physics, Nanotechnology, Biology, Chemistry, Ornithology), and they include Stephen Hawkins. Her work with media (e.g. on concepts of data, virtual, real, body) has focused on interactive artworks that immerse the audience in experiencing the science and the ideas behind a technology, be it an installation, a networked event, or a participatory event. For example in her project NANO, participants can feel what it is like to manipulate atoms one by one and experience nanoscale structures through art-making activities. Vesna describes herself as creating experimental creative research that *resides between* disciplines and technologies. With her installations she explores how communication technologies affect collective behavior and how perceptions of identity shift in relation to scientific innovation, for example, in the projects 'Celullar Trans_actions' and 'n O time network screen saver':

n 0 time is the amount of time that none of us have. n 0 time always grows, especially in a new world of globalized network communication, in which time zones become meaningless and the most important asset is no longer time, but attention. The n 0 time screen saver runs on an idle computer, constantly contributing that computer's amount of wasted time to a central n 0 time database. Screen-saving participants contribute their own n 0 time to either their very own n 0 time bodies, or those of other people. This is called "n 0 time-sharing." The longer you are away from your computer the denser the n 0 time body grows. When a noTime body implodes, all participants are notified by the imploading screen saver via email.

"Cellular Trans_Actions" performance / talk focuses on issues of real time, physical space interruptions, and the performative aspects of everyday life. With no social protocols established, the constant sounds of interruptions by cell phone use in public spaces have become a daily collective performance. Vesna creates a "ready made" performance by audience members by asking them to leave their cell phones on and feel free to make calls if they feel compelled to communicate with someone at any moment during the talk. They are also given phone numbers of other audience members to break the usual communication in public spaces. The conversations are streamed live to the net and archived. Much is left to chance, depending on the location and the number of audience members who have their phones on.

In her collaboration on 'the realm of energy at the edge of art and science', Vesna and nanoscientist James Gimzewski investigate ideas around the relationship between energy and matter, particularly between body and mind, with their projects on the sounds of bacterial cells (Vesna op cit.) and their Blue Morph installation at the Integratron. The following illustrates their dialogue process and

Vesna's approach to allowing a project to unfold without pre-determining it or its outcome. Their collaboration also illustrates how a dialogue between science and art can lead to discoveries that are both scientific and artistic. In 2002, at the Pico Lab in UCLA, Gimzewski and then PhD student Andrew Pelling discovered that yeast cells oscillate at the nanoscale. Vesna describes how Gimzewski was excited by the initial results and eager to share the data with her but he knew she would not be able to understand the importance by simply looking at their graph:

> "Knowing that Pelling was also interested in music, he asked him to output the data into sound files instead and sent me the audio file of live cell vibrations. This was definitely exciting, and through this sound, I could instantly see the importance of this finding. Soon after I asked whether he would "compose" sounds from the yeast cells, and Gimzewski experimented as Pollock would, by throwing scotch on the yeast cells and recording the sound of cell death. I used these sounds in a piece that I called "Cell Ghosts" (Vesna 2004) and Pelling collaborated with Anne Niemetz on a piece called "Dark Side of the Cell" (Niemetz and Pelling 2004), also inspired by these sounds. Not only art was created from this event, but an article on "screaming cells" came out in journal *Nature* (Zandonella 2003), and a scientific paper was produced in which Gimzewski coined a new word for this kind of data amplification of vibrations within a human audible range for research and analysis: "Sonocytology" (Pelling et al. 2004)."

The tool with which the cell sounds are extracted is the atomic force microscope (AFM), and Vesna proposes that this could be regarded as a new type of musical instrument. She compares the AFM to a record and a needle that moves across the surface grooves to produce sound—the AFM ''touches'' a cell with its small tip. The AFM ''feels'' oscillations taking place at the membrane of a cell and these electrical signals are converted, amplified and distributed by speakers.

The Blue Morph installation is inspired by the sounds of rhythm and silence of the wings of a Blue Morpho butterfly as it develops and emerges from its chrysallis, and the work explores metamorphosis as a spiritual idea. Nanotechnology is changing our perception of life and for Vesna this is symbolic in the Blue Morpho butterfly who's beautiful blue color is not pigment but patterns and structure which is what nano-photonics is centered on studying. Blue Morpho has intrigued scientists for generations because of its subtle optical engineering that manipulated photons. The real surprise of her collaboration with the nanoscientists is in the discovery of the way cellular change takes place in a butterfly, the sounds of metamorphosis. These sounds are not gradual, rather the cellular transformation happens in sudden surges that are broken up with stillness and silence. Then there are the eight pumps or "hearts" that remain constant throughout the changes, pumping the rhythm in the background. During the transformation to emergence each flattened cell of the wing becomes a nanophotonic structure of black protein and space leading to iridescence.

The process of how the project evolved through the connections between people and ideas, and the details that technologies made visible, is beautifully described in Vesna (2012) and summarized here. In short, the work on the yeast cell

lead to Grimzewski being approached by a specialist on Butterflies to record the metamorphosis to see what sounds would emerge, and was sent some chrysalis. He did so and sent the recordings to Vesna for ideas on creating a piece from them. In seeing and hearing the metamorphosis, they came to realise that the change is not gradual but 'is a series of intense bursts of energy with a rest period that vibrates in anticipation. (Pelling et al 2009)". Vesna reflects on how we think about butterflies, for example, 'feeling butterflies in the stomach', and the 'butterfly effect' first proposed by Ray Bradbury in his science fiction "A Sound of Thunder", and later expressed by the meteorologist Lorenz as 'does the flap of a butterfly's wings in Brazil set off a tornado in Texas?" She traces our historical relation to butterflies, depicted in 3,500 year old Egyptian hieroglyphics, and the Greek word for butterfly meaning 'soul and/or mind'. The butterfly has signified beauty and 'brought many to ponder the wonder of change and the power of nature'. Vesna believes it is this 'archetypal instinct that moved [her, Pelling, and Grimzewski] to consider this ephemeral and beautiful insect'.

Whilst she was working on these projects with the nanoscientists, Vesna was also intrigued by the symbolic and historical value of a building called the Integratron, a 38-foot-high, 55-foot-diameter, nonmetallic structure designed by Van Tassel as a rejuvenation and time machine (The Integratron 2009)]. It is located near the Great Rock in California which holds spiritual powers for the Native American Indian. George Van Tassel's Integratron is based on the design of Moses' Tabernacle, the writings of Nikola Tesla, and telepathic design directions that he claims he received from extraterrestrials during meditation. This 16 sided wooden rejuvenation and time machine was conceived and built during a period of interest in 'vibrations, electromagnetic fields and the invisible' realm, an ongoing interest recently re-inspired by a discovery by Japanese scientists that electricity can pass through air[7]. The Integratron was recently re-opened after 2 decades of renovation, and the website about it describes it as the 'fusion of art, science, and magic'.[8]

Vesna felt that the Integratron would be the ideal space for the Blue Morph installation. As both Vesna and Gimzewski are practitioners of Kindalini Yoga, they discussed how to create an environment where people interact by keeping still and/or moving from their centre. They decided to use meteorological balloons as turbans, a jest that became the Alice in Wonderland's 'mad hatter' of the project. People would come and sit in the centre and take turns at wearing this turban whilst experiencing the rhythmic sound of the cellular transformation of the Blue Morpho butterfly's metamorphosis. At the Integraton, the audience brought their own perceptions and interpretations which Vesna and the team allowed to guide them on how to evolve the interaction. What took them by surprise was the ritualistic way people engaged, 'seeing the installation as a place to release… their inner urge for transformation and metamorphosis'. Vesna describes how the audience is the performer when in the centre and the witness when observing others,

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[7]

[8] http://integratron.com/

and 'the artist (herself) and the scientist are on the sidelines.' She describes this as neither art nor science, nor theatre or reality, 'but a scene that is open to interpretation and allows for individualized ritual to take place'.

The experience opened up a new direction for the next phase of Vesna's work with Gimzewski, to look into our neuronal vibrations with our environment, and the rhythm of oscillations in the brain that give rise to consciousness, and how failures in rhythms give rise to brain disorders.

These examples illustrate how art, science and technology can come together and open unexpected investigations about their purposes and function, and how to engage the public in interpreting what these purposes and function might be. Neither is the outcome pre-defined, nor the process pre-determined. The creation, experience, and realisation of the artworks involve the personal act of knowing.

Betweeness – 'Witnessing You: Trust and truth in a networked world'

Caroline Nevejan is a deep thinker on digital culture, which she has pioneered since the 1980s. She has been driving the debates around issues of the networked society in the Netherlands through the Paradiso and the WAAG Society in Amsterdam, which she co-founded in 1994 as the Society for Old and New Media. Today, the WAAG has become an independent media lab and a knowledge center with a specific interest in the future of the public domain. She was part of the Doors of Perception network and worked on education and learning research. Over the years she has conducted numerous experiments around distributed performances and networked events. During the last decade she has focused on presence and the design of trust and is now Associate Professor with the Participatory Systems Initiative at the Technical University of Delft.

I had the pleasure of meeting Caroline in Edinburgh in 2003, at a European project proposal meeting on the theme of Presence. We found much in common, and continued a dialogue that eventually led to us working together in 2010 on a journal issue for AI&Society on Witnessed Presence. In reflecting with her on the relationship between rhythm and witnessed presence, we find that witnessed presence necessarily has a rhythmic quality.

In her work on Presence and the Design of Trust (Nevejan 2007), Nevejan has reframed Presence research with her analysis and discussion on what we mean by being present when face to face and when in distributed settings in terms of witnessing and being witnessed. I first saw her present her YUTPA framework in Edinburgh, an acronym for "being with You in Unity of Time, Place and Action". It depicts how four dimensions of *time, place, action* and *relation* have different values between You and not–You, Now and not–Now, Here and not–Here, Do and not–Do (see Fig 7).
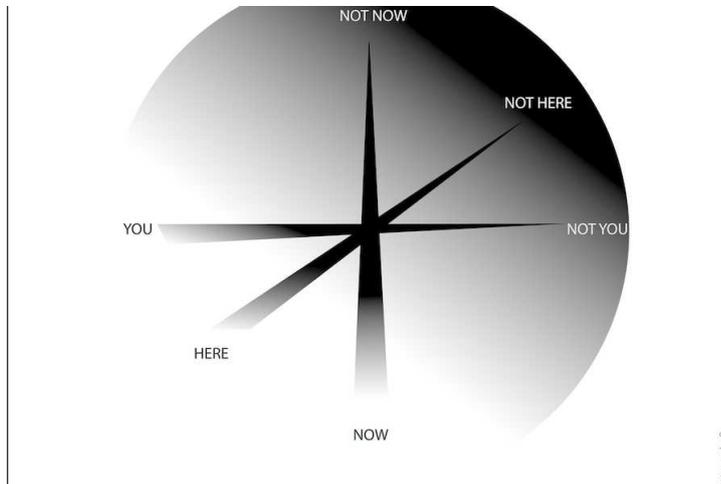
- The You/not-You dimension refers to the relationship with the other human being(s) with whom one interacts.
- The Now/not-Now dimension refers to the sharing of the experience of time, synchronous or asynchronous in past or future.
- The Here/not-Here dimension encompasses the sharing of place or not. Depending on how place is defined or experienced this can be geographically small or large, it can also refer to the sense of distance in virtual and online worlds.
- The Do/not-Do dimension refers to the possibility to act as part of or as a result of a social interaction.

The framework posits that trust requires both witnessing and being witnessed, how we do this differs according to the degree of distance one has from the presence of others in 'natural' and in mediated presence via various forms of technology. Critically, the presence of others influences how we 'orchestrate' our own presence. Mediated presence is partial and differs from the whole 'natural' presence that uses all the senses and cognitive and emotional structures in Real Life. We are able to accept the partial presence of another person(s) by balancing the four dimensions (time, space, action, relation) through attribution, synchronization, and adaptation to the partial presence. Differences in time and space, and in how we relate and what possible actions we can take, affect the trade-offs we make for presence and trust. For Nevejan, the distinction between You and not–You, founded in Buber's *I-Thou*, is fundamental to whether we consider mediated communication as mere 'information' or as communication with someone whom we are in a relationship with. "The specific configuration of time, space, action and relation in a certain product or process, in which natural presence, mediated presence and witnessed presence all play a role, enables certain forms of trust and truth to be established while excluding others." I have found Nevejan's concept of

witnessed presence to be helpful for understanding how ethics in communication is changing with distributed settings in comparison to how in face to face culture, we have checks on politeness, a subject of much work in Linguistics (see Brown and Levinson). We need to consider the nature of witnessing in online interactions, in addition to the discussions on how forms of representation create impolite behavior (such as awareness of how the written word can cause 'flaming' in the online world) and how we project our self onto a virtual environment.

In 2012 she co-lead a European EIT ICT Labs research program on 'Mediating presence' with architect Charlie Gullstrom. This was a cross disciplinary and cross cultural collaboration between Delft University of Technology, KTH Royal Institute of Technology in Stockholm and Lulea University in Sweden. It involved philosophers, artists, designers, computer scientists, architects, crafts designers (e.g. of glass), and social scientists. It was innovative in dealing with both fundamental issues around mediated presence and creating designs for it, simultaneously, in an evolving dialogue. As part of this process, Nevejan designed the collaborative research platform www.being-here.net which extends the concept of a website and what it means to share information and make connections between ideas; in their participation with reflections and ideas, they are responding to a key question, 'what happens when one is witness to the other?'

As part of the being-here research, Nevejan has been working together with 13 artists (Nevejan 2012) to explore today's footprint on the future. The artistic research explores new values for the (meta) design of participatory systems in which people accept responsibility for their words and deeds and negotiate trust and truth in a networked world. The questions they ask are: How are trust and truth established in the emerging network society? How do the stories we exchange become part of the experiences we share? Are we in touch with each other, do we witness each other, when time and place are not shared? Witnessing is acquiring new dynamics. Networks are like mirrors to the self and fuel imagination. Love and passion drive engagement. However, engagement in merging realities challenges human dignities to the core. www.being-here.net.

The artists' works are an expression of their personal act of knowing which can give insights that scientific methods may not. One of these artists, Anna Carlgren, works with glass, and in her project on 'Looking Glass' she explores how by changing the materiality of glass we can change how we 'look' with it and witness. Angelo Vermeulen creates installations to investigates co-creation and symbiosis between technology, biology, and the social. Karen Lancel explores how public and private space is experienced, and is investigating how the body is the interface of trust.

Example. Intimate Strangers

One of the artists collaborating with Nevejan, Martin Butler, is a performance artist bridging a variety of disciplines. Between film, dance, theatre and visual arts,

he explores the new dramatic that information and communication technologies faciliate. His work "Intimate Strangers" (2012) asks, 'How do you create intimacy with strangers? How do you take responsibility for people you don't know? What happens when one person witnesses another? What happens when you witness another? How do you deal with strangers?' He explores these questions through various scenarios – for example, in this project he asks strangers how they deal with strangers. Martin asks 100 people, 50 whom he knows in some way and 50 whom he does not know, two questions:

When would you trust a stranger?
How would you make a stranger trust you?
All 100 people replied to his query and he presents some of their answers:

- Person 1. When I can look him/her in the eyes.. or can read in between his/her lines; When he/she looks me in the eyes, Or when he/she can read in between my lines.
- Person 2. Most of the time. Trust is the base for communication. Trust is always a better first choice. So I trust people from the strat… and hope the trust will endure throughout the time.; By trusting the stranger.
- Person 4. Well, it depends on what kind of feeling that person gives me during the first meeting/conversation. Body language, use of words, tone of voice, questions etc. etc. ; Just to be myself and to have no alternative motives.
- Person 25. I think everything is in the feeling that I get from that person, the eyes, the smile, the face, what I feel inside… Do I feel good, do I feel repulsion; I will generally trust my feelings, my perceptions. It doesn't have to do with the way the person looks, but more with how I feel when standing in front of him/her.
- Just being myself completely; I don't have to play games, I'm a trustable person. If the other person cannot feel it, too bad!

It is a very interesting exercise to do, and you might like to try this yourselves. One factor that seems to run throughout them is that in order to make the other person trust me I need to be authentic, i.e. true to who I am. Likewise in how we trust someone else, are they being honest, truthful, have ulterior motives?

The future body and tele-intuition (Body-Data)

Ghislaine Boddington's work (Boddington 2012) on telepresence posits the full body as its locus. She explores and questions what happens to somatic knowledge, and thereby our identity, in tele-present interaction with virtual worlds and gaming environments. In the near future younger generations will be working and playing daily in virtual worlds and be communicating extensively with colleagues via telematics and forming new intuitions, that she calls 'tele-intuitions'. Boddington

founded the body>data>space in London, which engages the public in what these changes implicate through participatory performances and installations. By engaging the public she seeks to tap into these emerging tele-intuitions and enable these to be creatively used. She approaches this work from her background as a dancer and choreographer. I first met Boddington via ResCen in 2005, a leading performance arts group in the UK based at Middlesex University, and was interested to find a dancer and choreographer working with technology to explore the limits and possibilities of human connection. In 'Woven Bodies, Woven Cultures' (op cit.) she reflects that "*In terms of the discussions, experiences and writings in the last 15 years re-occurring words such as spiritual, magic, embracing, out of body, extended, disembodied, re-embodiment, transcendence, transformation, shared consciousness all come to mind.*"

At body>data>space, she has been discussing these re-occurring ideas and emerging tele-intuitions with her research group to discuss the multi-identity mode of modern living, of existing in the real and the virtual in many forms, and how it is gradually dissolving boundaries between the real and the virtual. With the evolution of mass interaction on the web through social networks and virtual environments, the opportunity (with web access) to re-present oneself in avatar form in virtual environments today has exploded. With the ease of using online avatar making tools "we have moved into a generation of easy representation of the multiple self through virtual bodies, thereby expanding ourselves into many selves."

She proposes that we recognise and start to engage with the topical and complex issue of the new reflectivity of ourselves on ourselves through the use of the virtual reality, and ultimately our abilities to deal with 'the other' within the virtual, and this means understanding 'identity'. She asks, "How does the telematic 'you' expand and enhance the real 'you'? How do our avatars in the virtual realm reflect on ourselves? What do they teach us about ourselves and how can we use that knowledge to extend our understanding of others?" She reflects on the word avatar being a Sanskrit word, implying re-incarnation. In Hindu philosophy, an avatar (also spelled as avatara) (Sanskrit: avatãra), most commonly refers to the incarnation (bodily manifestation) of a higher being (deva), or the Supreme Being (God) onto planet Earth. The Sanskrit word avatãra literally means 'descent' (avatarati) and usually implies a deliberate descent into lower realms of existence for special purposes.

As with avatar creation, "performative telematics (where you re-present your real self as streamed video data) deals us all with a complex identity card. How have we used this and what has it bought to us all? Travelling through personal space, working with community in distant space and being globally aware at the same time is an intricate place for the body/mind to inhabit and to orientate itself within. Your baseline somatic knowledge knows that you are encapsulating a new you, even though it is you."

She asked her research group, 'What was it like for you in your first experiences in telematic space? What were your feelings and thoughts? Does it still feel the same for you now?' Their responses revealed that telematic experience has

shifted the way we exist in the real world today, the way we make relationships and the way we understand the concept of 'presence'.

She gives an example of telematics experience, where young Portuguese artists treat the projection screens in different locations as transparent walls of an unknown fluid, through which they could transport themselves from one space to another. This is in contrast to treating the projection screens as separate image canvases that need to be mixed to enable interaction. In both aesthetics and intent, a very special set of work emerged where they passed objects and gestures through virtual space to each other in a fluid and watery way. This illustrates the physical experience of the body and its reliance on what she calls 'the interface of the mind' and kinetic responses.

Many of the artists whom Boddington has researched see the full bodied telematic space as having the potential to allow a wider representational say in the debates of today's world. To make full use of 'the strong emergent dynamic of a porous network of highly active clusters of interaction is essential to the ways of being in the 21st century', and she believes that making this a full bodied physical interface could make a key difference in the world.

Speedier data transfer is allowing more and more people to use video as well as text and voice, from home web cams to office environments, yet this is not often approached through the use of the full body. On the projection of the self onto the virtual, she cites the choreographer Yacov Sharir who works in live performance with virtual avatars that react to his movements within the performance space. Wearable devices used on his performers allow them to generate cyber human counter-parts in real time. These are projected around the performers, creating what he describes as being 'an environment of mutual co-existence'. 'Following many years of this shared performance space, experience, and practice with several computerised cyber human characters, I have continually been experiencing/noticing the presence of a shared energy field in performance much similar to the energy shared between two physical human bodies as they interact in traditional dance partnering work, and as practiced in dance contact improvisation principles. Like in Contact Improvisation, the success of such physical, virtual and spiritual interaction 'necessitates mutual support and trust' (Joe Edelman), which is to say that there are many levels by which we are interacting over and beyond the range of our ability, experience, inhibition and electronic connection.' (Yacov Sharir speaking about the Second Life Internet-based virtual world).

Second life was launched in 2003 to enable its 'users', called Residents, to interact with each other through moving avatars, providing a social network service combined with general aspects of a 'metaverse'. Residents can explore, meet other Residents, socialise, participate in individual and group activities, create and trade items (virtual property) and services from one another. This is a *user-defined world* where the characters created by people 'teleport' from location to location to meet each other and interact. Dance is a large part of this world with many objects to touch enabling your avatar to dance in multiple ways. Boddington describes her first few hours in Second Life as exhausting: 'I hit a dance-enabling

object, had a wild time, but did not know how to stop dancing! I emerged feeling I had been clubbing for hours. The physical effect on my real body of the virtual dance of my avatar body stunned me.' Her experience was shared by choreographer Cosmin Manulescu: 'I felt very strange looking to my body flying over virtual spaces. Later somebody taught me how my body can also 'dance' with other virtual bodies. I started to experience different types of dance such as salsa, tango, hip-hop (...) I was dancing and looking at my own body moving at the same time. I had very different sensations from dancing on real stage and in real life. But still it is a powerful sensation. It was real because I knew somebody else was there together with me, we were chatting, exchanging words about the experience. It was unreal because I was just alone in front of my computer.' (Cosmin Manulescu)

Boddington believes that as the flow between real life and the virtual is dissolving in 'hyper existence', the key to full and reciprocal interconnectedness is that it is a full bodied and creative experience. She believes that the role of the artist is to ensure creativity is enabled in these environments. 'And yet what happens when your avatar can make its own avatar (...) or when one has a real space encounter with ones own avatars?'

Boddington's work throws up questions about what is reciprocity, and as we evolve tele-intuitions are we as artists and researchers clear on what is actually changing? How do we gauge this? In 'excited atoms' (Boddington 2010) she presents findings from a questionnaire from artists around the globe working on telematics, and there are mixed views with some disillusioned about telepresence being able to overcome distributed space and consider it to be failing in real interconnectedness. Boddington's approach is pragmatic, reflective, and positive, that we need to improve things and support the social, creative, and intuitive dimension of our ways of connecting with others, and that the wholeness of bodily connectivity is central to this goal.

Faraway – intimacy

I first came across the Faraway project by Kristina Andersen and her colleagues at their presentation of it at a V2 event in Rotterdam in 2004. It has remained in my thoughts as their work touches fundamental issues of how we can sense how we are relating with someone else.

Kristina Andersen is based at STEIM (Studio for Electro-Instrumental Music), in Amsterdam. She works with electronics and reclaimed materials to create unusual devices and experience, whilst exploring how we can allow each other to imagine our possible (technological) futures through the making of exploratory objects. I find her approach refreshing, as she begins by asking what the purpose of an artefact might be, and that it must be intuitive, magical. She sees making objects as a method of both thinking about and imagining ideas, teasing out the new and unexpected from the everyday and the mundane. The results are experimental prototypes of "technological matter" that is understood through physical and tac-

tile interaction with the object itself, hence working with ideas is a process of be-coming.

This is illustrated well in the project Faraway (Andersen, Jacobs, Polazzi 2002) which explores intimacy in communication, in particular emotional close-ness and physical distance. Andersen and her team's aim was to identify new di-rections and ways of thinking for the design of physical interactive applications that increase our sense of presence of people we love but are separated from by distance. They believe that the objective of mediated communication is to *feel each other's presence*. Telecommunications is used by loved ones to 'express a wish to be together' more than for any actual exchange of verbal content.

The team describe the focus of Faraway to be on 'high meaning and low bandwidth', and by low bandwidth they seem to mean the degree of complex in-formation being represented. The project is not focused around creating design products but rather on defining a design space and design methodology for devel-oping applications for distant communication applications. The team are three core questions: How do people communicate with their loved ones? How can this communication be improved? What can interaction design do to increase the per-ception of distance in affectionate relationships? They investigate: a) how can we sense the presence of someone in an object?; b) In distance communication, body messages are lost. Is it possible to use them as substitutes, surrogates or placebo for physical presence?

Andersen et al. draw on Shannon and Weaver's (1949) model of transmis-sion of information, Umberto Eco's (1976) and Jakobsens' (1960) semiotics, to consider the intersection between technical choices and meaning creation, and this is their definition of interaction design. Their approach to the problem is to substi-tute 'me' and 'you' for 'sender' and 'receiver' (Shannon and Weaver's model) and for 'addresser' and 'addressee' (Jakobsen's model). This is an interesting take on these models.

Another core idea is 'emotional space', which is 'exclusive; only two people inhabit it.' Hence their design framework is 'communicating presence in the emo-tional space'. They use 'If-only' games to suspend disbelief and take people be-yond the reality of current communication to imagine new possibilities.

In 2004 I saw their presentation of one of their Faraway project experiments, called Blush. This game was about 'are you my distant one?' Some players were asked to produce messages for a 'Distant One', and others were given these mes-sages and told they came from their loved one. There were eight players. Four were given white smocks and painting materials and asked to imagine they were communicating a 'Distant One' (someone they love or feel close to) by painting gestures on this 'magical medium'. The other four players were asked to wear the-se painted smocks and imagine what their loved one is trying to convey to them. Other experiments included soundscapes and objects. After each experiment, all the players were given questionnaires, which revealed that in general, players who produced messages were happy to express themselves, but players who wore the smocks (and sounds and objects) and received the message had a mixed response,

with half of them questioning the identify of a 'distant one'. For example, in response to the question, 'How did you feel wearing Distant One's express?', one of the players who wore a painted smock replied, 'Good for the first 30 minutes; then I discovered that was not my Distant One.'

Andersen and the team used a 'scientific method' approach in their experiments, yet were able to use the qualities of the method that supported their investigation within a human life experience context. Andersen's approach is to always question what the purpose of an artefact might be, and that whatever we create must work with our natural intuitions. Most importantly, any interface needs to capture our imagination and immediately hold our attention, and a key ingredient is magic. She humourously and seriously says that she tests all her designs on young children, because they will be bored if it is not easy to understand and if you cannot inspire their wonder, then you have failed. This echoes Sha's call for the obvious or the transparent as puzzle solving '*reinscribes only cognitive acts, and a particularly reduced set of such acts at that.*

In between – Tangible digital – radical atoms and materiality

Hiroshi Ishii is director of the MIT Media Lab, and his works, such as Transform[9], conjure up the words, magical, aesthetic, sensory, and organic. Although his projects do not all deal directly with human engagement with others, what interests me is that he explores aspects of our immediate relation with the world and each other in a way which engages the imagination and makes one want to experience. His work is inspired by a problem of how to get beyond the limitations of the computer interface as most of us know it, i.e. a visual interface, and move beyond the keyboard and pen and predefined gesture functions, in order to find ways to seamlessly engage with 'data' and each other. To meet this challenge he reconceives the idea of interface and the digital, not as a screen for a virtual world fronting invisible or visible data, but as tangible bits that we can directly manipulate, and do so together with another person.

In 2012, Hiroshi Ishii and the MIT media lab took things further and proposed that an interface be reconceived as computationally transformed material where dynamic changes in the forms and appearance of materials would be 'as reconfigurable as pixels on a screen' by being 'bidrectionally coupled' with an underlying digital model of 'bits', i.e. dynamic changes in the physical form (materiality) would be reflected in digital states in real time, and vice versa. Such materials could alter their shape, 'conform to constraints' (be manageable and controlled), and 'inform users of their affordances'. The vision is that in human-material interaction, the digital has a physical manifestation allowing us to directly interact with it and manipulate it. Their work, Transform, is an example of this vision called 'radical atoms.'

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[9] http://tangible.media.mit.edu/project/transform/

Transform fuses technology and 'design' transforming still furniture into a dynamic machine driven by a stream of energy and data, and by bringing together the aesthetics of furniture and the aesthetics of motion, it draws our attention to the aesthetics of the complexity of the machine, rather than to the complexity itself. There are over a thousand motors (driving pins) to control with a computer, and this complexity disappears in the beauty of the motion. Kinetic energy of views, capture by a sensory, drives the wave motion represented by the dynamics pins.

The Lab's recent project on telepresence (Leithinger, Follme, Olwal, Ishii, 2014) involves participants either directly touching and pushing down physical pins, or moving their hands and arms over a screen, to drive the movement of objects by manipulating them using the pins or the pins themselves become the object to manipulate, rather than the furniture as in Transform. In order to manipulate objects via movement over a screen, there is a representation of body parts, e.g. the hand and the arm, and this draws on robotics work for manipulating distant objects.

Although Ishii's work does not directly deal with human to human relations, it does explore how our bodies connect via tangible data and can shape the interface and what it means to interface.

Hybrid- the informal

In this last example, I have drawn on architecture, and in particular the work of Cecil Balmond as his ideas about the 'informal' in design bear a relation to how I think about tacit engagement in human life. His idea of the informal is that is it the essential nature of 'structure', a re-examination of space as rhythm, of syncopation, and he speaks of being 'out of phase', and of a dynamic, a movement. The informal moves architecture beyond a conception of structure as reduction and regulation. In applying the informal to design, he reconceives it as 'intervention' which is a 'local forcing move', a 'juxtaposition that stresses rhythm', or 'two or more events mixing to reveal hybrid natures.' There is no hierarchy, only interdependence. This is the 'template' of the Informal.

In his asking about how to find the dynamic in a building, he reflects on patterns and beauty, and finds the 'answer lies in configuration': We are made of patterns, random and regular, physical and emotional, and in probing the archetype of patterns we may find the element of beauty. Beauty may lie in 'processes of engagement and *be more abstract* than the aesthetic of objecthood'. This resonates with my work on the aesthetics of the empathetic knowledge mediator and the aesthetics of being in the flow with another living being. The informal necessarily allows for the emergence of 'structure', as something spontaneous, just as the architects who were sketching together in Chapter Four.

In the informal, there is structural framing in the punctuation of space which is a syncopation rather than the dull metronomic beat of post and beam, again like

human interaction. There is also a layer of ambiguity over structure which makes for richer experience. Balmond's conception of the informal shares much in common with my conception of the tacit in dialogue.

Conclusion

In conclusion, I would like to leave us with some reflections and questions. In Chapter One, I proposed that although technologies may have altered in shape and form, the essential concept of the interface whether invisible, available, or backgrounded, seems to have remained unchanged. The convergence of the arts, performance arts, with science and technology explores how our understanding of science, and our relationship with the world and others can be experienced as aesthetic, emotional, trusting, sensory, and imaginary, but is their use of computation and conception of interface fundamentally different?

Sha's topological media 'is an approach to design, *a way to imagine and think about living in the world,* how to shape experience, a disposition with respect to the world, rather than a methodology or a technology." Kuzmanovic's encouragement to grow your own worlds is creating a community of nodes of practice *working at the interstices of contrasting disciplines*. Vesna opens us to the realization that there is a *realm of energy* at the edge of art and science that draws the public to artwork that resides "inbetween" that is neither art not science, nor theatre or reality, but something *open to interpretation*. Nevejan makes us aware that trust and ethics requires both *witnessing and being witnessed*, where the presence of others influences how we 'orchestrate' our own presence in a *spectrum of closeness (I-You) to distance (I-It)*. Ishii seeks to break free from the limitations of the interface to directly *manipulate data by bodily realizing it* and thereby connect with others via bodily touch and movement.

Dancing with a computationally produced shadow reflects how in seeking to make the interface more 'human' we define this in terms of action. Action becomes computed empirical time. However, transparency and immediacy in natural life do not equate to quantified time. Sha's discussion of 'transparency' and Andersen's reflection on 'immediacy' are not simply about action. We can feel time suspended, we can feel it is slow, or too fast, etc. (Einstein's 'theory of relativity'). Empirical and computational time is not experiential time, and a focus on an action paradigm can lose sight of this. This can affect our own conceptions of our self. For example, dancing with computational shadows that are derived from our movement data and to then think we are learning something about this 'other self' of ours, is to perceive and redefine ourselves according to data abstracted from our *person*, something we need to be careful about.

In a discussion with the psychologist Carl Rogers about whether 'science can lead to truth about man?", Polanyi speaks of how in academia, 'in a very characteristic way, the use of the term "scientific" as an appreciation of what can and

what cannot be done, [is being] applied in a way which is absolutely destructive
… . And if this is at all characteristic of our culture, our culture is in serious dan-
ger'. (ref 1984 op cit. p.173) Whilst some may agree and some disagree, there is
no doubt that this 'scientific' approach will not enable my colleague in Japan (re.
Chapter One) to share what is tacit in dialogue, and will be unable to bridge the re-
lational gap in distributed interaction (Chapter One). In our relations with others,
as with art and performance art, authenticity makes for trust, and truth lies in a
personal act of knowing the authentic is such, experienced and felt in the situation
(as with the players who wore the painted smocks in Andersen's Blush game and
felt that the person was someone they knew or not).

The projects described here do question what matters, and in doing so, they
are creating novel ideas and designs for both what an interface means and whether
it is a relevant concept for the relationship between the digital and the non digital
world, and for how we might engage with and via the digital at a level that allows
us our own personal acts of knowing. They seem to extend ways of doing science
and ways of doing art in a cross cultural dialogue with self reflection and con-
scious awareness of their assumptions. This is a markedly different approach from
the 'scientific' one.

As is often said, technology is here to stay, but focusing on the technology
seems to limit us culturally. What is the relation between mediation and interface?
It has been shown and proposed (Chapter Four) that mediation is not an individu-
al's action (be this a gesture and/or utterance) as a go between of two parties or a
conduit between two nodes, but a collective moment between two or more per-
sons, where one recognizes the other in his/her response. In the collective moment
we 'know how', 'know that' and 'know when' simultaneously. Can an interface
facilitate this? Can a virtual agent or an avatar achieve this with us?

There is a belief that if an interface can facilitate intersubjectivity in human
relations this will solve the problems facing the interface. However, the problem
of intersubjectivity is that we assume and judge others according to our own 'self',
so what if the problem of a difference of opinion or a misunderstanding lies with
our assumption and not with the other? How can we realize our cultural assump-
tions in a distributed setting?

Technologies of data and utility, where a person becomes a user, presume to
represent and provide certainty. Just as the expert loses confidence in doubting
and making judgements with human certainty ('this feels right', 'intuition', 'skill',
'cultural logic') when using a knowledge based system, might we lose our bodily
awareness of grasping and making sense of behavior when interacting with com-
putated representations of behavior, such as the abstraction of gesture and move-
ment from culture?

Tacit engagement involves a structure of mediation, which is a collective
moment that involves being consciously aware of the other from the other's per-
spective and recognizing oneself in that situation simultaneously in a personal act
of knowing. Polanyi said all knowing is the same as that of seeing a problem in a

personal act of knowing. For an interface to mediate, it needs to afford this process of tacit engagement.

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