

I'm Terry Flaxton, Professor of Cinematography and Director of the Centre for Moving Image Research at the University of the West of England. In researching the expanding parameters of the moving image: higher frame rates, higher resolution and higher dynamic range – we realize that our investigations take us to the point where we now recognize that we need to explore the gaze of the viewer as much as the technologies of production of the moving image.

In this panel – Dr Leon Gurevitch from Victoria University of Wellington's School of Design, Charlotte Humpston, from Bath Spa University and myself would like to propose to you that the advent of a technology – say the invention of a locomotive, a silicon chip, a suspension bridge or a sharpened flint can all be thought of as arising within an overall system of proximal development. We will argue that within the behaviour of manipulating its environment, this begins a process of internal and external feedback that in turn will reflect back into human genetic and epigenetic development. Epigenetic in this case means arising from *other than* gene expression. In so doing, the manipulatory gesture gains an internal momentum that create harmonics of behaviour that resonate with the core behaviour in such a way as to develop both higher and lower frequencies of the 'core behaviour' - so that wave functionalities begin in its iterations and its re-iterations. So the intentionality behind the technological gesture then develops as a response to the manipulation of the environment - which in turn manipulates *the manipulator* at higher and higher levels of adaptation.

But not only does technology come in waves, but that these waves – after many millennia - are so ubiquitous, consistent and resonant, that deeper and deeper wave function develops as the central impulse for the human

project – which itself is the object of life wherever it arises. The last is an assertion of course – but we are aware now of the many exoplanets around distant stars - an cognizance of which is the product of our own technological development.

So: I'll speak in detail first about this and on what theories it is based upon – then Charlotte Humpston, long time Production Designer for film and television as well as Artist in her own right, from Bath Spa University - will divulge the nature of the agency of the artist in a digital and velocitised world - not only to highlight how today's artist/thinker/ innovator thinks, but also to examine the anthropology of that behaviour via a piece of auto-ethnography.

Then we'll move to an idea proposed by Dr Leon Gurevitch Deputy Head of School and Senior Lecturer at Victoria University of Wellington's School of Design: "Cognitive Labour, Technology and Waves of Migration in the Global VFX Industry" – the implication within his presentation is that not only do we innovate technology and physically change ourselves but the imperatives of changing technologies actually produces human migrations – and this in itself produces a second reason besides climate change to now begin to produce movements of humanity over the millennia – think of planetary colonization in the future. The centre piece of Leon's talk will be the demonstration of a crowd-sourced, big-data based, migration visualisation that details the routes 13,000 professionals have taken across the world in search of work in the last 25 years.

Then we'll move across to a discussion with you on whether or not our overall proposition has legs.

I heard a planetary scientist talking about flying an instrument through a water plume on Europa, the far-flung moon of Jupiter, to take samples of 'sufficient resolution and dynamic range'. I caught my breath at hearing this phrase because this terminology is familiar to me in my discipline but its use was unfamiliar. I used this phrase to describe the expanding parameters of the moving image as resolution, dynamic range and frame rate – because with the relinquishment of moving image capture by photochemical means, suddenly how we capture the image has increased our capacity many hundreds of times over that afforded by the older dental and sewing machine technologies that underpinned photochemical film. I'll come back to that but the idea of taking measurements of 'sufficient resolution and dynamic range' is itself a game changer. The language of the digital has seeped through into scientific parlance.

This phrase 'sufficient resolution and dynamic range' evokes a detailed length, breadth and width measurement that can render a map of the thing examined in a three dimensionally reproducible manner. If it can be digitized it can be reproduced and manipulated - at least in mathematical terms - to a hyper-real degree.

With motion imaging the phrase refers to a similar thing – except that this refers to a measurement of an image of two dimensions, until that is, the step change on data capture required to produce two dimensions in the realm of Higher Dynamics then produces three dimensions (as we have done with experiment) and so a sense of depth projection then occurs. So in the motion image, 'enough' resolution and dynamic range produce a third data set: depth. The X, Y, Z axes of animation in computer space.

This obviously evokes some ideas that Lev Manovich has been proposing a few years ago, but in this case the word 'animation' should be used in an allegorical sense. The lack of poetry in Manovich's description belies the important truth that when viewed within allegory, we can actually change what we see – in the way that Heisenberg inferred in to observe is to alter – and this results in seeing depth in a higher dynamic range display. It's a form of truth by trigonometry where that study - again in an allegorical sense – can plot the position of a third element from knowing the values of two other elements – and abracadabra, there is an actual manifestation of depth in the mind of the audience from a 2D image.

I'm actually not trying to bamboozle you with this 'kind' of description. The issue is whether or not words - the semantic paradigm, the voice inside and outside your head - can relay to you what we've actually perceived happening on a sensory level. However, what I'm trying to speak about here is to invoke something about the digital as being one of the waves of technology – because each innovative phase: be it optical in the middle ages where glass technology developed; or 'mechanisms' within the enlightenment from Newton's clockwork universe onwards - until McLuhan's understanding in the late analogue, that somehow the medium itself is the thing being said, that somehow, as Shakespeare knew 4 hundred years before, that we are the stuff as dreams are made of – we too are the message, and the message, *and the triage* and in our current "DIGITAL" age, in most especially in the epigenetic redirection of neuron pathways.

But standard language cannot get us past our blindspot – we have to use the language of allegory to become the realisation of the allegory– in the

words of both the Reverend Charles Dobson re-mastered by the Grateful Dead: “The Rounder we go, the faster we get”.

Resolution and dynamic range. Human nature is ephemeral. We come and we go. Looking at the detail of our behaviour may speak about our wider human purpose in terms of the short term, looking at the overall behaviour may tell us about the long term. Its my contention that our inventiveness and material innovations, though as constant as the need to survive, also come in peaks and troughs. We are waves of innovation and we are particles of innovation – you and I know this to be true at least in terms of individual innovation – I’m simply invoking the wave particle duality to bring up the possibility that we together are also the behaviour itself and can combine in behaviour or appear as individuals.

It would seem that the two imperatives compete, to survive and also to innovate or dream, and are so are often in conflict because the need to survive becomes the need to survive well. So I argue for the idea of waves of innovation – waves of *dreaming* and waves of *doing* - to synchronize with the time we’re in – we can obviously survive well, and survive well enough for many so that we now *consume* innovation. Consumption of innovation is now a part of the development of the self such that who I am and who you are is integrally related to the perceived use of technology by one’s own avatar – ones representation not only to others - but to oneself.

If you follow Larry Siedentop in his construction of the development of the individual in ‘Inventing the Individual’ (Penguin), this leads you back to a definition of the pre-city state individual who tended the fire in the half and paid homage to their ancestors, forward through city state allegiances

where the priestly role encompassed many families in allegiance (the dynastic priest) – forward to the development of monasteries in the early and late middle ages, through mercantile capitalism, through dynasties and wars and nation state configurations – through to the enlightenment and now modernist and post-modernist formulations of the western liberal self – and you come to now, where you are looking at me and I am looking at you.

This gaze right now says to each of us: I have rights as an individual and those are either in contention or synchronous with the rights of the whole.... Then that self that seems so solid – after all, are you not Jim or Alice or Sebastian or Susan really - can be seen to be transient and its definition constantly changing.

Though I partially agree that technology enables change in the human biosphere, I believe that that narrative only tells half the story and does not enable a fit for purpose analysis of the world to enable effective political change in a way that reflects unique value and role of the self.

It would seem from observing nature that all long term systems operate through the surging of the factors that contribute to the identity of the functional whole - which is a product of harmonics within a system. Using an acoustic metaphor: if nature keeps doing something for long enough, harmonies develop to accompany the basis of the behaviour. Additional harmonics engender surging, and surging enables modification of the core note. Of course all of this requires a witness, lest the tree fall in the forest and no one hears it.

Right now in my own study of the capture and display of a representation of the world with moving images, how we capture and how we display – and how we see what that process is are so intimately connected such that the resonance back and forth in the lab where we construct this new technology affects what we do and who we are at the same time. We invent something then look in awe at each other at the fact that as we are inventing the form we start to see something we'd never seen before within a two dimensional image. We are either learning to see something we'd not seen before – which is of course transformative – or we are changing both the technology and ourselves at the same time.

As this is happening our conviction is growing that we are about to experience a step-change in the peak of technological inventiveness. For instance, within the capture and display of moving images, as we learn to manipulate and manufacture materials through the production of artificial atoms within an OLED TV, the images we display as well as the material reality they display will have been changed. With new OLED display technology we create and maintain a holder for energy values (an atom). The energy holder is artificial – it's a form of confinement for values of energy of a certain level – and the values themselves do not occur naturally, they are held by the artificial energy container. We have created an artificial atom. Us – we humans did that.

This quantum technology will continue to make itself known in two ways: the resolution of the images we can see and the veracity of the reproduction such that depth will accompany that reproduction without any kind of mediation, such as with polarized glasses. But this is not just happening around the sense of sight – in every research lab I've been into for the last 20 years the human project is furiously trying to work on the

area of synthesizing the behaviour of human senses to materialise those senses such that we can manipulate our own reality in each of the sensory areas. And of course those senses – combined with the common sense, the mind – all of those contribute to the idea of a sensorium experiencing a ‘reality’. Which has one of several possibilities:

The way we speak about these developments uses a language which owes allegiance to the concept of progress - thus the project is within the Western materialist imperative of a better life for all, providing of course *that there's a much better life for the few in their gated communities and future hill forts to repel the disenfranchised.*

Others still speak of technicity, digital fluidity, and lately cognitive capitalism is a nod to a combining of the neuro-scientific and the Marxist analysis. Other predecessors – John Berger for instance - talked about ways of seeing and others yet still, talked about The Varieties of Religious Experience **William James (his book was subtitled ‘A Study in Human Nature’)**, other predecessors talked about the human condition as the laboratory for technological change. We were both the seer and the seen, the experiencer of epiphanies and the epiphany itself. Yet most of the above is posited within a materialist framework. *That* the wall is solid, *that* heat dissipates in a cold environment, *that* water turns to ice in that cold.

The framework of materialist ideology and its deeper studies, cognitive neuroscience, biology, chemistry, anthropology etc, argue that two million years ago we came down from the trees - we then learnt to stand, walk then run, to flex our thumbs and index fingers in new ways; that we learnt to create flints in the form of axes and knives, to skin animals and eat meat, farm artichokes and aubergines & generally enjoy a bottle of wine.

Cognitive Neuroscientists rationalize that all sentient creatures create a picture in the head of their surroundings, rapidly rehearse a series of outcomes, then execute their behaviour in an imagined fraction of a second – and then physically do what they imagined doing modified by the reality of the situation. In this we're very similar to all other animals. Looking closer via the microscope of Cognitive Neuro-scientific ideology – and here I refer to the work of Merlin Donald in the *Origins of the Modern Mind* and Iain McGilchrist in the *Master and His Emissary* -

Within this narrative, Cognitive Neuro-Scientists argue that mammals and possibly all animate creatures, have within their minds a precise internal map of their immediate environment; that each creature can only maneuver within their world by first imaginatively representing their intentions in that world as a rehearsal for action.

It is claimed that within our initial communications we mimed our intent to each other, which enabled us to get past the episodic memory boundary that animals experience. Episodic memory is what it says on the tin. A memory exists within an episode and then is forgotten. An Episode plays itself out through a variety of 'scripts': There's a predator so I'll run. There's food so I'll eat - and so on. When the episode is over the memory drifts away – but the scripts remain for the next episode.

With mimetic behaviour we gained a distinct advantage in the control of animals and our environment because our mimetic behaviour enabled us to go past the boundaries of episodes and so develop long term scripts for living. This was the Mimetic Age, the first of the four ages of change we

were to generate. Then along came a development called the Mythic age and by 500,000 years ago we had learned to make prosodic sounds, pre-word humming and singing which intimated meaning and accompanied mimetic behaviour. Then we learnt to create staccato shortened sounds which eventually turned in-to-mean-ning-ful-words. In the Mythic age we eventually started to tell stories and create myths, and also remembered what was important about our behaviour. Oral storytelling of myths created even longer 'scripts' that transcended the limitations of mimetic behaviour - We therefore started 'banking' our advantage as a sentient being.

Together with standing up, creating flints, learning to mimetically communicate, 'prosody' was one of our important developing technologies. By 70000 years ago we had mythologized reality sufficiently to imagine a different set of possibilities and entered into the cognitive revolution and eventually discovered farming – some recent reports arguing this to be about 25,000 years ago which also induced new technological concepts and imagined realities and by 10,000 years ago at the beginning of the third age, the Theoretic age, we had uttered enough staccato sounds and refined them to such a degree into words that we then developed the urge to inscribe them on stone and then papyrus – and effectively write our behaviour into our physical environment.

All the while we were engaged in behaviours that located memory in the surrounding world – body painting and dance, pantomime gesture, carving into wood and stone, fetishizing things and places - all to evoke ritualized memory that maintained our survival status. We were busy exporting memories into exograms – coded referents that unlocked the

recall of memories. Our materialist colleagues argue that this was a 2 million year project to place our knowledge into the material environment.

When writing came along we had already constructed and built memory systems such as the pyramids and stonehenge and with writing came more efficient storage function in codices and books and instruments that charted our passage around the earth. The entire human project of placing not only memory, but now our entire knowledge base has been further aided now by the invention of advanced computational systems that further accelerate and encode our knowledge outside of ourselves and it is perhaps ironic that the instrumentalisation of knowledge reaches its apogee when the entirety of information is now placed in what academia has long regarded as a completely immaterial form: That of data. **Reveal: The Velocitised Age – The Fourth Age - The Age of Data**

Fortunately academia is getting over thinking data immaterial by recognising that server farms that melt the planets ice and destroy its ecology now supersedes the worlds air industry in producing global pollution and therefore global warming.

I use the word velocitisation to denote that the developing rapidity of technological change requires a higher level of epigenetically encoded agility than the frontal lobe system - to cope with the increased waves of technological change. Materialist colleagues will be happy to reside in frontal lobe analysis. Anyone who has experienced a hallucinogen, will not.

So let's talk about velocitisation: You're on the freeway and comfortable with 85 miles per hour. You come to the off-ramp and need to get down to

30 miles per hour - fast. That takes adjustment – just as much as if you enter the onramp from the urban road system and get into a high speed flow of traffic. This behaviour has previously been frontal lobe based which relies on input of data supplied by the senses in the normal neuron flow of information developed over 2 million years to get *from branch swinging*, through running at 23 miles per hour and then jumping into an 80 mph car. But Test Pilots have learned to function with velocitized use of their mid-brain agility, to engage in ‘calmness’ at high velocities to increase their adaptation to rapidity. We the public now have to learn the same thing.

In the increasing speeds of the data freeway, you put your foot down and surf the highway and with the increase of acceleration and the repetition of this behaviour epigenetically modifies your physiognomy to give you a post-frontal lobe comprehension of the world. No more analogue systems failure which as Illych tells us have a systemic 50 % failure rate encoded into their **‘try-this-and-if-it-fails-repeat-with-minor-changes’** behaviour.

So what you might muse upon now – within the theoretic age, with a theoretic mind, is that we are within a new ‘Prosody’ – allegorically speaking. It’s a step change on the semantic paradigm which still uses the linguistic base we are familiar with in much the same way that prosody used the mimetic base and the mythic overlay to sing-song it's way to staccato word units. Now we utilise in that same scaffolded way the sing-song behaviours of velocitisation where we transcend the linguistic frontal lobes of the ‘post-theoretic’ – digitally humming to each other our prosodic agreement to develop the new staccato comprehension required after post velocitisation.

In all of this talk of technology we can observe that innovation has always come to us in waves - like waiting for a bus at a bus stop with pretty much all the buses arriving at the same time; like the study of liquid or gas in fluid mechanics models, the bunching behaviours; like musical innovation that comes in tranches; like laughter as it catches hold and flows around a room. Like this moment now.

Intro to Charlotte Humpston: We will pursue these ideas later but first we're going to stop off to remind ourselves about how the increasingly velocitised artist – trained in analogue craft modes - now addresses digital behaviour. Charlotte Humpston, a long time art director and MA returnee to Bath Spa University will speak about re-training and re-considering artistic behaviour.

Thanks Charlotte - So Charlotte is a professional artist but ordinary people now make images before they experience a place. In prior times, artists might paint a scene to capture experience (a sort of epigenetic hand-eye-brain behaviour), now we produce images as mediating behaviour for that experience. Is there a possibility for the production of the iconographic within this conduct? So what happens in an age of ubiquity when there are a trillion images and several billion people making images day in day out? Can these amateur artists produce an image worth anything when often his or her gesture is just a rehearsal of having already seen impactful images? Can a person with a smartphone aiming it at the beautiful buildings on Venice canal produce an image worth disseminating rather than just the evidence of their presence?

In a period of scarcity – any time prior to the present - then species needs would be answered by the response of an artist to their situation who made images that asserted themselves into our consciousness like, say Michelangelo's god reaching out to touch Adams hand to invest him with humanity (as we reach back to our prior selves).

The iconographic is the image that stimulates a deeper response in the human psyche, a galvanizing and impactful gesture and also a capturing of human passions that mean something to us because it is impactful in a way which far outweighs the effects of ordinary images. So can the iconographic be produced now without graphos, drawing etching, etched into consciousness, without the icon-stimulating religiosity that pushes one to first kneel down then reproduce the behaviour – the mimetic, the virally spreading internal responding excitement that all artists recognize... the candy box of passion still exists but now lies elsewhere and that 'elsewhere' now lies within the velocitised moment. The moment of agile change – it now moves out of sight, prior to being seen, prior to frontal lobe comprehension.

Previously the word icon described an image with potency, and iconographic referred to an idea with a high level of potency, but an iconogram now refers to any idea *container* that has internal potency and therefore external impact that is pursuant to the characteristics of the velocitised mid-brain orientation of the modern human.

The iconogram is also a descriptor of the wave/particle condition. I mean this in terms of allegorical comprehension.

You can understand it in the terms of the linguistic as *a particulate* – a comprehensive unitary notion

- or you can understand it in its *wave function* – as ‘a notion that contains an agile response to change’.

[And talking of which I'd now like to turn to Dr Leon Gurevitch:](#) Over the last few decades a large and globally distributed digital VFX industry has arisen from the periphery of Hollywood’s traditional base in Los Angeles. As Hollywood visual effects production began to adopt computational processes, practices and technologies, what started out as a branch of the IT and computer sciences industry became a hybrid. Neither ‘inside’ the Hollywood studios traditional financial structures, nor entirely outside the value chains attached to Hollywood’s film output, the VFX industries have functioned as networks of precarious creative industries offering work for hire on a film by film, contract by contract basis. All of this has lead to an industry defined by migration of cognitive labour to an extent that has dwarfed even traditional Hollywood production. This next paper will consider the effects of this migration, the relationship between

cognitive labour and technological innovation, and its implications for the future of a Global Hollywood increasingly governed by computational production pipelines. The centre piece of this talk will be the demonstration of a crowd-sourced, big-data based, migration visualization that details the routes 13,000 professionals have taken across the world in search of work in the last 25 years.

Thanks Leon

INTRO TO PANEL

So what are we coming to? In the narrative we have constructed, there is a constant scaffolded and developmental change and we've proposed that the frequency of the waves of change is increasing which in turn creates something akin to the properties of harmonic wave function – or using the scaffolding metaphor, a greater filigree of meanings in the structure of the support system that as the construction grows it reveals greater details of construction in the earlier forms. That's 'the Implicate Order': David Bohm's Holographic World proposition from an earlier age.

Using the wave metaphor, within this same narrative there are smaller waves within each era that are identifiable by accompanying technologies

that in turn affect behaviour through modifying neural networks. But importantly we have to create narratives and stories that have some relevance to human society to get everyone on the same page – which also could generate a form of academic activism which could mean something to the populace now rather than in a 100 years time. So should we academics become advocates for change? And should we argue to adapt to this velocitised change in particular?