IS71076B: Computational Arts-Based Research and Theory Project

Beyond Invisibility: Rethinking Computer Interfaces

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This is a story about Human Computer Interaction. An examination of the computer interfaces that facilitate human-to-machine interaction, and in particular, what happens when a user interacts with a web, desktop or mobile application.
Early cybernetic theorists and practitioners saw the potential for technology to challenge the Western notion of Subjectivity. They envisioned a bold future where our relationship with machines could transcend the concepts of autonomy and selfhood. We would be entered into systems that would deconstruct the Western notion of individualism, forging the path towards a future built around coevolution and collaboration. Machines could be more than just our servants.
However, this vision did not come to pass. Instead software manufacturers reinforced this hierarchy and firmly banished the workings of the computer to the servants' quarters, only to interact with us through a deliberately simplified or invisible interface. This has created an environment in which the use of software is inextricably enmeshed with the desires of a handful of omnipresent corporations. We have become willing participants in a system of surveillance capitalism that is so omnipresent it is hard to imagine another version of our relationship with technology. Can examining the history of cybernetics provide us with an alternative vision of this relationship and of Western subjectivity in general? How can we negate the Western ideas of the self through cybernetic theory and technology? What would an app that rejects the notions set out by late capitalist corporate structures and interface paradigms look like?
We have created a weather app to explore these questions. Explanations for how the weather app functions to respond to our research is included throughout the text as blue side notes.

Cybernetics and Boundaries

Cybernetics is the study of the flow of information, messages and signals between humans and non-humans defined through feedback and information processing.[1] It was initially established in 1947 by Norbert Wiener, an MIT mathematician. Cybernetics has had social, cultural, and theoretical implications on subjectivity because of its tendency to reconfigure boundaries when constructing a framework in which to place humans and non-humans. N. Katherine Hayles, has presented the history of cybernetics through three distinct phases.[2] First-order cybernetics (1943-1960) was focused on information flowing through the system with the observer standing outside the boundary of that system. However, the observer could be drawn in to the system being observed through a feedback loop. Second-order (1960-1985) brought the observer from outside the boundary and fundamentally into the system thereby breaching the boundary between human and machine. The observer has a role within the system and thus can alter the flow and transmission of information.[3] The observer enters the system they are observing therefore becoming an observer observed. With this redrawing of boundaries came the notion of reflexivity - that which was seen to generate a system becomes part of the system.[4] From the self-referencing system emerges recursivity, meaning, the observer inside the loop of the system can adjust the system based on feedback moving from a linear mechanism of inputs and outputs to spiral pattern.[5] Third-order (1980 -

present) is concerned with virtuality. It holds the observer and the system within a complex environment which is networked, adaptive, coevolving and emerging.[6] Concern became not just with how systems could replicate themselves but how systems could serve as the "springboard to emergence" [7]. For example, growth within an artificial life computer program can evolve spontaneously in directions the programmer may not have anticipated.

Reflexivity and the Implications on Western Subjectivity

From the period of reflexivity we see the blurring boundaries of inside and outside challenging the Western idea of the subject. The Western subject is anthropocentric - an autonomous, private, stand-alone agent acting on the world where consciousness is the seat of human identity. The consequence of this is the use and abuse of those considered non-human and the misunderstanding of the entangled nature of the human/non-human milieu.[8] Cybernetics breaks this Western tradition with it's systems approach to "human-machine networks and collective consciousness" - within the system humans and non-humans are considered equal where the subject is constituted as a node which is part of a whole.[9] Outside is inside and inside is outside. We have here, what Hayle's coined, the "posthuman", that is, the post-individualised-human where the human persists through machines.[10] The study of cybernetics created a cultural shift which bled into media art practices that reflected upon and appropriated the tenets of cybernetics; information, feedback, and systems. ☾

☾ The weather app attempts to subvert and challenge Western subject-centric nature of human-machine interaction by not providing information about the human observers actual geographic context as they would expect, instead information relates to a location picked by the machine, therefore decentralising the human observer. The machine is given "choice" over the human user reversing the traditional hierarchy of user over machine.

Fig. 1. *Radical Software*, (from Volume II, Number 1Changing Channels, Winter 1972).

Radical Software* and Radical Subjectivity

The *Radical Software* publication (1970-1974) was devoted to TV, video and video art. It's content was cross-disciplinary with contributors including artists, scientists and writers interested in media ecology, decentralising media and influenced by new philosophies of electronic media and computing technologies.[11] Members of the *Radical Software* community, through their work and practices, explored new subjectivities that were brought about by cybernetics.

Fig. 2. Radical Software Covers, left to right: Volume I, Number 3 Untitled, Spring 1971, Volume II, Number 4 Solid State, Autumn 1973 and Radical Software, Volume II, Number 1 Changing Channels, Winter 1972.

Cybernetic video artist and *Radical Software* contributor, Paul Ryan, used the analogy of the looping Möbius strip in his work to demonstrate how cybernetic reflexivity strips the barrier of inside and outside.

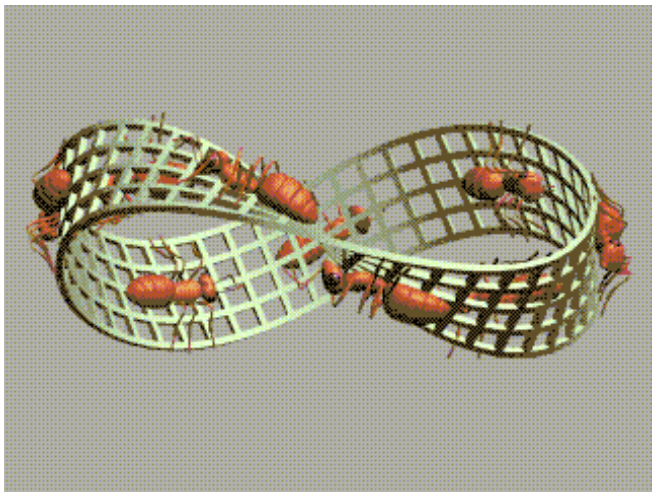


Fig. 3. Möbius Strip (Giphy)

In Ryan's work, *Everyman's Mobius (1969-1972)*, gallery visitors were invited to follow instructions to record themselves performing certain actions then watch this videotape recording before it was then erased by the next user.[12] Ryan called the direct video experience of watching oneself "self-processing". The viewing of yourself on video, for Ryan, dissolved the idea of being a singular isolated subject.[13]

Fig. 4. Paul Ryan setting up *Everyman's Möbius Strip* for the exhibition TV as a Creative Medium, at the Howard Wise Gallery, 1969.
(Video still documentation © Ira Schneider)

> **With video we can know the difference between how we intend to come across and how we actually do come across. What we put out, what is taken by the tape, is an imitation of our intended image...Taking in your own outside with video means more than just tripping around the moebius strip in private. One can pass through the barrier of the skin-pass through the pseudo self to explore the entirety of one's cybernet.[14]**

Ryan was working in the early days of the introduction of portable cameras and home video recording. It allowed for instant feedback and new possibilities for making art - video was a new medium. Now recording yourself with a smart phone is part of the everyday. As a result the users of these technologies can have a hyper-awareness of themselves in media spaces, an awareness which was new and liberating for Ryan.

Experimental anthropologist and *Radical Software* contributor, Gregory Bateson, made use of cybernetic systems in his study of Alcoholics Anonymous (1971) to demonstrate a model of social subjectivity as an alternative to the traditional Western psychologies of the self.[15] AA is a networked group of recovering alcoholics that share their experiences in a non-hierarchical way where the members can identify with each others stories to

The weather app attempts to dissolve the idea of being a singular isolated subject and demonstrate the subject as a node within a system by connecting and visualising the presence of others. Any touch interaction between a human observer and the app is sent to all other human observers, creating a sort of symmetry in the reflective network of touches between observers. They will each see each others movements in real-time. When they touch the same place at the same time magic happens - there is a spark.

see their own use of alcohol in a new light.[16] This emulates a cybernetic system in that the members are nodes within a whole. They mirror each other and create feedback. The empathetic process of listening to each others' stories may move the listener to realise that one's existence is not one of a self-willed autonomy but rather linked to the group.[17] Bateson claims:

> **There is a Power greater than the self. Cybernetics would go somewhat further and recognize that the "self" as ordinarily understood is only a small part of a much larger trial-and-error system which does the thinking, acting, and deciding... The "self" is a false reification of an improperly delimited part of this much larger field of interlocking processes.[18]**

Similar to Ryan's work mentioned above, there is an implicit self-awareness and reflection in this social system of A.A. which can dissolve the delusion of the singular isolated subject.

In an article discussing the appropriation of cybernetics by the *Radical Software* community, Carolyn L. Kane uses the notion "radical subjectivity" to define the new human-machine subjectivities brought about by reflexivity. Our interpretation of what Kane means by radical is taken from Herbert Marcuse. Marcuse set out the notion of radical subjectivity as referring to the "development of a form of self-consciousness that finds present social and economic conditions intolerable. The radical act is a refusal of these conditions and an orientation toward social transformation".[19] Cybernetics can be considered radical in that it challenges the dominant construct of subjectivity - the Western subject - by drawing wider boundaries and creating frameworks where machines, humans and animals are treated as equals. The subject is no longer a stand-alone agent acting on the world but within loops with ceaseless recursive flows and exchanges of information.[20] This subject, however, has not prevailed.

The Private "I" in Personal Computer and Surveillance Capitalism

The liberation from the Western autonomous subject that the *Radical Software* community had envisioned in the 1970s did not come to fruition, rather what we see now from technology is, for the most part, maintaining the singular, isolated subject. With the widespread distribution and access of personal computing came easy-to-use interactive and self-reflexive technology with feedback from a global network of people. However, this has been realised through corporate and commercial platforms, which rely upon preserving the status of the individual consumer as a private owner of goods and commodities, which have a personal identity and profile that can be exploited and capitalised upon.[21] The philosopher, Isabelle Stengers, asserts that technology is usually linked to power, and as such social technology, like internet platforms and social media networks, facilitate the opportunity for those with power to manipulate and to subdue.[22] To exemplify this we can turn to Facebook. Facebook allows one to freely personalise their profile, create an identity and share this as long as it respects the platforms policies. What appears free, claims American author, Harvard professor, social psychologist, philosopher Shoshana Zuboff, is actually the user voluntarily partaking in immaterial labour where their behaviour is monitored (not always with consent), the data collected and sold off to come back to the user as targeted marketing.[23] This mutant form of capitalism, which has harnessed technology for it's bidding, has been coined surveillance capitalism by Zuboff.☀

Zuboff explains that surveillance capitalism, from the likes of Google and Facebook treats human experience, and the behaviour data, as free raw material which is digested by machine intelligence to create prediction products that anticipate and shape our actions.[24] These products are then traded in what she calls "behavioural futures markets".[25]

Zuboff sees that, through digital technology, the combination of state surveillance and

☀ The weather app does not collect your data. It is not involved in trying to anticipate what the user will do. We purposefully do not use cookies to demonstrate that technology and surveillance capitalism are not the same thing. You can have technology and user interaction without surveillance capitalism. Not using the users location to deliver relevant data is a further indication that the user is not monitored.

privatised surveillance capitalism is separating society into the invisible, unknown and unaccountable watchers and the watched, creating an asymmetry in knowledge and power. Surveillance capitalism has harnessed the participation of users online and made them "exiled from their own behaviour".[26] So why do we continue to engage? Surveillance capitalism is far reaching among digital products and services. We use them for socialising, education, finance, healthcare and general logistics, like checking the weather. They are all, in one way or another, connected online and can be monitored. Zuboff claims that the self-authorising pursuit of shaping the behaviour of others for profit is not democratic and lacks moral legitimacy but we continue to engage out of necessity, dependency, the lack of alternatives, and ignorance. [27] ☽

☽ The weather app, for us, is the beginning to start thinking about how we can engage online without the control and manipulation of surveillance capitalism shaping our behaviour. This app is innocent in that it does not seek to use user data to manipulate or control. Many applications register touch positions in order to collect that information and analyse user behaviour based on it to drive conversion rate and increase revenue etc. - but instead of collecting it we are just sending the touch information to other people to share a moment.

American sociologist, Benjamin Bratton, agrees that being surveilled and manipulated by large scale platforms such as Google and Facebook are a problem but that Zuboff does not touch the deeper issues. For Bratton, using planetary scale computation for tracking and predicting what individuals will click on and do next is an "incredibly tragic misuse of planetary scale computation as a whole" but the deeper issue is that, through interfaces and this kind of surveillance, "society is being defined and constructed as the aggregation of these atomic, individual subject, agent actors in the first place", which is a mis-recognition of society.[28] Bratton views the interface of a computer as a map that directs users with options and paths. What is inherent in this interface structure and current culture of interface design is the construction of the user as an individual subject separate from others. He believes this model is contingent and not necessary and compares the computer as a sinlge-user interface to street traffic lights - an interface that allows for a plurality of users.[28] Again, if we examine Facebook, it appears to have attempted to create a network for a plurality but the model and interaction design of the platform encourages the narrative and construction of the autonomous individual user as a piloting creature of its own data and presentation of self identity in relationship to the social network.*

French philosopher, Gilles Deleuze, claims that types of machines can be matched to societies "because they express those social forms capable of generating them and using them".[29] From Zuboff's work, it appears that our machines express an asymmetrical society where the watchers know more about us than we know about them or ourselves allowing them to wield power and control over our behaviour. Through digital technology and the internet the user has become a node in a networked system and surveillance capitalism has diminished the autonomy of the user or subject but not in the way that the *Radical Software* community had envisioned. Surveillance capitalism wants to keep the intensified individualism of the Western subject. This can be further explained through the expression of interface design paradigms and how they position the human-machine relationship by choreographing interaction.

Invisible Interfaces

> **If we only look through the interface we cannot appreciate the ways in which it shapes our experience[30]**

Net artist and theorist, Olia Lialina, claims that it is commonplace and an understatement to say that interfaces powerfully influence our daily lives.[31] Interfaces influence the users understanding of how to relate to the computer and define the roles of user and computer. Decisions are made on how to design these interfaces and herein lies power and politics. Who is making these decisions and why?

User Experience theorist, Don Norman, pushed for the development of invisible or transparent interfaces because, he claimed, the user wanted to spend the least time possible on the computer. Norman coined the term User Experience when he became a head of Apple's research group in 1993. Examples of his dictum on interface design are:

> **The problem with the interface is that there is an interface.[32]**
> **Computers exist to make life easier for the user.[33]**

The designer should always aim to make the task dominate, while making the tools invisible.[34]

Norman's texts are almost universally assigned as core reading for interface design students.[35] He has created a widely accepted design paradigm where the computer is positioned to be a subservient, invisible tool with a simplified or erased interface. ☂

☂ The weather app defiantly refuses to be a tool for the user. Traditionally a weather app allows a user to choose a relevant location allowing them to make plans. These plans might be based around their daily happenings (what to wear, whether to take an umbrella), or to plan a holiday based on the forecast etc. The users rigid expectations for relevant information to inform their actions are purposefully not met.

In *Windows and Mirrors (2005),* Botler and Gromala question the paradigms and practices of mainstream interface design and the myth of transparency/interface as window while asking what can digital art offer interface design and human computer interaction. They believe that "every digital artefact needs at times to be visible to its user; it needs to be both a window and a mirror".[36] They claim that invisible interfaces mean the user never knows or understands, rather the software thinks for them and provides the user with a path - the user relies on the program and it becomes a window rather than a mirror reflecting the user.[37] They argue against Norman's idea of the computer being a mere appliance, claiming computers effect culture as do books and cameras in a way more interesting than a refrigerator.[38]

Like Botler and Gromala, Lialina disagrees with the perspective of, "what's inside the box doesn't matter as long as it works", and recalls the websites created by everyday users in the 1990s.[39] For Lialina, these DIY websites demonstrate that users desired visible and foregrounded interfaces which contradicts the assumption, made by Norman, that users do not want to see or think about interfaces. Instead they actively create against seamlessness and invisibility.[40]

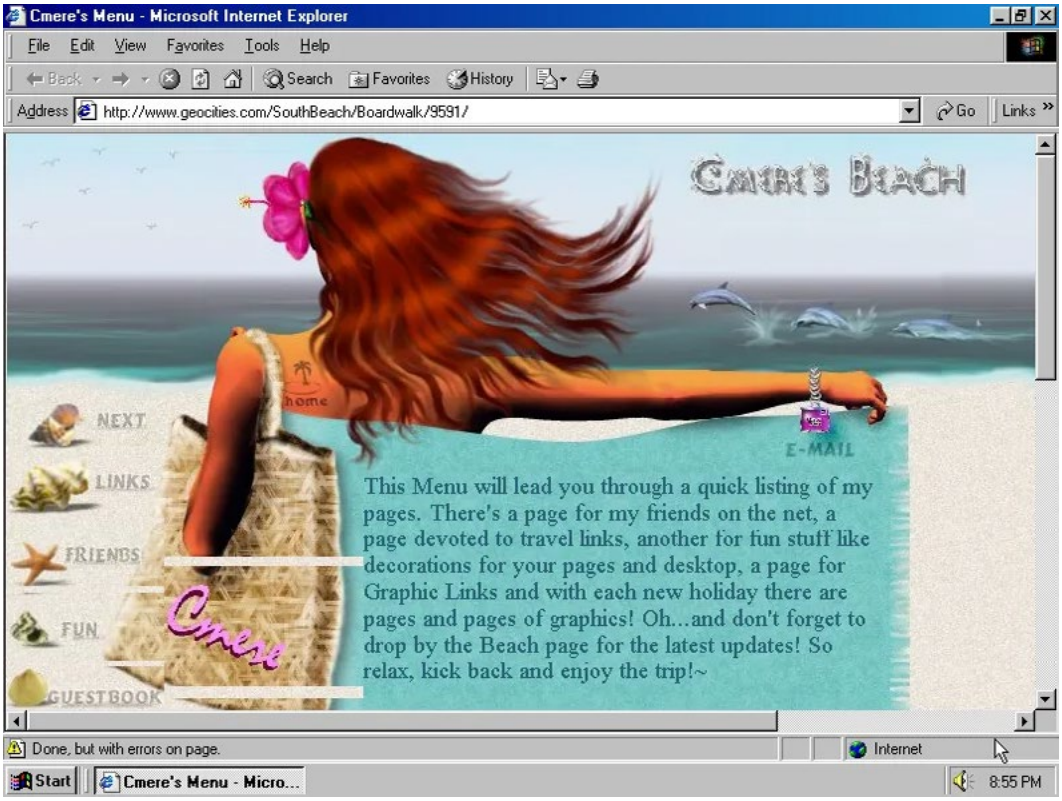


Fig. 5. From One Terabyte of Kilobyte Age (2009, ongoing), Olia Lialina and Dragan Espenschied

To further demonstrate, when asking "What did peeman pee on?" in Geocities, Lialina and her team at Geocities Research Institute found 700 uses of the animated Peeman GIF, which was essentially a dislike reaction, used on "manly" neighbourhoods of Geocities.

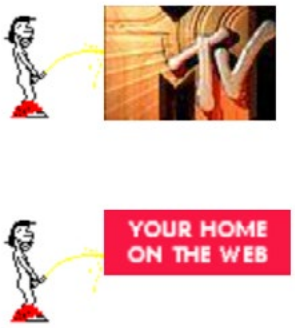


Fig. 6. Geocities Research Institute: What Did Peeman Pee On?[41]

This example portrays the lengths of a user for customisation. The GIF had to be coupled with another made or found graphic and placed in a specific position on the page to give it context.[42]

Before the establishment of transparency in interface design in the mainstream, even large corporations such as Microsoft were experimenting with alternative ways of creating spaces for user interaction that go beyond the invisible point of least resistance. This is exemplified with "Microsoft BoB", a 1995 desktop *environment* that interfaces with the user by providing a digital representation of a physical space for the user to interact with. A computer animated character intended to assist the human user created a sort of two-way communication that gives the machine a distinct personality. Something that in many ways, would now be a very surprising step from a capitalist entity of this magnitude.

Fig. 7. Microsoft Bob - A tour of Microsoft's forgotten desktop "enhancement" (from TopWindowsTutorials)

This can also be observed in smaller such experiments that attempt to make personal computing more approachable. The Microsoft Office 1997 virtual assistant, "Clippy", for example, would observe that you were trying to write a letter and offer specific assistance - a reflection of the user. The anthropomorphised paper clip, captured the imagination of many of its users due to its expression of personality and character, giving the software a very visible face. Memes were dedicated to Clippy expressing annoyance with the assistant because unless you were a first time user of the program or its features Clippy was not really helpful. Microsoft replaced this feature in Office XP with task panes and smart tags in 2001, thereby removing any trace of subject-like nature from its word

processor, leaving it exactly the same as all other word processors, an invisible interface that helps the user fulfil a task and nothing more. Today our virtual assistants are invisible and gendered, such as the subservient female automatons Siri, Cortana and Alexa. Clippy was briefly resurrected in 2019 as a pack of stickers in *Microsoft Teams* but was quashed a day later by the "brand police" resulting in users starting a petition to restore Clippy to teams.[43]

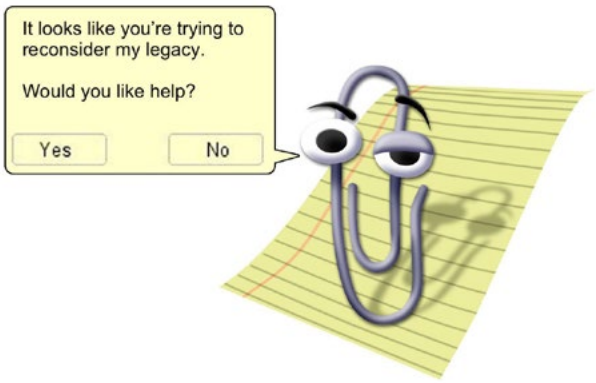


Fig. 8. Clippy (from *The Vindicated*)[44]

Another observable side effect of this transparency paradigm as the staus quo of machine interface design, as well as the aforementioned user-as-consumer centric capitalist view regarding software, is the increasing homogenisation of user interfaces. A recent example of this would be the introduction of 'stories' to social media apps. These allow users to share time limited media with their social circle. They were first pioneered by the messaging app Snapchat, then adopted by Instagram, Facebook, and WhatsApp, and now in late 2020 finally by Twitter. Now every major social application in the west is essentially offering the same interface and interaction, thereby forcing that specific mode of communication to become the standard. This results in a huge loss in diversity of expression for the human user even in the context of a supposedly diverse range of applications to choose from.

Geocities' sites were grouped into neighbourhoods. This playfully applied the geographic metaphor of literal neighbourhoods to collections of humans with similar interests. This provided a canvas for people to express themselves and influence the space that they express themselves within (the neighbourhoods) without the limitations of contemporary social media and software interfaces. This is the polar opposite of the previously mentioned homogenised user interfaces and interactions of today's social media apps.

In Human Computer Interaction the components are the computer, the interface and the users. This equates to the User Experience components of technology (the computer), experience (the interface) and people (the users).[45] Norman's UX paradigm, for Lialina, provides an experience whereby the user is locked-out of the customisability and programability of the system to reduce user interaction and rigidly define how the user gets to play with the computer.[46] This in turn effects their role in computer culture.

The transparency paradigm and interaction homogeneity within the interface design industry pushes against people seeing the architecture of the web and the way the interface shapes their behaviour. This is exemplified with social media stories and contrasting the aforementioned interactions available with Facebook as opposed to Geocities.

An example seen in today's Net Art and alternative games culture, which presents an alternative to the transparency paradigm, are the works of Aleinmelon (Nathalie Lawhead). Aleinmelon's games apply user interaction as a character visibly reflecting and responding to the users actions with animated interfaces.[47] For example, In Anatomically Incorrect Dinosaurs, the characters begin to cry when the user minimises the game and the song *What is Love (Baby Don't Hurt Me)*, by Haddaway, is played.[48]

Fig. 9. Alienmelon (screenshot from website).[49]

Another example is *Lingscars.com.* Ling demonstrates a unique approach to designing websites and interfaces claiming one must “Stop regarding website as a “thing”. Regard it as real life, alive, like an animal or pet. You need to feed website EVERY day! Maybe like pet spider.”.[50]

Fig. 10. Lingscars.com (screenshot from website).[51]

For Bolter and Gromala, “digital art can provide the clearest test of possibilities and constraints of digital design...[because] digital art is all interface, defined entirely by the experience of the user” and fails or succeeds based in the strength of the interface.[52] Based on this idea we look now to how Lialina challenges the constraints of the transparency paradigm. Lialina believes the web browser to be the most empowering medium and thus rendering the interface transparent results in a great loss in creativity and empowerment of the user.[53] Her works can be seen to expose the mediums structure and defy the paradigm of transparency. *Best Effort Network* (2015/2020), shows Lialina riding a merry-go-round in a browser, however, she can only be in one browser at a time. If two people are viewing the website at the same time one will see her the other will not. The work is tied to the medium of the browser and forces the viewer to be aware that they are part of a network as well as visualises the movement of data around it.[54]

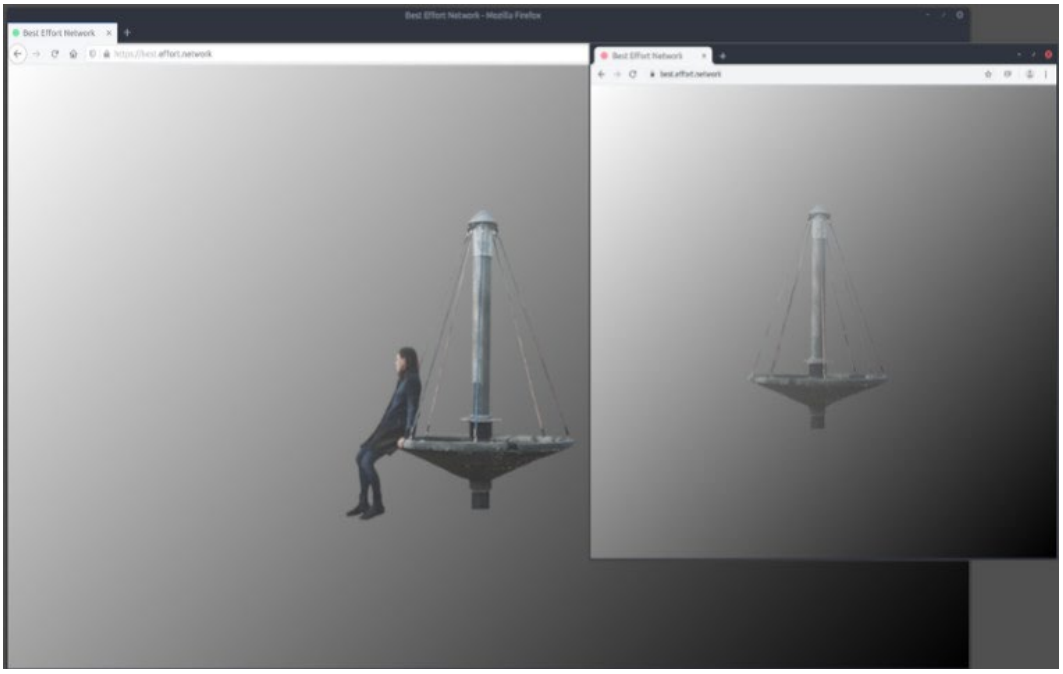


Fig. 11. Olia Lialina, *Best Effort Network*, 2015-2020[55]

Lialina in contrast to Norman engages with the computer in what could be described as collaboration. We are made aware of the machine, it's architecture and functionality. Norman's paradigm of transparency and invisible computing affirms the Western subject and human-machine divide by limiting the machine to a tool to add convenience and simplicity to our lives. It works against reflexivity and also makes the job of surveillance capitalism smoother and less detectable as the user is not made aware of the furnishings which communicate that they are being monitored. If there's barely an interface, or an invisible interface, then inputs, algorithms, and computer architecture will go unnoticed as long as you arrive where you need to be through a direct path with all the right prompts and text field placeholders. Furthermore, customisable interface architecture reduces the quality and consistency of the data that can be collected and converted into marketable use behaviour, thus, homogeneous and rigid interface and interaction design is in the best interest of surveillance capitalism. The transparency paradigm allows for the illusion of being an autonomous, self-determining individual when in actuality your behaviour is being monitored and sold.

Computer and Body as Media

What happens when we see the computer not as a tool but as media, like film, radio, or television? What happens when we see the body as media? From a cybernetic perspective human and animal bodies are media because of their capacities to store, transmit and process information.[56] Positing the body as an informational medium brings it closer to, and entangles it with, computational media such as the Internet and Web. Further entangling occurs through the overlay of physical objects with virtual reality, for example, through mobile phones, GPS technology, and bio-sensors, which have allowed for physical and virtual realms to merge. [57] In a collaborative virtual reality project, Diane Gromola, explores embodiment and the merging of the virtual and physical with *Dancing with the Virtual Dervish: Virtual Bodies* (1994-2003). The VR environment was constructed from MRI scans of Gromala's body. Rather than use the "unfamiliar sensation and cognitive disruption" features of the VR experience to escape and disembody, Gromala wanted to look inwards to reconfigure and enhance her experience of her body as a way to deal with chronic pain - a re-embodiment through technology and the virtual realm. [58] The disruption and immersiveness of VR allows for the user to potentially experience a disruptive embodied subjectivity with the date and images of Gromala's body. [59] This experience dismantles the Western notion of subjectivity by loosening the individual's solipsistic subjectivity to be embodied with the machine outside.

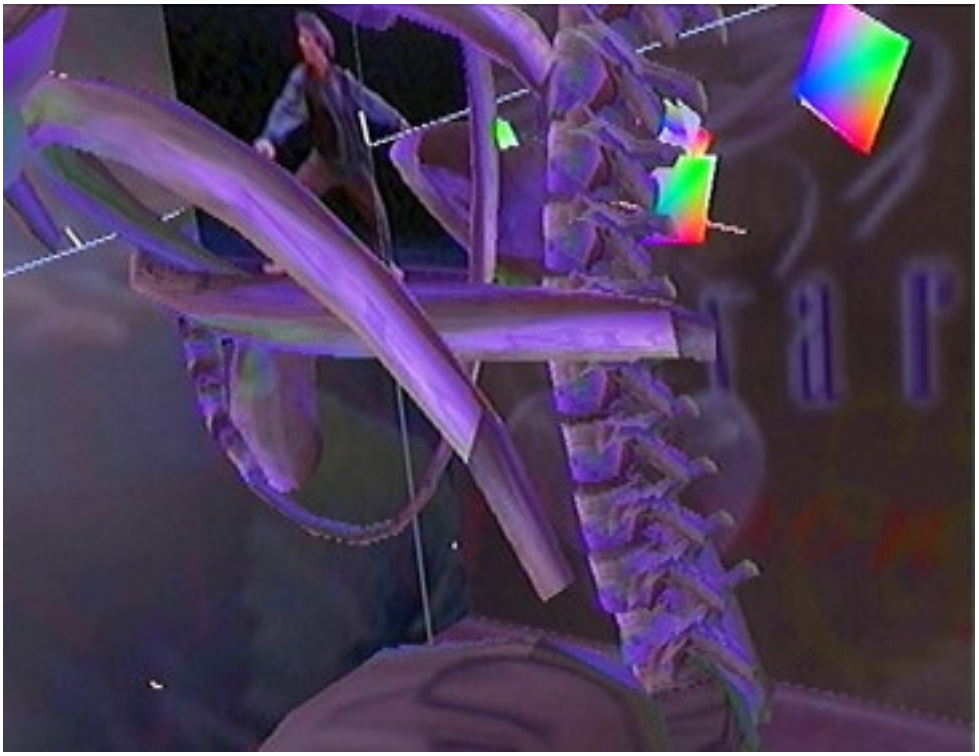


Fig. 12. Still from *Dancing with the Virtual Dervish: Virtual Bodies* (1994-2003).

Hayles defines the merging of physical and virtual realms as the fourth phase of cybernetics where the actual and the virtual are integrated to form mixed reality. The entanglement of the body and machine under the cybernetic framework allows for emergence and the ability to coevolve, thus, Hayles claims, it is part of the cybernetic impulse to perceive computers as cognisant and human bodies as media, blurring the line between nature and culture.[60] However, Hayles does not wish to collapse the feedback loops connecting bodies and computational media, "these recursive feedback loops between culture and computation create a coevolutionary dynamic in which computational media and humans mutually modify, influence, and help to constitute one another in the phenomenon known as technogenesis.".[61] This idea is returning to the kind of radical subjectivity envisioned by *Radical Software* where the human subject is integrated into the system with the machine. Within the cybernetic system the outside becomes inside and the inside becomes the outside along the Möbius strip. Technogenesis brings the technology from outside to the subjectivity inside, and in doing so, affects it while recursively affecting each other. In this picture the human subjectivity is integrated with its non-human environment configuring something vastly different to the traditional singular isolated subject of the West.

Examining human computer interaction and subjectivity through the history of cybernetics helps us to understand the long standing potential to deconstruct and dismantle the human-machine divide and the Western notion of the individual subject. The opportunity to re-configure the Western subject based on an integrated cybernetic system has been stunted by the corporate capitalist structures working to maintain the individual consumer. The threads of this narrative are woven into interaction and interface design paradigms which tie this anthropocentric story together and continue to shape (online and offline) our culture, social experience, and personal expression. The standardised and homogeneous interaction design of our software does not reflect a society embedded within a system coevolving with machines or integrated with its environment but rather reflects the making and maintaining of a society easily monitored and manipulated. With our artefact we humbly attempt to address, expose and challenge the current limitations imposed on users that restrict their subjectivity and their relationships with machines.

Artefact Overview: Weather App
https://weather.distancing.space/

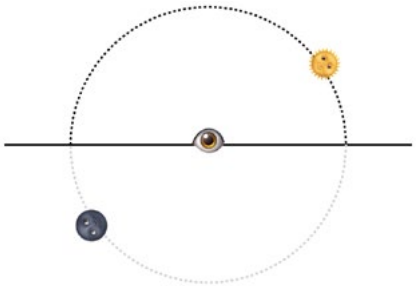
As part of the project we have created a weather app to respond to our findings. Our artefact aims to challenge the Western subject-centric nature of human-machine interaction. We are attempting to reject mainstream human-machine interface paradigms in order to explore radicalising common software tropes and move outside of the homogenized corporate structures that shape them.

Region Indicator Blob
The region is randomly picked by the algorithm. The region indicator displays an image representation of the currently active region, regions are usually municipalities at the city level. The indicator image is fetched dynamically from human provided content on the web, representations may take any possible form, and may or may not provide a clue regarding the geographic location of the currently active region, its cultural context or related information.

Temperature Display
The temperature display shows the current measured temperature in the active region in degrees celsius.

Wind Indicator Hand
The wind indicator hand indicates the wind direction in the active region by pointing in the angle of the corresponding compass hading, the length of the index finger indicates the wind speed, with the finger increasing in length as wind speed increases in the active region.

Time Cosmos Indicator
The time cosmos indicator displays the time, and information about sunrise and sunset. The observer subject is placed centrally at a horizon line, with sun and moon rotating around this horizon line based on information regarding the current time and sunset as well as sunrise time in the active region.



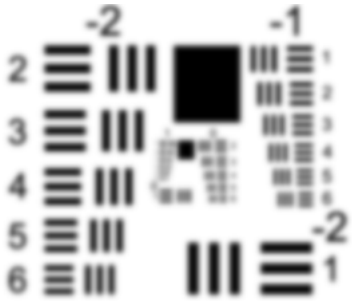
Local Bird Context Indicator

The bird context indicator highlights a recent notable bird sighting in the greater active region. Bird sightings are fetched from human reported information, specifically “notable” sightings which may refer to rare or unusual bird activity, migration movements etc. The bird context indicator provides the common as well as scientific name of the spotted bird or birds, as well as the noted location. A graphic fetched from human provided content on the web based on the bird’s common name adds an aesthetic aspect to the sighting item.

Black-crowned Night-Heron (Nycticorax nycticorax) @ Antonis Tritsis Metropolitan Park

Pollution Indicator Target

A 1951 USAF resolution test chart on the page displays information regarding the pollution in the active region. This is a common resolution target used to test optical imaging systems, in this context, the target is increasingly blurred based on how bad measured air quality in the active region is.

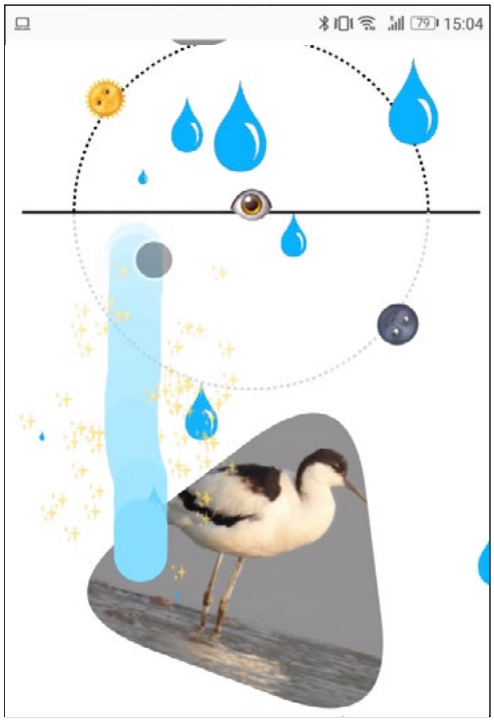


Sound Based Weather Indicator

An ear-button allows a human interacting with the website to hear an auditory representation of the weather at the active region. The page will begin emitting an ambient soundscape based on the current weather as soon as the ear is touched by the user.

Shared Interaction

The user can see the interaction of other users in real time through coloured smudges appearing from touch interaction. If users touch the same place at the same time sparks fly.



Notes:

***** Here the use of 'Software' pre-dates the way we use this term now in a sense of a digital program running on a computer. The *Radical Software* movement was more concerned with analogue signals such as television and video film.
This use also presents us with a more abstract kind of software, the programming that allows subjects in a cybernetic network to interact with each other, which is indicative of the difference between the ideas of the *Radical Software* movement and computer interfaces as we perceive them now.

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