Transformations

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Interruptions: Reconsidering the Immaterial in Human Engagements with Technology

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Theorising negotiations with and across technological systems becomes imperative as people's lives are increasingly entwined with and enacted through technological devices and the Internet. As these technologies become ubiquitous, the devices themselves may retain their importance as valuable objects, but the underlying systems – hardware, software and processes – that enable these devices to function become imperceptible. At the same time the idea of who, or what, has control becomes convoluted and difficult to pin down, such that these imperceptible systems are also considered immaterial: "of no matter," unimportant or inconsequential. At this level, technologies can be understood to have moved into the background in their relations with humans, becoming, as Don Ihde says, "a kind of near-technological environment" (108) or an "absent presence" (109 & 111). When operating normally, such systems are often "barely detectable," remaining broadly unnoticed in spite of the fact that people may actually be required, or choose, to interact with them on a regular basis, as is the case with Facebook, for example (Ihde 109). The resulting invisibility of these systems reinforces their seeming immateriality, as their physical instantiation is forgotten during everyday use, and they are judged to be not just inconsequential but also non-corporeal.

Ihde emphasises that background technologies are nonetheless able to "transform the gestalts of human experience and, precisely because they are absent presences, may exert more subtle indirect effects upon the way a world is experienced" (112). Indeed, as this paper explores, technologies regarded by users as immaterial may suddenly reveal themselves and their influence such that their power and consequence must be reassessed. In particular, technological and philosophical interruptions can be identified as triggers for this process of re-evaluation. In some cases, what was in a background relation to humans moves into the foreground to become more clearly part of a "hermeneutic relation" by providing a technological window onto the world. In other cases, technology moves into the position of an "alterity relation," recognised as an other with a level of agency and control (Ihde 72 & 80).

This paper analyses two examples: Facebook's frictionless sharing initiative using Open Graph and the Y2K or Millennium bug, positioning their effects as interruptions theorised from two different perspectives. The first theoretical perspective is drawn from the terminology of the interrupt or interruption as applied directly to computer processes by Simon Yuill, who asserts that "The interrupt … is the mechanism through which the social, as a process of making and breaking associations with others, is inscribed into a piece of running software" (163). This theorisation positions the interrupt as functioning somewhat like the interruptions that occur where discourse "is composed of sequences that are interrupted when the conversation moves from partner to partner" (Blanchot 75). More marked interruptions also arise when the listener, or even another person external to the conversation, cannot wait their turn and interjects, thus

disrupting the flow of the speaker unexpectedly.

In addition to noting the importance of interruptions in moments of "saying," Maurice Blanchot also builds on Emmanuel Levinas's defence of the irreducible distance retained between self and other even in the proximity of an encounter. In extending this idea, Blanchot draws out the second theoretical perspective considered by this paper, the "interruption of being," which protects the other from assimilation into the self, or fusion with the self to form a unity, by highlighting the need to respect their alterity (69). This sense of interruption is used to explore the revelation of a system, or piece of software, as an other, and therefore the perception that it is an agent, capable of making decisions and performing actions whether for itself or on behalf of a user.

Although evoking this philosophical understanding of interruption does position technology and technological systems as "others," this paper's exploration of relations between humans and technology does not adopt increasingly popular streams of thought such as object oriented ontology (Harman), actor-network theory (Latour) or an alien phenomenological approach (Bogost), all of which flatten ontological distinctions to regard people and technologies as singular entities of equivalence in terms of agency and experiences. While this theoretical impetus may translate in time to the world views and understandings of people in their everyday relationships with technology, as yet these understandings largely do not appear to have percolated through to the "person on the street." Instead, the examples discussed in this paper highlight the ways in which, experientially and perceptually, people generally do not see objects and people as equivalent or as being open to being considered and treated equally: people feel that they "use" technology, although their understanding of or communication with these technologies may at times make them feel powerless as if the technology "uses" them (the subject of many science fiction movies). It is this (sometimes) uneasy relationship which this paper seeks to explore further.

The adoption of a phenomenological perspective has also been used to support the idea that technologies (as phenomena) and people that encounter and use that technology have a co-constitutive relationship. For example, Kittler's argument is that forms of technology and technological processes intersect with and influence humans, human actions and social systems, affecting "our very ability to think critically about what 'technology' and the 'human' actually are" (Gane 39), and as a consequence interrupting or altering being. This type of interruption is different from that identified by Blanchot and Levinas, since it is used to highlight the ways that being is altered when it is mediated through technology, such that the writer using a typewriter as opposed to a pen experiences changes to their physical actions and mental processes as a result of the affordances or form of the technology, resulting in associated differences in the produced text's flow, structure and content. Bernard Stiegler makes a similar claim when his reappraisal of the work of André Leroi-Gourhan results in the argument that humans and technology "invent each other respectively" (142). In a recent book, Sarah Kember and Joanna Zylinska take this idea further to suggest that media technologies and human subjects can be understood to be mutually co-constituted in an "*intertwined process of media coproduction*", such that "life is mediation" (164). While not wishing to overlook the effects of technology on being, and ideas of human and technologies co-constituting each other, this paper concentrates instead on moments of interruption where the separations between humans and technologies are drawn to attention.

For the purposes of this paper, the interrupt is also positioned as a useful heuristic to enable an exploration of understandings of the immaterial – the intent of this special issue – and the contextual specificity but also uncertainty that is expressed by this notion. As has already been briefly explained, and will become more apparent through the following discussion, the immaterial is understood herein in two ways. First, the term may be used to identify something that is perceived as inconsequential or not mattering. In that sense, the immaterial is deemed unimportant or at the very least unworthy of notice. The examples drawn upon in this paper

use the notion of the interrupt to highlight moments when this lack of certainty or questions about importance of entities, processes and categories become evident.

Second, the immaterial is linked to a perceived lack of corporeality, referring to things that cannot be physically picked up, moved or handled. In this paper, the examples drawn upon note the immateriality (in this sense) of software and computing signals in terms of their inability to be physically engaged with. This understanding does not negate the oft-noted material possibilities and outcomes of these phenomena / entities nor negate the very materiality of their operation through the transmission of electronic signals, code and underpinning hardware (Kittler). Indeed, the intention is not to overlook the possibilities offered by their transformative potential: it is instead related to the first sense of immaterial, in terms of it being perceived by most people (those who are not studying or working in a way that is directly engaged with these systems) as invisible, ephemeral, somehow inaccessible or (when running smoothly) as largely inconsequential. As Katherine Hayles notes, "There are all of these invisible information flows surging around us of which we're unconscious and unaware but that are nevertheless becoming increasingly important in the technical infrastructural and the larger picture of what's going on" (30). The notions of the interrupt and interruption employed in the paper are used to highlight shifts or moments when these understandings or experiences of the immaterial are called into awareness or renegotiated.

According to Simon Yuill, the interrupt was one of two computing processes introduced in conjunction with interactive computing. Interactive computing requires the computer processor to be able to deal with incoming external signals (from systems and / or users) whilst running multiple programs simultaneously which can be stopped, started and edited on command. This type of interactive operation was in stark contrast with earlier batch processing models, where single programs were run consecutively, without the ability to stop, edit, start or redirect the process to work on a different task (Yuill 161). As a result of this need to manage multiple signals and processes simultaneously, the interrupt was introduced.

> The interrupt is the main mechanism through which an operating system seeks to maintain a coherent environment for programs to run within, coordinating everything external to the central processor, whether that be events in the outside world, such as a user typing on a keyboard or moving a mouse, or things outside the system's internal coherence, such as a buffer overflow or an operational error in a piece of software. … The interrupt not only creates a break in the temporal step-by-step processing of an algorithm, but also creates an opening in its "operational space." (Yuill 161-162)

Therefore, the interrupt in computing terms offers a means for managing coherence amongst entities, including humans, and processes, and also a way of enabling the introduction of, recognition of, and communication between, different systems and processes.

An interrupt is a momentary signal or communication. Infrastructure and coding is required for it to take place, its production may even rely on a hardware interface such as a keyboard, but it has no perceivable physical corporeality in itself. An interrupt cannot be taken and handled, moved or reconfigured except possibly through an alteration of the means by which it is enacted. However, in spite of their apparent lack of physicality, interrupts play important roles enabling a number of computing possibilities: they have agency in that they make things happen, which in turn have consequences.

Facebook is an increasingly far-ranging system, which offers valuable examples of the relation between the interrupt, interruption and ideas of seemingly immaterial, yet potentially consequential, action. This is because the operation of Facebook as a Social Network Site (SNS) is not only about allowing users to interact with the system and each other via various different interfaces such as computers and mobile devices, but also about enabling interactions between

systems themselves. This latter idea, of systems interacting on Facebook, became particularly evident in 2011 when Mark Zuckerberg, Facebook's Chief Executive Officer, launched the new Timeline interface and a "completely new class of social apps" that, once installed, would automatically share what users were reading, listening to or watching with their Facebook friends (Bosker).

This new class of social app stood in contrast with the existing practice of adding "like" buttons to external sites, such as news media sites and video sharing sites. Like buttons functioned in such a way as to enable users to make an active decision to "like" a particular piece of online content found outside of the SNS in order to share a link to that content on their Facebook timeline. In contrast, some of the new apps changed the ways in which online content had previously been shared through enabling what was described as frictionless, or seamless, sharing using the new Open Graph framework. Once initially authorised, such apps would go on to share everything that a user accessed in the linked media service such as Spotify, or read on news sites such as *The Washington Post* (Darwell). In Yuill's terms, sharing between systems linked using this frictionless model was no longer driven by an interrupt directly caused by the user clicking on or touching the "like" button or icon; rather, sharing had become wholly reliant on software interactions. The material link between user and system, via the interface, had been replaced by a software link, which, while supported by the material infrastructure of the Internet, faded into the background to be regarded as immaterial. Frictionless sharing of one's actions with a service or on a website, via system raised interrupts, as opposed to the user-triggered hardware interrupts, and the seamless transmission of information on Facebook that it enabled, raised concerns as people wondered whether they really wanted to share all they read, for example, with others, or indeed whether they really wanted to know what all their friends had read.

In the world of frictionless sharing, it might be the user who had shared something they hardly remembered even opening, let alone listening to, reading or watching, that might be most interrupted by the realisation that a post had been made to their timeline by an app. However, it is also worth noting that the reality of the sharing practices enabled by these new apps was often less than seamless, initially at least. This was because when an app shared a link, it was only those users who had already installed that app who could simply click through to the source. Before sharing could become frictionless, the user had to be interrupted by a dialogue box encouraging them to decide if they too (as their friend had) wanted to authorise the app to monitor and share their actions on that site (Wood). Instead of the system being solely subject to an interrupt, in this case the user is also interrupted as they attempt to read, listen to or watch the content that had been shared on their friend's behalf. As Yuill argues, in this case the interrupt "makes software social … its performance dependent upon associations with others" whether those others are "human users" or "other pieces of software" (162). Indeed, the user may perceive this unexpected dialogue box as something akin to the app interrupting their asynchronous social conversation with a friend. The seemingly immaterial code (of the app, or of the service or website) draws attention to its existence and its desire to act on behalf of a new user, if it is subsequently authorised. The operating and software codes underlying these engagements – which may have been unnoticed, unconsidered and deemed unimportant or inconsequential previously by the user – instead demand to be noticed and taken into account through compelling a response. The technology moves from the background into the foreground, and the user is required to acknowledge its existence, its importance, its consequences and its actions. For some users, the foregrounded technology might be read as a window onto their network of friends and the information they read and might share, accepted as a useful hermeneutic connector. For other users, the technology might be understood as an alterity, an agent that has gained (or wishes to gain) a level of control over what they share with others.

In fact, Open Graph is perfectly able to suspend auto-sharing in order to support more regular interruptions allowing users to confirm whether something that has been viewed should

actually be shared in Facebook. In this case, instead of being frictionless, Open Graph enables constant interruptions, allowing users the opportunity to decide if they really want to share a particular piece of content on their timeline. Operating in this way, Open Graph is overtly positioned in a hermeneutic relation with users, who are aware of its ability to help them interact with their networks of Facebook friends. When providing regular interruptions, Open Graph effectively enhances one's awareness of the consequences of sharing each particular item from a source system, via Facebook, with what is often a very varied set of Facebook friends. Continual interruptions of this kind might be regarded as unwanted disruptions by some users but, for many others, the opportunity to choose not to share something is seen as vital. Unfortunately, Zuckerberg's use of the word "frictionless" in the initial presentation about Open Graph and Timeline, led application developers down the auto-sharing path, as opposed to promoting a less seamless, and more regularly interrupted process, within which the system and its code is less of an agent, and more of an enabler.

This example, of Facebook's seamless sharing, links Yuill's idea of the interrupt with a more general idea about the interruptions that are a part of any dialogue. Drawing on Levinas's discussion of the encounter between self and other, Blanchot identifies the interruption as an inherent part of any conversation, because the discourse between self and other "is composed of sequences that are interrupted when the conversation moves from partner to partner" (75). In this way, Blanchot highlights interruption as an essential part of turn-taking in dialogue, although in a stronger sense there is always the possibility that the other might not wait their turn, or indeed that a third party might interject. It is interruption in these terms that resonates most strongly with Yuill's discussion of the interrupt, whether the interrupt acts to make the processor set aside its current thread in favour of a different one, or whether the interrupt relates to a hardware trigger, such as a user pressing a key on the keyboard. In addition, this sense of interruption in saying is also a productive way to understand the strength of interruption experienced by a user expecting to read, for example, what has been shared via their friend's timeline, only to be taken to an unexpected dialogue asking them to register for an app. The app interjects, as a third person might, interrupting the flow of communication between user and friend in order to ask its question.

While what the interrupt in computing "is" is relevant for the discussion within this article, it is also important to consider what the process draws attention to – simultaneously a disruption, but also a means of introducing and recognising difference or alterity and the necessity of negotiating with this difference in some way. This sense of disruption and recognition is found in Blanchot's identification of a more significant understanding of interruption based on Levinas's conception of "the face to face" encounter between self and other, within which the communicators always remain clearly separated (Levinas 79-81). For Levinas, this separation is not simply related to the physical distance between communicators; rather, it denotes the presence of an insurmountable and valuable level of difference that continues to exist between them even as they are brought into the proximity of the encounter. Blanchot extends Levinas's conception of the face to face when he describes a "relation of the third kind" for which maintaining the difference between those involved is the essential characteristic (68). He suggests that "what 'founds' this third relation … [is] the *strangeness*" that exists between the communicators (68). Blanchot, argues that "it will not suffice to characterize" this difference as Levinas does, "as a separation or even as a distance" (68); instead, it is better thought of as "an interruption" (68), later termed "an *interruption of being*" (77). The self and other to which Levinas and Blanchot refer are always human. However, Levinas's description of the self-other encounter as "the face to face," defines the "face" not as a set of physical human features that can be seen, but rather as encompassing all the ways in which the other chooses to reveal themselves (79-81 & 262). Therefore, although this idea would have been alien to Levinas, this paper stretches the notion of the face, and the otherness revealed in the face to face encounter, so that it can consider the interruption of being that occurs when non-human entities, such as the systems and apps discussed above, reveal their agency in encounters with humans.

This conception would seem particularly helpful in analysing people's deeper responses to the apps that enabled frictionless sharing as occupying an alterity relation with users, and it is appropriate to use Ihde's terminology here, since his use of the word alterity was drawn from Levinas's philosophy. Although the moment when the app dialogue interjects, asking the user to decide whether to allow this app access to their timeline, can be understood as an interruption in a conversation, for some users it offered an important opportunity to recognise the system and its agency as an untrusted other. The potential for automatic sharing, a feature of many social music, video and news reading apps at the time when seamless sharing was first introduced, made the initial moment to consider the act of authorising the app seem vital to some users. When the app dialogue box, as opposed to the expected content, was reached, the user's engagement with their friend (as it initially appeared to them) was interrupted, and as a result they were reminded of the presence not only of the technical interface, but also the raft of potential other interested parties that might be involved in this encounter and the possible consequences that might result. Thus the user was called upon – by a message auto-generated by the underlying technical system – to pause their course of action and to reflect and consider whether they wished to continue. The interruption of the dialogue box during the communicative act draws the user's attention to the presence of previously unnoticed, seemingly immaterial processes and their possible consequences: the multiple layers of data collection, commercial interests and potential privacy implications.

The conception of an interruption in being can be further drawn out by considering the sudden recognition of a computer system, and the consequence of interacting with it for human users, during the run up to Y2K. In some ways, this second example, of Y2K or the Millennium bug, is a more extreme illustration of a realisation, or a bringing into the foreground, of our relationships with technology throughout the everyday and the extent of our reliance on them, than the Facebook example already discussed.

Y2K, or the Millennium bug as it was variously referred, was the result of programming decisions that had been made where year dates were stored using only the last two digits rather than all four. Consequently, the impending turn of the century would have caused these systems to represent the year 2000 as "00," causing potentially dramatic processing interpretations as a result (see Li, Williams and Bogle for an overview). Apocalyptic visions of planes falling out of the sky, cars losing control on the road or more mundane notions that toasters or refrigerators might stop working, or credit cards be declined, were rife throughout the press, in academia and in everyday conversations on the street (see Poulsen for some particularly dire scenario predictions). Indeed, according to Li et al., "It has been predicted that many patients will die (it was estimated that half of the equipment in NHS hospitals could not cope with the date change!). Traffic will grind to a halt because some traffic lights and air traffic control systems will fail" (6). People were unsure about what devices contained potentially affected technologies (micro-chip processors) and what did not. In essence, people were encouraged to notice the potential otherness of the gadgets and larger machines that they took for granted as part of their everyday lives. They were afraid that these technologies would interrupt their lives, in what might even be harmful or deadly ways. However, although the most serious implications discussed were most often physical in nature, for example aeroplanes falling from the sky, the otherness that was being revealed was actually strongly linked not with the material, but with the unpredictability of and lack of control over the internal programming of these objects. The relevance of a failure in a seemingly immaterial system was perhaps even clearer when considering the disruption expected in monetary and trading systems, offering the potential effectively to interrupt the world economy.

In terms of the more philosophical notion of interruption that we are exploring, Y2K caused the potential for interruptions of being in particular – because much of the hype was about drawing attention to the unknowability or alterity, and therefore the potential loss of control, of the system. Underlying the sense of otherness that people recognised within objects ranging from planes to toasters, and systems involved in running anything from trading markets to

applications on their own home computer, however, is still the question of code and process-level interrupts. A return to Yuill's understanding of the interrupt therefore highlights that the issues being discussed around Y2K, both large and small, were still closely linked with the idea of unexpected errors being raised. The "00" dates were "dangerous" because they might be misunderstood. They might raise "unhandled" errors, likely to result in system interrupts that were not gracefully incorporated into a set of controlled changes to the processing path, and which might therefore lead to small glitches, or partial or even complete system failures.

In reality though, it did prove possible to cater for most of these possibilities by reprogramming. In some cases, the expectation of difficulty was overhyped, since only code dealing directly with dates was likely to be badly affected. Through a combination of pre-emptive action and less dire consequences at times than anticipated, the millennium bug had far fewer dramatic effects than people expected. Nevertheless, it caused a period of global uncertainty, costing businesses many billions in risk assessment, remedial management and system testing. People's fears and lack of certainty in the reliability of their technological counterparts and their once thought immaterial systems also led to modifications in immediate personal courses of action: the cancellation of air flights and holidays, for example, as well as changes in individual behaviours more generally for at least a day and in some cases more extensively.

The Y2K and Facebook examples are both interesting not only because of the potential interruptions in technology and human activity that were suggested, but also for the ways these interruptions brought the presence of technology, technological systems and processes involved in the everyday to people's attention; changed behaviours and practices; and caused them to question the place of these technologies in their lives, particularly their reliance upon them. In varied ways, people were called on to recognise and acknowledge the interdependence of human and technology as part of a broader operating system. As Lewis clarifies in relation to Y2K, "Whatever the effects over the coming months on the world economy, and on the convenience of our daily lives, the reputation of computer systems will be transformed" (196).

In terms of the Millennium situation, for example, the lack of foresight inscribed in the decision to use only two figure years in dates, in part possibly driven by the way that the hardware of computers at that time was constrained in size (memory) and power (processing) was overlooked for many years, only becoming recognised, in a sense becoming material (although it always had been material, just not understood as such), when the year 2000 loomed. In contrast, the negative response to the Open Graph architecture was more indicative of a mismatch between the desire of Facebook, or maybe more clearly of Zuckerberg himself, to encourage people to share everything that they did, and those of the Facebook users, who preferred to share information with particular people selectively as opposed to with all "friends" or publicly.

In both of the examples discussed in this paper, people were forced to interrupt what they were doing, to address the possible material consequences of processes that had previously been ignored, or thought to be immaterial, not just in the sense of being black boxes of code, but also in the sense of their being inconsequential when working smoothly. People were asked to engage with technologies in a way that recognised and acknowledged them as other, no longer reliably under control, or at the least potentially about to be inoperable, resulting in a need to modify their practices as a result. In the sense that things that are immaterial are understood to be inconsequential, the interruptions discussed above also mark moments when an immaterial action is instead quite clearly of consequence and merits further consideration. This paper's argument draws attention to the way that almost anything might be regarded as immaterial, at least for a time, such that a technology's immateriality, for example, is a temporary perceptual state supported by its move into the background instead of being foregrounded in everyday relations with people. The immateriality of technological systems is thus linked with their perceived salience, while technical interrupts or philosophical interruptions offer various ways

in which that salience may be re-established or brought to the fore and acknowledged.

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