Technology, Technicity and Emerging Practices of Temporal Sensitivity in Videogames

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Word Count: 9446 [inclusive of references and footnotes]

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Abstract: This paper develops the concept of technicity to think through how technology shapes spatio-temporal perception. It applies this concept of technicity to the development of skilled play in the fighting videogame, *Street Fighter IV*. Drawing upon a larger research project consisting of participant observation, interviews and video ethnography with professional and non-professional competitive players, the paper develops an in-depth analysis of how information about the animation system for the game is compiled and used to develop new sensitivities to time. In doing so, the paper argues that this is one example of the ways in which a variety of technologies shape users capacities to sense space and time through the habitual development of skill.

Key words: technology, videogames, technicity, habit, phenomenality, post-phenomenology

1. Introduction

> 'There is no space and time apart from the technical mediations through which selected events . . . are linked' (Mackenzie 2001 page 241–2).

> "That each hour, minute and second comes to seem as though it does not have to be negotiated but simply slides by, is the result of the density of intermediaries" (Glennie and Thrift 2002 page 156).

In this paper, I develop the concept of technicity to theorise how technology operates to constitutively shape the spatio-temporal awareness, or what could be termed the 'phenomenality', of human beings. Following Mackenzie and Thrift and Glennie, the paper recognizes the multiple technical, material and bodily intermediaries that make time 'appear' in particular ways in particular contexts. In doing so, the paper expands insights around the nature of these 'spacings' and 'timings' (Cooren et al 2005) to think about how sensitivities to time become naturalized into bodily practice.

I outline a concrete example of how the human sensorium is becoming recalibrated in relation to a specific practice: playing and learning to play the arcade fighting videogame *Street Fighter IV* (hereafter referred to as *SF IV*). I point to how the development of habit and skill in relation to these technologies is central in the production of new bodily capacities of time sensitivity. As Cote puts it, "There is no *a priori* or natural configuration of the human sensorium; rather… sensory perception is only ever calibrated in relation to techn[ology]" (Coté, 2010, no pagination, also see Wolff 2010).

Any account of perceptual awareness has to consider the specific technologies through which making sense is enabled, gathered and sensitised within particular material contexts and assemblages. While *SF IV* may seem a colloquial and minor example, the specialist nature of its practice and the explicit formalisation of the knowledges it requires provide a great opportunity to investigate how digital technologies alter the capacities of sense for those who use them. In particular, *SF IV* is an example that demonstrates how new vocabularies for measuring and perceiving time are coming into existence. As such, the issues that *SF IV* raises can be used to lay the theoretical groundwork to begin to think more broadly about the relationships between technology and sensory awareness.

In developing this case, the paper furthers emerging concerns in geography around post-phenomenology (Ihde 2003, 2008, Simpson 2009, Ash 2010) and, in particular, the concept of 'phenomenality' (see Thrift, 2007; 2010; 2011). For Hart, an emphasis on phenomenality, rather than phenomena, shifts attention from the object that appears to *how* that object appears (2007 p39). Or, in other words, the term phenomena refers to what an entity is (for consciousness) while phenomenality refers to the process by which that entity comes to be potentially intelligible for consciousness: “phenomenality corresponds not to qualitative properties of consciousness (qualia), but to the qualitative appearance of the world for consciousness” (Thompson, Lutz and Cosmelli 2005 p15). For Dewsbury, phenomenality refers to “the ways in which, through different systems and technologies the world can be made present and thus different, instead of accepting the implicitly universal phenomena of the world as perceived by subjects” (2010, page 149). For Dewsbury and Cloke, phenomenality is a concept used to “firmly take the intentional and personal subject out of the equation of phenomenology” (2009, page 705). Here, I want to define phenomenality as a process through which the spatio-temporal limits of sense are organised. In other words, phenomenality encompasses how the past, present and future appear as specific modes of potential and how these modes are actively fixed for human perception as a kind of spatio-temporal envelope through a variety of body-technology assemblages. The paper attends to some of the ways in which these processes operate and become habitual in local socialities and contexts. In the case of highly motivated *SF IV* players, these habits are actively excavated through practice, discussion and the development of new vocabularies of language. I argue that the development of these skills can be understood as the contextually appropriate deployment of habituated action. Thinking through the relationship between habit and skill allows us to understand how these forms of action can be simultaneously intentional and conscious, and unconscious and implicit.

The paper also contributes to geographers' interest in code and software in relation to the governmental effects of technology. Much of this work has emphasised the inhibiting nature of technological environments. For example, Dodge and Kitchin have argued we should attend to the 'codespace' that orders the backgrounds of human environments because of the intense "regulatory power" of code (2004, page 205). As Adey puts it, code can operate to 'secure and sort' (2004) bodies and objects into particular categories of threat, or it can work to spatially shape and control bodily movement (Budd and Adey, 2009). While the work of identifying who is in control of these processes of inhibiting is important, the point is that bodies always exist in a inhibiting/disinhibiting relationship with any environment. Rather than simply inhibiting thought and action, practices of technology use can actively be used to disinhibit and recalibrate the temporal perception of users. Technologies are worked into the practices of bodies and directly reorganise the perceptual capacities of these bodies. Accounts of control should therefore take into account this dual process of inhibition and disinhibition. The emergence of these phenomenalities are not simply imposed from above, but are actively generated and negotiated through the development and training of specific habits of the users themselves.

The empirical material for this paper is based upon interviews, participant observation and video ethnography collected at the UK's largest videogame fighting tournament *Super Vs Battle* in 2009 and 2010. What makes *SF IV* and the tournament scene associated with it so interesting is that it provides something of a phenomenological laboratory with which to study processes of perception. Specifically, it allows an investigation of temporal experience that is usually unremarked upon because it exists at the thresholds of conscious awareness. Whereas casual players of the game may have an intuitive awareness of the more complex aspects of the game's underlying systems, individuals visiting and competing at *Super Vs Battle* are generally more actively involved and skilled in the game. These skilled players have developed a vocabulary (which includes both numbers and words) they can use to verbalise and reflect upon moves and forms of action that require the ability to differentiate between very small units of measured time. Indirectly (and often implicitly) this provides skilled players with forms of temporal awareness that exist at thresholds of consciousness that casual players usually lack. As I argue in sections three and four, the tournament scene and its associated online community consist of a group of individuals who are actively involved in the excavation and investigation of these thresholds as an implicit part of how they learn to play the game better[1].

The rest of the paper forms four parts. In section two, I review various understandings of the term technicity in order to develop a post-phenomenological account of technicity. In section three, I apply this concept of technicity to argue that the 'combo' system of moves in *SF IV* and the 'frame data' that has been generated to analyse this combo system produces new units for measuring and experiencing time. In section four, I outline how these units are utilised by players to technically inscribe new sensitivities to time within their bodies through habitual techniques. I conclude by arguing that this post-phenemenological account has broader implications in terms of how human phenomenality is becoming orientated around a set of more transparent and ubiquitous technologies that operate to generate particular forms of implicit habit.

2. Towards a post-phenomenological account of technicity

The concept of technicity has a long and complex history (see Bradley 2011). Armand and Bradley (2007) argue the concept originates in Aristotle's concept of *technē*. For Aristotle:

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[1] For example, www.Shoryuken.com is an international website where players come together to share tips, tricks and post the details of local, national and international tournaments.

> "*technē* is an essentially inert, neutral tool whose status is entirely determined by the use to which it is put by human beings…*technē* is a prosthesis (pro-thesis, i.e., an addition; what-is-placed-in-front-of) considered "in relation to" nature, humanity or thought; one that can be utilised for good or ill depending upon who or what happens to wield it" (ibid 2007 page 2).

More recently, the term has taken on a variety of meanings outside of this narrow instrumental definition. In what follows I outline how writers such as Martin Heidegger, Gilbert Simondon and Bernard Stiegler have developed the concept. I argue that technicity can be understood in three key ways: as a persuasive logic for thinking about the world; as a mode of existence of technical objects; or as an originary condition for human life itself. Developing aspects of all of these approaches I suggest my own post-phenomenological definition of technicity.

For Heidegger, technicity refers to the capacity of technology to render beings calculable and knowable: "Technicity is producing beings themselves (producing nature and history) unto the calculable makability; unto the machination that thoroughly empowers the producibility" (2006 page 152). In other words, "technicity is the manner in which entities in the world, including human beings, become revealed such that they are experienced as objects that are available and subject to control and exploitation" (Kleiman and Kleiman 2007 page 157, see also Levin, 1999; Cranny-Francis, 2007; Wolff, 2008).

For Simondon (2009), technicity refers to the specific 'mentality' of technical objects (also see Bontems 2009, Vries 2007). This mentality consists of two postulates. The first being that technical objects are made up of "subsets [that] are relatively detachable from the whole of which they are a part" (2009 page 18), and the second that these objects have a particular homeostatic autonomy or zone of stability in which they can exercise a degree of autonomy. As Simondon puts it, "the majority of technical realities are subject to the existence of a threshold to start up and to maintain their own functioning; above this threshold, they are absurd, self-destructive; below it, they are self-stable" (2009 page 19). To illustrate this, Simondon gives the example of a combustion engine:

> "An internal combustion engine that is turned off is in a stable state and cannot turn itself on; it needs a certain amount of energy coming from outside, it needs to receive a certain angular speed in order to reach the threshold of self -maintenance, the threshold beyond which it functions as a regime of automatism, with each phase of the cycle

> preparing the conditions of completion for the following phase" (ibid).

In this case, particular parts of the engine can be detached and replaced when worn out—such as the fan belt—and the engine will still operate in the same way. This illustrates the first postulate of technicity. At the same time, the engine also demonstrates the second postulate; once started, the engine will continue to cycle as long as fuel is fed to it. For Massumi, Simondon's account of the technical object is based around a distinction between potentiality and actuality, in which any particular object is always undergoing a process of:

> "individuation—an event of taking-form—whose past conditioning pre-contains the coming potential of its functional autonomy within certain parameters. The parameters are homeostatic, or equilibrium-tending. The key point is that the moment of technical mentality—the *technicity* of the technical object—is always immanent to a material event of taking-form". (Massumi 2009 page 42).

In developing Simondon's account, Mackenzie explains that, "'technicity' refers to a specific virtuality or eventfulness associated with technical mediations. At the risk of misunderstanding, it could be said that technicity is a term for the historical mode of existence of technical mediations" (2001 page 237).

In summary, Simondon, Massumi and Mackenzie theorise technicity as a way in which technical objects exist in the world. Within geography, the concept of technicity has mainly been developed in this sense as "the productive power of technology to make things happen" (Dodge and Kitchin 2005 page 162, see also Kitchin and Dodge 2011, Galloway 2004; 2010, Thrift 2005). However, as Armand and Bradley argue, the concept of technicity, as developed by writers such as Derrida (1976), does not refer simply to technology as productive. Instead technicity refers to the originary nature of technology to human life.

> "[T]echnicity names something which can no longer be seen as just a series of prostheses or technical artefacts—which would be merely 'supplemental' (or supernumerary) to our nature—but the basic and enabling condition of our life-world. From the watch we wear to the server we log into, we exist prosthetically, that is to say, by putting ourselves outside ourselves" (2007 page 3, see also Beardsworth 1998, Frabetti 2011).

Developing the notion, Stiegler argues that technicity refers to the originary capacity for technology to give humans an orientation in time (1998, see also Roberts, 2005, Camp 2009). The technicity of technology works as a "durable fixing of the now" (Stiegler, 1998, page 224; see also Stiegler 2009 page 53). By this Stiegler means that using technology shapes how the 'now' as a phenomenological experience emerges from a relationship between the memory of the past and the anticipation of the future that is related to an activity in question. As such, Stiegler suggests that the 'now' of perception is not simply 'there' or apparent to human perception but only 'appears' to humans through the sets of equipment and technology that make up the ecology of an environment. Clocks, timetables, hammers and so on implicitly create an experience of the present and a way of relating past memory to future experience. As Heidegger puts it:

> "That which gets counted when one measures time concernfully, the 'now', gets co-understood in ones concern with the present-at-hand and the ready-to-hand […] Thus the 'nows' are in a certain manner, co-present-at-hand: that is, entities are encountered and so too is the 'now'. Although it is not said explicitly that the 'nows' are at the same time present as Things, they still get seen ontologically within the horizon of the idea of presence-at-hand" (Heidegger, 1962, page 475).

For example, in swinging a hammer to hit a nail, the user must be aware of why they are performing that action (perhaps to hang a picture on a wall). This implies a future outside of present experience. At the same time, the ability to swing the hammer relies upon past experience or memory. In this way, the experience of a 'present' or 'now' of perception (whether that be conscious or unconscious) is constructed from this equipmental structure. The 'now' therefore has no objective existence and only exists for perception as structured around a dual process of anticipation and memory that actively emerges from an equipmental structure of technology. As Stiegler argues, this process of fixing:

> "does not mean to determine but to establish. The tool of what is established is the vice that fixes the object of work, that makes possible both a determination and…the indetermination of the multiplicity of possible determinations" (Stiegler 1998 page, 222).

Therefore, how the now is established is highly contingent upon, and relative to, the technologies and practices within a specific locality. Hammering, watching a television set or playing a video game actively shape the experience of temporality; engrossed in the television program an hour passes quickly, whilst an hour sweating at building a cabinet may seem much more to the unskilled carpenter. However, this is not merely a subjective take on an objective activity. Stiegler argues that each object acts as a kind of miniature clock that attunes users of that object to different durations of temporality based upon its material structure and interface. As he puts it "concern is always inscribed in a complex of tools and a tool is always inscribed in a finality that itself stems from a mode of temporalisation of temporality" (1998 page 264). Just as one technology establishes the now in a specific way, it also opens up other possibilities for ways of establishing other forms of 'nowness'.

Returning to Simondon, each objects specific technical mentality is central to the establishment of this now. For example, the size and weight of a hammer head would affect the speed and power with which the hammer is swung. The swing would also be affected by the relative durability of the hammer and the distance and size of the target. The now emerges from the relationship between anticipation and memory (which is itself structured by the technical mentality of the object) that is utilized to swing the hammer.

This concept of technicity complicates traditional phenomenological accounts of time consciousness and debates around the reality of the now for consciousness (see for example Crang 2005, Dodgshon 2008, 2008b). As Dodgshon (2008b), following James (1890) argues, humans inhabit a 'specious present' in which we never experience a completely unextended now and we never experience a now in isolation. Or in Pockett's words, "Now always shades on one side into the past and on the other side into the future" (2003, page 56). This follows our common sense intuition that "all time—what is past or in the future no less than what is present—is experienced only through each now, an experience that leads us to tense time around the present" (Dodgshon 2008b page 300). In contrast to this common sense perspective, I want to argue that the now emerges from the relationship between memory and anticipation and is thus secondary to past and future. The now only exists through a relation with an activity, environment or ecology rather than some form of fixed or *a priori* subjective position from which experience is registered. Hansen draws upon Stiegler to argue that the specious present of perception:

> "always and necessarily finds itself in the midst of an horizon – a world already constituted by and compromising both what it had experienced in the past and what of the past it never experienced (i.e. what was experienced by others and gifted to it through technical memory supports)" (2002 page 255).

This is not to say that contemporary time consciousness is entirely dependent on technology. As Glennie and Thrift argue, time awareness was available before the advent of clocks or other technical objects, based upon: "a mixture of environmental cues (solar position, perceived qualities of light or dusk and so on) and the unequal (seasonably variable) hours of the…day" (2002 page 159). As such, one cannot argue that technology is constitutive of contemporary time consciousness, only that it actively and continuously shapes how the now is experienced. Relating this to Stiegler's work, James asks us to:

> "demand that the new technical media be thought in such a way as to engage critically with the modes of temporalization they engender, with the time-consciousness they may come to constitute, and with the 'programs,' or cultural forms they may produce or be in the process of producing" (James 2010 p223-224).

In this paper, I attempt to perform such a task by developing the a case study of *SF IV*. The example of *SF IV* points to the intimate relation between bodily skill and time consciousness and demonstrates how particular assemblages of technology generate particular technicities of time. The effect of this technicity is that skilled players are able to use what is known as 'frame data' to sensitize themselves to new and incredibly small units and modes of temporality. Engaging with technologies such as *SF IV* literally generates new capacities to deal with and experience time.

3. Street Fighter, 'Frame Rate' and emerging units of temporal awareness

SF IV is a fighting videogame that was released in 2009 by Capcom in arcades and on home videogame consoles including the Xbox 360 and Playstation 3. The game is the latest incarnation of Capcom's long running series, which to date has had over 30 iterations since the original *Street Fighter* was released in arcades in 1987. The *Street Fighter* series of games (here after *SF*) are two dimensional, one-on-one fighting games in which players choose from a cast of characters, all of whom have their own specific fighting techniques and special moves. In the arcade version of the game, players control their characters using a joystick and six buttons that are fixed to the arcade cabinet.

Successful play in *SF IV* is based on the mastery of increasingly complex directional inputs and combinations of button presses. The result of this complexity is that the majority of serious players play the game through an arcade stick rather than the console's control pad.

The *SF* series became incredibly popular in its second iteration *SF II*, which was released in arcades in 1991 and spawned many iterations and upgrades over the next ten years. However, each iteration created a more niche and specialist market as the games became increasingly complex and opaque to play, which dampened mass interest. *SF*'s popularity was rekindled by the release of *SF IV*, which saw a return to the roots of the series and a simplification of its more complex gameplay mechanics. The overall popularity of *SF* as a series can possibly be explained by the competitive nature of its design. Arcade units have two sets of controls which means that two human players can directly compete against one another. This competitiveness led to the development of national and international tournaments where individuals would enter to prove their superiority on a world stage.

Frame rate forms the basic temporal unit of sense in *SF* games (and indeed the majority of current fighting games) because of the development of so called combination moves or 'combos' in *SF IV*'s popular predecessor *SF II*. Combos are sets of linked attacks that can inflict high levels of damage on an opponent. Curran defines combos as "an unbreakable series of hits performed by one player on another" (2004, page 33). What is interesting about the development of combos is that they were not intentionally designed into *Street Fighter II* but emerged almost accidentally as the contingent product of the game's complex animation system. Citing an interview with Funamizu (the creator of *SF II*) Curran suggests:

> "[combos] fortuitous appearance in *Streetfighter II* was entirely down to the amount of craft that had gone into the art side of things. Funamizu… had demanded distinct frames of animation showing each character reacting appropriately to every possible injury, so the impact of blows would be felt as keenly as possible by the player. But those few frames of pained animation prevented the player from blocking, and gave the opponent grace to land a second blow, and then a third, and so on. Once the first blow had landed, there was no escape. Combos weren't easy to pull off…They required skill and timing, a knowledge of which blow would link neatly to the next, and which move would create the most damage while leaving the combo open for the follow up" (Curran, 2004, page 33).

The emergence of combos as a distinct skill and knowledge base was the outcome of the way in which movement was represented spatially through the cutting of time into distinct frames of animation. In *SF IV* the game itself runs at 60 frames of animation a second, meaning that a single frame lasts one sixtieth of a second. The specific perceptual and somatic skills that are necessary to perform combos in the game are shaped by this seemingly contingent mathematic variable. Some combos in *SF IV* require the player to input moves within temporal windows of ten, five and even a single frame of animation. This means that skilled players regularly have to respond to what is happening on screen within one sixth, one twelfth or even one sixtieth of a second. It is hard to overstate how tiny such units of time are, let alone how difficult it is to input moves through the control stick within such windows—and to do so reliably.

Frame rate can be understood as a novel way of measuring and framing time because, historically, it was never supposed to be perceived by the human viewer. Like cinema, videogames are intended to be experienced as a continuous stream of motion, rather than a series of discrete frames. Cinema is usually shot at twenty four frames a second, but the viewer should perceive the content of the film and not the material movement of the film itself. As Doane puts it:

> "temporal continuity is in fact haunted by absence, by the lost time represented by the division between frames. During the projection of a film, the spectator is sitting in unperceived darkness for almost 40 percent of the running time" (Doane, 2003, page 172).

Historically, this illusion has been accounted for through the concept of the afterimage—the idea that the viewer momentarily retains an image that is placed before them. However, more recent accounts suggest that the experience of movement is derived from a series of images because the speed at which they are played makes the difference between individual frames imperceptible to the human eye (Doane, 2003).

Since combos emerged within *SF II,* Capcom has intentionally developed the combo and special moves systems of subsequent *SF* games. Capcom have achieved this by introducing 'power up' bars and meters that can be used to perform 'ex' and 'ultra' moves, which can themselves be utilised to create more complex and challenging combos. The complexity of these combos and the popularity of the games led to a formalisation and publication of knowledge about the underlying mechanics and systems of the game.

Originally published as lists of combos printed in specialist videogame magazines, this knowledge has most recently been formalised through the creation of tables of 'frame data' for characters' moves in *SF IV* (see Table 1). The development of frame data begun with the fan communities themselves who created their own tables of data in order to improve their skills[2]. In

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[2]Fans create frame data by video recording specific moves and then slowing down the footage to count the number of frames for each part of a move. These unofficial tables of frame data can be found at sites such as www.eventhubs.com which lists frame data and strategy guides for all the characters in *SF IV* and other popular fighting games.

response, Capcom has published its own 'official' tables of frame data in an attempt to capitalise on player interest.

Table 1: example of frame data for the SF IV *character Ryu. Adapted from* [*http://www.eventhubs.com/guides/2008/nov/13/ryu-frame-data-street-fighter-4/*](http://www.eventhubs.com/guides/2008/nov/13/ryu-frame-data-street-fighter-4/)

As it will become clear in this paper, the frame data (from official or fan sources) provides players with new ways of conceptualising the game and, in doing so, offers them the information to respond in an appropriate way when an opponent attacks. Frame data presents and quantifies each move in the game in terms of the amount of frames it takes to complete and the frames of 'advantage' each move provides. Frame data breaks each move down into three components: 'Execution, Active and Recovery' (or 'Startup', 'Active' and 'Recover' in Table 1). As the official strategy guide to the game explains:

> "Execution [is] [t]he number of frames it takes from the moment the attack command is input to the earliest possible moment it connects with an opponent. Active [is] [t]he number of frames an attack can hit an opponent after it has been executed. Recovery [is] [t]he number of frames it takes for the character to recover from an attack before another command can be input" (sfframedata.com 2009).

Take the frame data for Ryu's close light punch (the first line of data in Table 1). From Startup to Recovery, Ryu's close light punch takes twelve frames of animation to complete. This is equivalent to 0.2 of a second. This is broken up into three frames of Startup animation, three frames of Attack animation, and six frames of Recovery. If the punch hits the opponent, it gives the player a five frame 'Hit Advantage' where the opponents character is stunned and cannot respond. In order to link Ryu's light punch to another move, the player has to respond within these five frames The player can link Ryu's light punch to another light punch because the Startup animation is three frames for the following punch. There are five frames of animation after the player's initial light punch in which the opponent is stunned, during this window the move can be executed again. The player has a margin of error of two frames of animation (equivalent to 1/30th of a second) to successfully perform the link from one light punch to the next. In this way, frame data is a complex system for analysing the seemingly imperceptible flow of animation at 60 frames a second that has been developed, by both fans and developers, in order to exploit the underlying animation system of the game.

For Sobchack (2009), the term animation is a contradictory concept. Animation refers both to the vital, creative movement of life and living bodies and the automatic and mechanical movement of dead machines. Thinking through the materiality of frames and frame data, the animation system in *SF IV* is not simply about vital or mechanical movement alone. Instead, the animation system is a meeting point at which relations between living and dead matter become reorganised. Drawing upon Stiegler, the frame data can be understood as a 'system of traces' (embodied in the numbers that make up the charts of data) that translate the phenomenological flow of animation moving at sixty frames a second into a series of static figures that can be reflected upon and analysed outside of the context of the game. As Stiegler puts it:

> "number in general can only be conceived of as being determined within a system of traces, any notation constituting itself through the external manipulations of symbols: there is no mental calculation not resulting from the secondary interiorization of a calculation by symbolic manipulation [such as numbers or words], that is to say through manual behaviour" (2011, page 52).

In other words, there is no opposition between gesture, calculation and the representation of symbols that make up the frame data. The process of representing frames of animation as frame data does not simply deaden the potential of the animation. Instead, this process of representation, and the analysis this representation allows, actively enables players to rework their experience of moving images and potentially recalibrate their temporal perception.

Drawing upon Stiegler's account of the relationship between materiality, corporeality and inscription, the frame data in *SF IV* can be usefully rethought as helping players become sensitive to and aware of different units of measured time. The frame data form part of an assemblage between player and game and producing a specific technicity which operates to reframe capacities for temporal experience. Frame data works to represent and quantify units of time far below conscious awareness and, in doing so, provides an equipmental context for the opening of temporal windows at increasingly small intervals in players' perceptions. Drawing upon Stiegler's account of technicity as a 'durable fixing of the now', we can begin to consider how the frame data operates to technically frame and mediate habit and in doing so shape the temporal consciousness of highly skilled *SF IV* players.

Much like the temporal marker of a clock, the frame data operates to measure change through the equalization of a duration of time. As Stiegler, via Heidegger, puts it: "the clock measures time (or change) by comparing the duration of an event "to identical sequences on the clock[,] and [it] can thereby be numerically determined (Heidegger, 1992, page 4e)" (Stiegler, 1998 page 212). The equipmental context of the frame data is the discreet numbers and tables that name, partition and separate out parts of the move into a series of decontextualised elements. In Stiegler's terms, the frame data works as a 'vice' to enable a determination of time into a specific unit (the frame) that can then be worked into the somatic habits of dedicated players. But, at the same time, this framing also opens up a series of further indeterminations. A range of previously unknown moves and combos can become apparent and available to players once the frame data from various moves can be compared. These moves and combos open opportunities in the game, but they also work to determine future possibilities.

By formalizing the simple mathematics within the animation and move system in the game as a set of frame data, players are able to open up the potential to develop new sensitivities to temporal experience. This is not a simple process of calculating what moves are possible within a given situation and then acting upon this calculation; It involves a difficult process of learning the perceptual windows in which links must be performed into the habitual capacities of the body. To the causal onlooker, a light punch is gone as soon as it arrives. But, for the experienced *SF IV* player, who is familiar with frame data, the punch has a specific temporal window in which a follow up move can be performed.

There are a number of ways in which the frame data is enrolled into competitive and professional players' practices with the game. Firstly, the frame data can be viewed on a computer, laptop or smartphone screen, or it can be printed out onto paper. this allows the data to be used as a reference guide before and after match play. For example, if a player is continuously being attacked with a move or combo they can look up the frame data for that move and work out a move that they can respond with that has a lower start up or recovery value. The data works as a memory aid to inform the broader strategy of the player as they compete. Secondly, data for key moves and characters can be memorized and drawn upon in match play itself. Players may know the data for popular characters moves because they are likely to encounter them within match play on a fairly regular basis. Here the memorization of frame data can inform strategy at key points during a match. For example, when opponents have little energy left the player can use frame data to work out the best opportunity to land a killer move or combo.

As such, the individual frames of animation that make up the basis of the combo system in *SF IV* and the frame data itself act as a temporal framing device. The specific duration of the frame serves to break up the flow of time through a process of distinction and separation into a discreet unit. This unit then forms the basis for new potential sensitivities of temporal awareness. These forms of temporal awareness are technically habituated into the body through the development of a series of bodily habits, which I outline in the next section.

4. Habit and generating temporal sensitivity in the body

For many *SF IV* players, the joy and frustration of the game is learning to perform complex moves and combos in match play. Execution is a key part of this learning process. Even once competent players have learnt key aspects of their chosen character's frame data, the temporal windows in which the inputs have to be performed can still be too small to be performed in reaction to what other players are doing. As one player puts it:

> "There is no way you can react to it [an opponents move], but you can anticipate it. Its anticipation over reaction. There are times when you can react to things, but 70% of the time its anticipation" (interview with competitive *SF IV* player)

Indeed, within geography and other disciplines the existence of a half second delay between action and cognition has been much debated (see Libet et al, 1979, Thrift 2002, Massumi 2002, and critics such as Pockett 2002, Trevena and Miller 2002, Bennett et al 2003, Durgin and Sternberg 2002, Leys 2011). Rather than comment directly on the reality of such a delay, I want to point to the ways in which players actively attempt to linger, transgress and play at the edges of a conscious limit that seems to exist well below this half second threshold. In *SF IV*, players utilise frame data as an external measure to differentiate between single frames of animation in an attempt to open up this delay in order to improve their game. I turn to the notion of habit here in order to theorise how these skills emerge as complex forms of habituated action. In this section, I outline two bodily techniques of habit and perception that players utilise to play at the thresholds of temporal distinctions that are unavailable or inaccessible to consciousness: 'buffering' and 'plinking'.

Buffering is a key technique used by competent *SF IV* players to reduce the temporal gap between action and reaction that operates as a biological limit on the potentials of human perception when an opponent attacks. Buffering refers to inputting parts of the move commands on the control stick in advance of performing the full move in order to respond more quickly to an emerging situation. As one player puts it:

> "The thing with Street Fighter is that you can have execution down fine, if you know what your opponent is going to do you will generally win because you can let them do their moves and then counter them. It's a lot of guess work and probability. If you come up against a character that jumps in a lot like Juri or Adon, their attacks come from the air. You need to anti air those characters [an attack that intercepts their attack in mid air]. But you haven't got time to react to those moves, its too quick. You can't perceive or see Adon's air attack Startup and then react to it. But what you can do is be entering the directional input all the time when you think it is going to happen. Because you are not pressing the button you are not committing to anything. When suddenly he comes up, you just press punch and it [the anti air attack] will intercept [them]." (interview with competitive *SF IV* player)

In this way, buffering works to overcome the indeterminate, inaccessible space between action and perception. However, when performing a combo, this buffering technique cannot be used because the inputs required by the system to perform the move require exact temporal intervals to be successful.

It is only through conscious practice and the development of habit that players can begin to perform the complex combos in the game. For Ravaisson, habit is "what remains of a repeated change" (Malabou, 2008, page viii). Habit can be understood in a general sense as the outcome between two opposing forces: action and passion.

> "Passion is the manner of being that has its immediate cause in something other than the being to which it belongs. Action is the manner of being whose immediate cause is the being to which that manner of being belongs. Action and passion are thus opposed to each other; and the coming together of these contraries contains all the possible forms of existence" (2008 page 43).

Habit in this sense become generated in relation to particular environments and technologies. In Dewsbury's words:

> "Habit simultaneously enacts two agonistic powers: the weakening of passivity and the exaltation of activity. Take a new encounter that might stimulate a change in habit, this is first received with passivity in the passive affections of the body (can you balance your body on the two wheels of a bike?). If this affect is joyful (in that it increases the capacity to be), the encounter is desired again" (2011 page 151).

The outcome of these antagonisms is that these habits can also become instinctive: "habit transforms voluntary movements into instinctive movement" (Ravaisson 2008, page 59). The temporal recalibration of perception operates through the development of this instinctive movement, embodied in the repetition of action. Take, for example, one players account of learning a difficult 'link' combo in *SF IV*'s training mode.

> "Personally, it happens so fast it's hard to break down the relationship between the image, the sound and the input. But, for me, learning new combos is all about rhythm. You feel when the right time is to do the next input" (interview with competitive *SF IV* player).

The player argues that, at first, the necessary inputs to perform a combo are beyond the limits of his visual awareness. The relationship between image, sound and input are too closely tied to work out the specific temporal relationship between these markers that will allow him to successfully perform the combo. He suggests that, in order to learn the move, players have to break the combo down into its individual components.

> "The hardest combo I can do it crouching light kick, crouching light punch, crouching strong punch to hurricane kick [a spinning kick performed by turning the control stick a quarter circle away from the direction the players character is facing and then pressing any kick button]. When I first started learning the combo, I could do it maybe

> one in ten times…So what I did was break down the combo. Get down the basic crouching light kick, light punch so there was no question this was always going to happen. Then the key part of it was the transition from the crouching light punch to the crouching hard punch because there is also Startup animation for any move. So crouching hard punch is quite a powerful move…and takes quite a while to initiate after you hit the button. So that is quite a tight window and was a key one to learn" (interview with competitive *SF IV* player).

For the above player, the hardest part of the combo is the transition from the light punch to the hard punch. This is because it has the smallest temporal window in which the link between the two moves can successfully be made. However, the player is only able to articulate this point clearly because of the prior exteriorisation of this phenomenological experience into a broader discourse of knowledge and language regarding the animation system and frames of the game. The player breaks down the combo into its individual moves—light kick, light punch, hard punch and hurricane kick. It is only then that he can break each move into its consecutive components. Furthermore, it is only when equipped with the idea that each move is formed from a Start up, Execution and Recovery period (that is provided by the frame data) that he can begin to assess what part of the combo he needs to practice. In this specific case, the difficult link is between the Recovery of the crouching light punch and the Frame Advantage it provides and the Startup of the crouching hard punch. The data, and the language used to describe the data, therefore offers an accuracy to the players practice that would not be possible without this language.

> "You have to defeat your own perception of when it should be in terms of the animation just to learn by trial and error when it will actually be. It's not a case of looking to see when his [the character Ryu's] hand and arm pulls back. You have to learn when it works and then look at the screen retroactively. You don't lead with the visual, you lead with the success of the inputs. You then try and find signs that indicate this is when it should be. Once you have done it a few times right, you will notice Ryu's arm is back so far and that is when its time to do the hard punch" (interview with competitive *SF IV* player).

From this excerpt, we can clearly see how this competitive player has to rework his own perceptual relations between vision, touch and action. Ravaisson might argue that the development of this habit emerges from the players body itself: '[a]ction is the manner of being whose immediate cause is the being to which that manner of being belongs' (2008 p59). In the above player's own words, he has to actively 'defeat' his naturalized processes of perception and habitually inscribe new relations between thought and action into his body (which participant one discusses as a process of learning).

Bateson terms this transformation of voluntary movement into instinctive movement the 'economy of consciousness' (1972 page 143).

In Bateson's account, habit becomes a way of freeing up the limited capacities of consciousness to deal with more complex tasks or events in an environment. In doing so, the less important tasks are dealt with by the underlying embodiment of habit. However, thinking through the technicity of the frames and frame data which underlie *SF IV* complicates this account. Developing the concept of technicity as a 'durable fixing of the now', it is possible to argue that the temporal windows of sense that become second nature in habit demonstrate the technically constituted nature of (human) habit itself. As Ravaisson puts it:

> "Habit is an acquired nature, a second nature that has its ultimate ground in primitive nature, but which alone explains the latter to the understanding. It is, finally, a natured nature, the product and successive revelation of naturing nature" (2008, page 59).

As an 'acquired nature', the development of habits can be actively used to develop techniques for transgressing the seemingly determined unit of time presented by the individual frames of animation. Particular habits employed while playing *SF IV* do not simply move from consciousness to unconsciousness, but can be actively brought to consciousness and reworked.

For example, advanced *SF IV* players develop the technique of 'plinking'—a novel way of linking combos together. As one player explains:

> "So plinking is making links [combos that require strict timing] easier… The best example where plinking is useful is where you are trying to link a crouching medium punch to crouching medium punch. That's quite a lengthy animation and there's quite a small window to try and link them both. When you plink you press two buttons at once. Instead of just pressing medium punch, medium punch, you press medium and light punch, medium and light punch [together]. It's a way of lengthening the window in which you can make the combo. It gives the computer the impression you are pressing light punch rather than medium and its much easier to link light punch to light punch. Basically its giving you more time to link the two punches together" (interview with competitive *SF IV* player).

Plinking works by transgressing the frame as a specific unit of duration. Hitting two punch or kick buttons together opens up the temporal window in which a link can be successfully made. This particular player plinks light punch and medium punch in order to make the link between two medium punches easier.

The technicity of time, durably fixed around the frame rate, can be actively reworked and re-fixed around a different set of technical relations. This is not a matter of the player subjectively analysing the scene in a more informed way (through the knowledge of how plinking operates, for example). Instead, the player actively creates more time in which to successfully link moves to one another. The frame data, therefore, allows players to actively investigate and explore the underlying computational system of *SF IV* and translate this into the development of new technicities of time. In the case of plinking, time is opened up and expanded as the computer is 'tricked' into giving the player more time to make the links between moves. In turn, these techniques form the basis of new structures of temporal awareness and habit. The inscription of these habits into the body can be a source of both great joy and frustration for players. Most players encounter real difficulty in producing consistent execution of combos, moves and other techniques. What this points to is the precarious nature of the phenomenalities that are generated during play.

5. Conclusion

This paper has developed the concept of technicity to understand how human sense is organised around particular technologies (in this case *SF IV*). In doing so, I have pointed out the ways in which *SF IV* players become sensitised to new units of temporality and how these sensitivities allow them to respond to events within incredibly small temporal windows.

The broader argument is that technology always has and always will alter human phenomenality in some way. As Stiegler suggests, all technology has a specific technicity—a way of disclosing 'the now' for human consciousness. What are the politics of such shifts in phenomenality? In the context of *SF IV*, players become sensitised to incredibly small units of time. How do other types of interface shape this sensitivity and to what ends? These questions move far beyond the remit of this paper. However the paper does offer a way for beginning to think about how the technicity of these frames are constructed and their effects on the structuring of bodily habit and perception.

Acknowledgements

Many thanks to three referees who provided perceptive and detailed insight and helped improve and sharpen the precision of the paper in many ways. As usual, thanks to Lesley Gallacher for reading drafts and offering sound advice.

References

Adey P, 2004, "Surveillance at the airport: surveillingmobility/mobilising surveillance" 'Environment and Planning A 36 1365 ^ 1380

Armand, L and Bradley A, 2007 *Technicity* (Prague: Charles University Press, 2007).

Anderson B and Harrison P, 2010 “The promise of non-representational theories in Anderson, B and Harrison, P (eds) Taking-Place: Non-representational theories and geography (Ashgate Publishing, London, UK)

Ash J, 2010 “Teleplastic technologies: charting practices of orientation and navigation in videogaming” Transactions of the Institute of British Geographers, 35 (3) 414-430

Bateson G, 1972 Steps to an ecology of mind (Chicago University Press, Chicago, US)

Bennett, MR and Hacker PMS 2003 “Philosophical foundations of neuroscience (Blackwell Publishing, London)

Beardsworth R, 1998 “Thinking Technicity” Journal for Cultural Research (2): 1 70-86

Bontems V, 2009 “Gilbert Simondon’s genetic “mecanology”and the understanding of laws of technical evolution” Techne 13 (1) 1-13

Bradley A, (2011) Originary Technicity: The Theory of Technology from Marx to Derrida (London: Palgrave Macmillan)

Budd L, Adey P, 2009 "The software-simulated airworld: anticipatory code and affective aeromobilities" Environment and Planning A 41(6) 1366 – 1385

Camp, N V 2009 “Stiegler, Habermas and the Techno-logical Condition of Man” Journal for Cultural Research 13(2) 125 - 141

Coté M, 2010 "Technics and the Human Sensorium: Rethinking Media Theory through the Body." Theory & Event 13(4) <http://muse.jhu.edu/>.

Cranny-Francis A, 2007 “Ecco-techne or suiting the biomechanical platform: immersion and contemporary embodiment” 6(2) 156-169

Curran S, 2004 Game Plan: Great Designs that changed the face of computer gaming (Rotovision Publishing, Sweden)

Dennett, Daniel C. & Kinsbourne, Marcel 1992 “Time and the Observer” *Behavioral and Brain Sciences* **15** (2) 183-247.

Dewsbury JD, 2010 “Language and the Event: The Unthought of Appearing Worlds” in Anderson, B and Harrison, P (eds) Taking-Place: Non-representational theories and geography (Ashgate Publishing, London, UK)

Dewsbury JD, and Cloke P, 2009 “Spiritual Landscapes: existence, performance, immanence” Social and Cultural Geography 10(6): 695-711

Dewsbury JD, 2011 “The Deleuze-Guattarian assemblage: plastic habits” Area 43(2) 148-153.

Doane MA, 2003 The Emergence of Cinematic Time, Modernity, Contingency, the Archive (Harvard University Press, Cambridge, MA)

Dodge M and Kitchin, R, 2004, “Flying through code/space: the real virtuality of air travel” Environment and Planning A 36 195-211

Dodgshon R A, 2008, "In what way is the world really flat? Debates over geographies of the moment" Environment and Planning D: Society and Space 26(2) 300 – 314

Doel M, 2010 “Representation and Difference” in Anderson, B and Harrison, P (eds) Taking-Place: Non-representational theories and geography (Ashgate Publishing, London, UK)

Doel M A, Clarke D B, 2007, “Afterimages” Environment and Planning D: Society and Space 25 890-910

Durgin, FH and Sternberg, S 2002 “The Time of Consciousness and Vice Versa” Consciousness and Cognition 11 284-290

Frabetti F, 2011 “RETHINKING THE DIGITAL HUMANITIES IN THE CONTEXT OF ORIGINARY TECHNICITY” Culture Machine 12

Friedberg A, 2006 The Virtual Window, (MIT Press, Cambridge, UK)

Galloway A, 2004 “Intimations of everyday life: Ubiquitous computing and the city” Cultural Studies 18(2-3) 384 - 408

Galloway A, 2010 "Locating media futures in the present. Or how to map emergent associations and expectations" Aether the journal of media geography 5, 27-36

Glennie, P and Thrift, N 2002 "The spaces of clock time" in Joyce, P (ed) (2002) The Social in Question: New bearings in history and the social sciences (Routledge Publishing, New York) p151-175

Hart, K 2007 "Phenomenality and Christianity" *Angelaki: Journal of the Theoretical Humanities* **12**(1) 37-53

Heidegger M, 1962 Being and Time (Blackwell Publishing, Oxford, UK)

Heidegger M, 1977 The Question Concerning Technology (Harper Collins: London, UK)

Heidegger M, 1992 The Concept of Time (Blackwell Publishing, Oxford, UK)

Ihde, D 2003 *Postphenomenology – Again?* (The centre for STS studies, Aarhus)

Ihde, D 2008 "Introduction: Postphenomenological Research" *Human Studies* **31** 1–9

James I, 2010 "Bernard Stiegler and time of technics" Cultural Politics 6(2) 207-227

Kitchin, and Dodge, 2011 "Code/space: software and everyday life" (MIT Press, Massachusetts)

Kleiman S and Kleiman A, 2007 'Technicity in Nursing and the dispensation of thinking" Nursing Economics 25(3) 157-161

Lakoff G, 2010 "Why it Matters How We Frame the Environment", Environmental Communication: A Journal of Nature and Culture, 4(1) p70 - 81

Levin DM, 1999. The Philosopher's Gaze: Modernity in the Shadow of Enlightenment, (University of California Press, Berkeley)

Libet B. Wright Jr, E. W. and Pearl, D. K. 1979 "Subjective referral of the timing for a conscious sensory experience". Brain 102 193-224.

Mackenzie A, 2001 "The Technicity of Time: From 1.00 oscillations/sec to 9,192,631,770 Hz" Time and Society 10(2-3) 235-257

Malabou C, 2008 "Addiction and Grace: Preface to Felix Ravaisson's Of Habit" in Ravaisson F, Of Habit (Continuum Publishing, New York)

Massumi B, 2009 "Technical Materiality" Revisited: Brian Massumi on Gilbert Simondon. Parrhesia 7 36–45

Pingree, L and Pingree, GB (eds) (2003) New Media, 1740-1915 (MIT Press, Cambridge, UK)

Pockett, S. (2002). On subjective back-referral and how long it takes to become conscious of a stimulus: A reinterpretation of Libet's data. Consciousness and Cognition, 11, 144–161.

Pockett S, (2003) 'How long is the now? Phenomenology and the specious present' Phenomenology and the cognitive sciences, 2(1) 55-68.

Ravaisson F, 2008 Of Habit (Continuum Publishing, New York, US)

Roberts B, 2005 "Stiegler Reading Derrida: The Prosthesis of Deconstruction in Technics" Postmodern Culture available at **http://muse.jhu.edu/journals/postmodern_culture/v016/16.1roberts.html** last accessed 21/6/11

sfframedata.com (2009) 'Street Fighter IV frame data' URL http://sfframedata.com/walkthrough/pages/ssf4_intro.php Last accessed 15/3/11

Simondon, G 2009 "Technical Mentality" Parrhesia 7 17-27

Simondon, G 2009b "The Position of the problem of ontogenesis: Parrhesia 7 4-16

Sobchack S, 2009 "Animation and automation, or, the incredible effortfulness of being" Screen 50(4) 375-391

Stiegler B, 1998 Technics and Time: The Fault of Epimetheus (Stanford University Press, Stanford, CA)

Stiegler, B (2009) The Theater of Individuation: Phase-Shift and Resolution in Simondon and Heidegger. Parrhesia 7 46–57

Stiegler B, 2011 Technics and Time 3: Cinema and Cultural Malaise. (Stanford University Press, Stanford, CA)

Thompson, E, Lutz, A & Cosmelli, D 2005 “Neurophenomenology; an introduction for Neurophilosophers” in Brook, A &Akins, K (eds) *Cognition and the Brain: The Philosophy and Neuroscience Movement* (Cambridge University Press, New York)

Thrift N, 2004, ‘Intensities of feeling: towards a spatial politics of affect'' Geografiska Annaler, Series B 86 57-78

Thrift N, 2007 Non-representational Theory: Spaces, Politics, Affects (Routledge Publishing, London)

Thrift, N, 2010, ‘The 27th Letter: An Interview with Nigel Thrift’ in Anderson B and Harrison P (eds) Taking-Place Nonrepresentational theories and Geography’ (Ashgate Publishing, London)

Thrift N, 2011, ‘Lifeworld Inc—and what to do about it" Environment and Planning D: Society and Space 29(1) 5 – 26

Trevena, J. A., & Miller, J. (2002). Cortical movement preparation before and after a conscious decision to move. Consciousness and Cognition, 11, 162–190.

Vries MJ, 2007 “Gilbert Simondon and the Dual Nature of Technical Artifacts” Techné: Research in Philosophy and Technology 11(1) available at http://scholar.lib.vt.edu/ejournals/SPT/v12n1/devries.html

Wolff E, 2008 “Aspects of Technicity in Heidegger's Early Philosophy: Rereading Aristotle's *Techné* and *Hexis*” Research in Phenomenology, 38(3) 317-357

Wolff E 2010 “Technicity of the Body as Part of the Socio-technical System: the Contributions of Mauss and Bourdieu” Theoria, 76: 333–354.