The Philosophy of Computer Games Conference, Malta 2016

Past Time. Questionable Epistemologies of Time and Identity in *SUPERHOT* and *Metal Gear Acid 2*

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Introduction

In early, formative texts in game studies, space has been identified as the dominant dimension of digital games. Janet Murray argued influentially that "linear media such as books and films can portray space […], but only digital environments can present space that we can move through" (Murray 1997: 79). Espen Aarseth goes even further, when he proclaims:

> "The defining element in computer games is spatiality. Computer games are essentially concerned with spatial representation and negotiation, and therefore a classification of computer games can be based on how they represent – or, perhaps, *implement* – space." (Aarseth 2000, 154)

Aarseth's point ultimately is that games appropriate and functionalize space; to him, they are "allegories of space: they pretend to portray space in ever more realistic ways, but rely on their deviation from reality in order to make the illusion playable" (Aarseth 2000, 169). Murray's and Aarseth's observations resonate in many later discussions of space in digital games that identify it as a medium-specific tool for meaning-making, both in a predominantly narrative (Jenkins 2004; Fernández-Vara 2011) and a more comprehensive dimension (Nitsche 2009).

Connected with this appreciation of the special role of space in digital games is a disregard of time, which can be traced back to Aarseth, as well: "More than time (which in most games can be stopped) […] games celebrate and explore spatial representation as their central motif and *raison d'être*" (Aarseth 2000, 161). In prototypical fashion, the engagement with space is foregrounded as a conscious playful act based on a careful design, while the manipulation of time is seen as trivial and purely functional.

While in most cases, this perception of time in digital games is functional, obscured, and naturalized is justified, a significant number of examples foregrounds time thematically or makes time a manipulable element, from *Day of the Tentacle* (Lucasarts, 1993) to *Quantum Break* (Remedy Entertainment/Microsoft, 2016). Both time-travel narratives and time-manipulation gameplay are often constructed as puzzles or riddles. When narrative comprehension and/or play is teleologically aimed at finding the one correct solution to a riddle, it means – in terms of epistemology – that audience respectively players have to actively strive to understand time as modeled in the artefact. They become active epistemic subjects in relation to time. However, all play in virtual worlds involves a perception of time that resembles the one in reality – inasmuch as it happens in the moment of immediate awareness that William James termed the 'specious moment' (Le Poidevin 2015), which bears a great deal of similarity as the phenomena of presence and engagement as theorized by Gordon Calleja (2011) –, yet may be subject to temporal relations not encountered in reality. As such, play in virtual worlds always has the potential to defamiliarize and thus expose our everyday perception and comprehension of time.

This epistemological potential resembles that of fiction, which has found some theoretical attention, especially with regard to time-travel narratives and the general malleability of time in narrative (Wittenberg, 2012; Jones & Omrod, 2015). Game studies has, in contrast, so far mostly focused on ontological questions, as evidenced in the existence of a number of competing ontological models of varying complexity (Juul 2005; Nitsche 2007; Tychsen & Hitchens 2009; Zagal & Mateas 2010). Although their conceptualization of time is necessarily more nuanced than that of the early proponents of a space-centric approach, the ontologies of time in digital games tend to discuss time mechanistically as a discrete resource that is mapped rather loosely to time as experienced by the player in the real world.

The majority of examples supports this view, yet a small number of digital games explore alternative, obscure or decidedly anti-mimetic models of time that create elaborate dissonances between gameworld-time and real-world-time that forcefully make epistemic subjects out of their players. The recent *SUPERHOT* (Superhot Team, 2016) is explicitly about time without dealing with time-travel or time-manipulation. Its narrative and interface frame the anti-mimetic use of gameworld time in a riddle about identity, control, and hierarchy. An older example that engages even more directly with the epistemology of time is *Metal Gear Acid 2* (Kojima Productions, 2006).[1] In it, time is used as a resource in a very obvious fashion, yet the concurrent, interdependent uses of more than one non-linear system of quasi-time inevitably provokes an epistemic engagement with it. Although neither a time-travel narrative nor explicitly about time-manipulation on the level of mechanics, MGA2 thus connects questions of time, memory, and identity in a way that is, at the same time, related to that of SUPERHOT, yet different in some key aspects.

[1] The title is originally typographed as *Metal Gear Ac!d²* and will henceforth be abbreviated to MGA2.

The argument presented here is meant as an exploration of the epistemology of time in digital games – which, of course, is fraught with the considerable difficulty of distinguishing between the ontology of time and the epistemology of time in the first place. The fascination with time that philosophers have had since antiquity results in great part from our unavoidable embeddedness in time. Human life (and thus our experience of being) is tied closely to ageing, maturation, and eventual death that life is virtually unimaginable independent of time. The thought experiment of an eternal life serves primarily to identify the inescapable temporality of our existence. Because life, experience, and thought are naturally bound to time, we cannot perceive time from the outside, cannot think about it from a neutral position. Time remains elusive, intangible, only approachable axiomatically and asymptotically.

Thinking about how we acquire knowledge about time thus inescapably broaches the question of what time is. If my thinking about time is predicated in every respect by the nature of time, epistemological questions necessarily contain a certain measure of ontological questions (or, at the very least, assumptions).[2] And because the nature of time is so elusive, discussing its ontology generally borders on or includes metaphysical issues that connect "the discussion of whether time, or space, exists with the further question whether mathematical objects, or other abstract entities exist" (Fraassen 2013: 17). Yet as complex and contested these questions might be, and even if Space and Time as physical or philosophical entities might be debated, "this cannot be taken to imply that discourse which employs temporal locutions is meaningless" (Fraassen 2013: 16).

Discussion of Time outside Philosophy

The idea at the root of this paper is that digital games that foreground a model of time that is distinctively different from the naturalized models usually encountered, they provoke an engagement with concepts of time. Just like time-travel narratives, they produce "a radical confrontation with our understanding of temporality, not only as we live it in the present, but also of how we encounter history and the future" (Deamer 2015: 36). This makes them *loci* or at least stimuli of philosophical enquiry. "The idea that fiction might know something, perhaps something more than philosophy" (Currie 2009: 107) is not new, but it has, to my knowledge, not yet been extended to treatments of time in digital games.[3]

David Wittenberg has devoted a monograph to discussing related phenomena in literature and come to the conclusion that "[…] time travel fiction will be regarded as philosophical

[2] This entanglement of problems is, according to Sherover's reading, central to Heidegger's interest in time: "The organizing principle of Heidegger's interrogation has been the meaning of what it is to-be in the light of the Copernican Revolution. Its outcome points us to the intrinsic relationship between his fundamental ontological question and that of the nature of Time as such" (Sherover 1971: 275).

[3] That I draw on fiction here to illustrate the potential for philosophical reflection outside philosophy proper is a meant to merely parallelize my thought process with that applied to other media. As the discussion of examples in the second half of this paper will show, I do not treat digital games as fictional texts – at least not necessarily or unqualifiedly.

literature *par excellence*" (Wittenberg 2013: 2). Temporal locutions are central to all narratives, and storytelling is generally both dependent on and concerned with time:

> "[S]ince even the most elementary narratives, whether fictional or nonfictional, set out to modify or manipulate the order, duration, and significance of events in time – that is, since all narratives do something like 'travel' through time or construct 'alternate' worlds – one could arguably call narrative itself a 'time machine,' which is to say, a mechanism for revising the arrangements of stories and histories." (Wittenberg 2013: 1)

As Wittenberg's examples show, this general potential for making time topical is only explored in some cases. It is most apparent when time travel is used to create thought experiments through paradoxes:

> "[…] The pathos of a postulated *fabula* still drives our reading – time travel is, after all, still a play on classical narrative, and shares the latter's usual compulsion toward coherency and self-conservation. But as the in-principle irreconcilability of *sjuzhet* and *fabula* becomes all too apparent in the time travel paradox narrative […]. The time travel paradox story exposes the postulate of *fabular* apriority – the Jamesian pretense of an underlying and prior historical or factual story – not merely as a fiction of its own, but more crucially as a dissimulation of the real, physical means of prioritizing *fabula*, the paratext." (Wittenberg 2013: 144-145)

What time travel narratives do, then, is to "play self-consciously or parodically with their own temporal mechanisms of story construction" (Wittenberg 2013: 227).[4] Mark Currie has argued that fiction excels especially at dealing with "the matter of internal time-consciousness" (Currie 2009: 109). He distinguishes with Roland Barthes, Paul Ricoeur, and Michael Wood between "knowing," "knowing of," and "knowing about," with the latter being the peculiar strength of literature and, effectively, all arts. Curry argues that "knowing about" something, the specific *forté* of the arts, is only superficially less impactful than philosophy's "knowing" something, "so that if Barthes appeared to be describing the modesty of literature, he is in fact making quite a large claim for its epistemological function" (Currie 2009: 109).

> "In other words, the impression that knowledge about something is trivial in comparison to knowing something is mistaken, and the reinscription of the idiom

[4] How difficult it is to acknowledge this primarily structural form of meta-reference can be seen when considering other approaches to time travel. Jones and Omrod have proposed a typology of time travel narratives categorized by theme, type, and catalyst, e.g. "Biological – Time loop – Alien Blood (*Edge of Tomorrow*)" or "Enigmatic – Karma – Poor Behavior (*Groundhog Day*)" (Jones & Omrod 2015: 5). While their categories clearly aim at distinguishing different structures or functions of time travel, what they actually describe is ultimately the fictional logic by which time travel is explained and (in most cases) naturalized.

> restores to the idea of knowledge all of the haunting force of the unspoken […]. The emphasis on the unspoken is important here because it characterises a non-philosophical mode of knowledge, in which claims are implicit." (Currie 2009: 110)

It is exactly the confluence of discourses of time and unspoken epistemic processes connected with time that I want to investigate in the following discussion. To do this meaningfully, it will, however, be necessary to give a brief exposition of some ontological considerations about time.

Ontologies of Time in Digital Games

Game studies has, as mentioned, developed several ontological models of time in digital games. The most useful for the argument presented here is the one developed by José Zagal and Michael Mateas (Zagal & Mateas 2010). They eschew a philosophical approach to time for a literally socio-logical one. They distinguish between different frames of reference that operate on different levels of abstraction and the comparison of which allows to discuss with a high level of detail which impact the overlap or divergence of the different frames has on the player.

They distinguish between four commonly found frames; although they consider them non-exclusive and ruminate the existence of additional ones, these four form the basic framework of their approach. As their model is player-centric, the baseline frame is that of real-world time, which is "established by the set of events taking place in the physical world around the player" (Zagal & Mateas 2010: 852). This frame is distinguished from that of gameworld time, which is "established by the set of events taking place within the represented gameworld" (Zagal & Mateas 2010: 852). This commonsensical distinction is refined by the addition of coordination time, a frame "established by the set of events that coordinate the actions of multiple players (human or artificial intelligence) and possibly in-game agents" (Zagal & Mateas 2010: 852). The fourth and final frame is that of fictive time, "established through the application of sociocultural labels to a subset of events" (Zagal & Mateas 2010: 852). Zagal and Mateas stress that these frames operate independently of each other and are based on different logical concepts. While the two world-times are logically processed in terms of e.g. cycles or durations, coordination time manifests in e.g. rounds or turn taking, while fictive time operates with socio-cultural references (e.g. to a historical event or period) and narrative tools (re-arrangement of events in plot and discourse).

The four temporal frames are less complex and stringent than some other, techno-logical models. However, Zagal and Mateas argue that there is no need for a finer-grained, technology-focused categorization like that developed by Tychsen and Hitchens (2009), because the relationship of temporal frames is sufficient to identify those phenomena. Instead of describing lag in terms of a discrepancy between (in Tychsen and Hitchens' terminology) playing time and, respectively, engine or server time, Zagal and Mateas propose to instead

diagnose where the time-differential is experienced and frame lag as "temporary inconsistencies in game state across players" (862). They demonstrate the efficiency of their model by analyzing a range of phenomena, including what they term temporal anomalies, which can indeed be expressed by differential relations between the temporal frames. They identify e.g. temporal warping, by which they mean a "general discrepancy between two frames, usually real world vs. game world" (Zagal & Mateas 2010: 855), and non-uniform temporality, a "gradual discrepancy between two frames" (Zagal & Mateas 2010: 855).

Philosophical Ontologies of Time

Models of time in digital games obviously have a very different character from philosophical reflections about time. Apart from Zagal and Mateas' first frame of real-world time, their categories pertain to formal properties of authored artefacts. They can thus be studied with a significantly higher level of certitude than an ephemeral and all-encompassing concept such as real-world time. The intangible nature of time results in philosophical approaches to it that do not even engage with the question of whether or not it is an existing entity, but instead treat time exclusively as "the mathematical structure used to represent temporal relations between events" (Fraassen 2013: 220), which can never perfectly model reality, but have some "success in the representation of empirical phenomena" (Fraassen 2013: 221).

The pragmatism of modern philosophy has its roots in the long struggle with metaphysics in discussions of time following Aristotle. According to Aristotle's phenomenological approach, "we cannot perceive time as such; we are conscious of the passing of time only through discerning change or movement" (Fraassen 2013: 22). In as far as Aristotle has no concept of time as such, but expresses it in logical categories of succession, duration, and simultaneity, he is the precursor of most later ontologies of time. His compelling logic has, however, forced post-Aristotelian philosophy of time to try and reconcile the refutation of creation implied by his model with religious beliefs (Fraassen 2013: 26). Modifications of Aristotle's views from Aquinas to Leibniz therefore involve a metaphysical component. Aquinas distinguishes in his comments on Aristotle's physics and metaphysics between real time (which we may not understand) vs. imaginary (i.e. experiential) time (Fraassen 2013: 26). Barrow seeks a different resolution of the problem when he sees time as an absolute, independent of motion and even creation, but not God (Fraassen 2013: 29). Leibniz strongly opposes the idea of absolute time; he holds that time begins with creation, but that in alternative worlds, creation might have happened sooner or later (Fraassen 2013: 31). Heidegger, finally, proposes a tripartite distinction that acknowledges the subjectivity of human time perception, the need for its codification, and the existential assumption of an underlying principle that must remain intangible:

> "In *Being and Time* 'temporality' has been taken to designate the human mode of constituting its general experience; 'time' has been reserved as the designation for the derivative constructive sequential orderings of events in terms of clocks and calendars; 'world-time,' only briefly alluded to, can be taken as ultimate Time

> itself, as the ontological 'real' referent of our subjective temporal modes." (Sherover 1971: 275-276)

Our efforts of ordering our perception of temporality into time (in Heidegger's terms) always return to Aristotle's observations, which have been incrementally refined. Our experience of time seems to be predicated by the perception of change or the absence of change:[5] "What happens happens in time, and what exists exists in time; but these two ways of being in time are different" (Fraassen 2013: 38). The difference is that between state and event. A state is expressed in "X was F while Y was changing from G to H." An event is expressed in "X exploded while Y was changing from G to H." In both cases, "while Y was changing" is a process. "Thus, in a process, a body passes through a series of successive states." Therefore, the concept of process is redundant; states and events are sufficient (Fraassen 2013: 39). The focus on change between states implies the significance of simultaneity. Leibniz' causal understanding of time foregrounds this, because its central argument is the impossibility "that predicates should belong at the same time to the same thing" (Fraassen 2013: 45). Leibniz' framing of change as causal relationships thus 'produces' time, because "the various circumstances or states of affairs are related to each other as cause to effect, and by definition, the cause is the earlier" (Fraassen 2013: 47).

Leibniz' view has found affirmation in Bachelard's revision of Bergson's distinction between an intuitive and a scientific understanding of time – a rationale that serves to show how closely linked ontological and epistemological reflections on time are and how much they owe to metaphysics and physics. By offhandedly referring to the axioms of thermodynamics, Bachelard makes the compelling argument that metaphysical dialectics

> "are not, as followers of traditional schools of thought would be inclined to think, logical in nature. They are temporal. Fundamentally, they are successions. A function cannot be permanent; it has to be succeeded by a period of non-functioning since energy diminishes as soon as it is expended. As regards the phenomena of life, it is therefore always in terms of succession that contradictions in behaviour must be defined. Indeed, so great is the heterogeneity of its terms that succession is in effect discontinuity." (Bachelard 2000: 42)

In effect, both in ontological and metaphysical conceptions of time, it emerges as a discrete, mathematical system of processes of change that manifest as relations between states and events. On this level of abstraction, philosophy of time is very much akin to the intuitively out-of-place category of coordination time that Zagal and Mateas identify as the most game-

[5] As Kant points out in his *Inaugural Dissertation*, the relation between changes and time is circular: "Hence the possibility of changes is thinkable only in time; time is not thinkable through changes, but *vice versa*" (Fraassen 2013: 46).

specific of their temporal frames – an observation that will be important for the discussion of examples.

Why Epistemologies of Game Time

That this paper focuses on epistemology of time instead of ontology results from the arguments just presented: In the light of philosophical ontologies of time, it becomes clear that the actual application of Zagal and Mateas' ontological model of time in games provides an analytical grid for an application that is distinctly epistemological. By pointing out that the relevance of time for the player lies in the observation and negotiation of discrepancies between the four temporal frames, they implicitly shift to an epistemological perspective.

Similar to the discussion of ontological matters in the previous section, my epistemological considerations only aim to point out some core concepts that facilitate a discussion of the phenomena observed in the examples. I will make no attempt whatsoever to discuss general epistemological questions about "the nature of perceiving and […] what we can know – or may mistakenly think we know" (Audi 2003: 1).

My interest lies rather in the inherent friction between the perception of time in games and other sources of knowledge, especially memory and "reflection as a way to acquire knowledge of abstract matters" (Audi 2003: 1). In play, we constantly engage in inferential processes, which are frequently a less self-conscious form of reasoning: "My drawing the inference is something I do; it is a kind of reasoning. But it is not necessarily self-conscious, as in some cases of engaging in reasoning with the aim of proving a theorem from axioms" (Audi 2003, 158). Players form mental models of game rules and processes as a basis for developing strategies, drawing, as with all epistemic processes, on perception, memory, and reflection. In many games, these processes are simple and relatively short: based on an implicitly or explicitly formulated hypothesis, the player acts, observes the result of the action, and accepts or modifies the hypothesis. Especially central, frequently repeated actions are easily identified, tested, and verified, thus resulting in an understanding of the mechanics of core gameplay loops.

Games like the ones under scrutiny offer a considerable degree of resistance to this established epistemic methodology. While the perception of processes is mostly unhindered and memory remains unquestioned (at least in the case of *SUPERHOT*), the manipulation of time in both games introduces a variable into reflection processes that is generally assumed as a constant in both other games and real life: time.

All reflection processes that occur in what Gordon Calleja calls micro-engagement – the "moment-by-moment engagement of gameplay" (Calleja 2011: 40) – happen embedded in the complex relations between temporal frames, even if this is usually not apparent. This is, however, true of all cognitive processes happening in games as well as their context. Play is

often effortless, which obscures the amount of attention we pay to what we are doing in games. “Most of the time, we are not aware of the way in which attention affects our performance or behavior. It becomes more apparent when, for example, we are trying to comprehend complex information, learn a new task, or engage in activities that are unfamiliar to us” (Calleja 2011: 40-41). Player involvement in a game is manifested not only “by the direct input of the player or the display of such an action on the screen, but by the player’s cognitive effort […]” (Calleja 2011: 42). Engaging with games in cognitive processes that aim to identify promising strategies is what Calleja calls ludic involvement. It “expresses players’ engagement with the choices made in the game and the repercussions of those choices. […] Seasoned game players understand that well-balanced game systems emphasize the opportunity cost of any particular action taken” (Calleja 2011: 44).

The knowledge players arrive at through ludic engagement are the result of an inferential process, “a mental episode of reasoning,” and inferential content, “the set of two or more propositions which are my conclusion and my ground for it” (Audi 2003, 157). Inferential processes can be highly individual, yet the inferential content, the abstract basis for them, is usually not:

> “The inferential content indicates what is inferred from what, and it does this in a way that shows how my inferring that there is a woodpecker nearby is drawing the same inference as you would make if you inferred this from the proposition that there is knocking which sounds like that of a woodpecker. Our inferrings are two different processes, one in me and one in you. But their content is the same.” (Audi 2003, 157)

The inferential processes that usually dominate in ludic involvement understand time as one of the measures that game systems use to evaluate player actions. Durations and cycles of gameworld time indicate how long, when, or how often an action needs to be performed, and coordination time dictates when actions are allowed. The temporal constraints for actions are inferential content, identical for all players. Puzzle-solving in time-travel games makes additional use of fictive time, as when players in *Day of the Tentacle* need to extrapolate the potential consequences of actions in the past, present, and future of the gameworld have on each other. In such a case, time is part of the inferential process as causality. The following discussion of the two main examples will show that the function of time in them is different, thus foregrounding the attention devoted to ludic engagement and the artificial nature of time in games.

The Many Times of *SUPERHOT*

The Polish First-Person Shooter *SUPERHOT* has a clear and innovative premise that already highlights its relevance for this paper: “Time moves only when you move.” Its action is embedded in a metaleptic narrative in which the player control a hacker who gets access to a leaked program called “superhot.exe.” It immerses him into a highly stylized virtual reality

world made out of white concrete and filled with shiny, jet-black objects, the VR-avatar is tasked with killing every single one of the red, crystalline humanoid guards that populate the levels. Both VR-avatar and enemies are very fragile: already the first weapon hit is enough to get killed. Firearms have a very limited ammo supply, and there is neither reloading nor an ammunition counter. With the exception of a katana, melee weapons break after only three strikes, and the avatar's fists take three hits to kill an enemy, while theirs only need to the avatar once to be lethal. The first-order avatar communicates with another hacker through a chat system, but increasingly loses control over his computer which has become infiltrated by what appears to be a malevolent Artificial Intelligence, the system of Superhot that instrumentalizes the hacker in order to break free from control.

Figure 1: *SUPERHOT* Gameplay

SUPERHOT thus breaks with many conventions of First-Person Shooters apart from its handling of time. This feature is what sets it apart most drastically from other games of the same genre with regard to ludic engagement. Gameworld time is drastically decelerated in relation to real world time whenever the avatar does not act; it is, however, not frozen, as the game claims.

Figure 2: *SUPERHOT*'s premise, as displayed on-screen at the beginning of the first level

With the exception of some game-modes (more on which later), *SUPERHOT* 'only' slows down time by a factor of 200:1. This ratio is made explicit in the game modes that show a gameworld-time timer or count-down: for every two seconds of real-world-time, 10 milliseconds of gameworld-time pass as long as the avatar is inactive. Whenever the avatar moves, time accelerates to an isomorphic mapping with real world time. Some interactions with the gameworld have a fixed duration that results in accelerating gameworld-time briefly. Firing a weapon, for example, takes 50 milliseconds of gameworld time. When a gun is fired without any other action before or after, the effect is thus that the gameworld time-frame is fast-forwarded to a time that would otherwise have been reached by the waiting for 10 seconds of real world time.

However, these ratios are not completely fixed. Players can unlock a number of additional game modes, which differ primarily in their handling of time. Two of *SUPERHOT*'s four "Endless" modes add the real-world-time goals of killing 30 enemies as quickly as possible ("Race"), and of killing as many enemies as possible in one minute ("Real"), respectively. It's third "Endless" mode is about killing as many opponents as possible in 20 seconds of action-dependent time. In addition, the game offers "Challenge" variants of its levels, which modify primarily parameters other than time, such as the amount of damage done by unarmed combat, ammo capacity of weapons, or the ability to use firearms at all. The "Challenge" mode "Fullstop," however, not only reduces the ammunition of all weapons to one shot, but increases the flight speed of bullets and (as the name suggests) completely stops time when the avatar is inactive.

All these peculiarities in the handling of time in *SUPERHOT* force the player into an ongoing ludic engagement with it. The main way in which the game foregrounds time is by calling into question one of the most firmly established binaries of game design, real-time versus turn-based gameplay. The extreme acceleration and deceleration of gameworld time challenges these categories and demonstrates their arbitrary nature. As one reviewer puts it: "It's a

massive change that makes *Superhot* play out more like a turn-based strategy game than a shooter. At first, it requires you to rethink the usual mental map you'd usually use in a game played from a perspective behind a gun" (Orland 2016). On a theoretical level, this conceptual challenge has been addressed in ontologies of game time. One of the applications that Zagal and Mateas propose for their temporal frames is a more nuanced description of temporal structures in games than the "primitive, binary distinction" (Zagal & Mateas 2010: 853) between real-time and turn based. Instead of a binary, they perceive it as "a number of related phenomena resulting from the interaction of multiple frames" (Zagal & Mateas 2010: 853).

> "We argue that the common distinction of 'real-time' versus 'turn based' results from a number of distinct interactions between the gameworld, coordination, and real-world temporal frames. Identifying these distinct interactions helps gain a more nuanced understanding of the phenomena that are masked by this binary distinction." (Zagal & Mateas 2010: 854)

They identify three qualities: availability, immediacy, and liveliness. Availability measures whether the player's "is allowed to cause gameworld events" (Zagal & Mateas 2010: 853). Availability is a binary: the player's physical manipulation of an input device in the real world either is or is not translated into gameworld events. Immediacy is a gradual discrepancy between the player's inputs and the causing of gameworld events. It can be part of the game design (e.g. when a reload animation has to be completed before a weapon can be fired again) or an unintended effect (e.g. network-based lag). Liveliness is determined by how much, if anything, changes in the gameworld without the player's input.

Expressed in Zagal and Mateas' terms, *SUPERHOT* possesses a great degree of liveliness; once spawned, the opposing 'red guys' move and attack mercilessly, albeit at glacial pace whenever the avatar holds still. The game exhibits great degrees of immediacy and availability, too: the control of the avatar is perfectly responsive, and the player can take control of the avatar at any given moment. Based on these observations, it would seem as if *SUPERHOT* could be characterized as a real-time game without reservation. Indeed, the major challenge the game poses can be located in the constant changes in mapping between gameworld time and real world time. Still, the almost turn-based quality the game exudes can be traced back to the features of time treatment described by Zagal and Mateas. Availablility is a problematic category in *SUPERHOT*: the player can trigger an avatar action at any given point, yet only movement can be halted at will. As mentioned before, shooting, hitting, and throwing have a fixed duration. Albeit brief, these moments render the avatar unavailable to the player. More noticeable (because longer) is the delay between shots of a gun, indicated by a rotation of the crosshairs, a period of time within which the avatar can be mobile, the weapon, however, is useless. This enforces a situation in which the player needs to consider their next action: move (potentially into the line of fire of an as yet unseen enemy), throw one of the rare firearms at an enemy (in the course destroying the weapon and only briefly stunning the enemy), or stay still until the weapon is ready to fire again. These enforced

phases of inactivity and contemplation go, virtually inevitably, hand-in-hand with inferences about the nature of time in the game.

The stimuli for and extent of reflection might be considered limited if it was not for *SUPERHOT*'s many defamiliarizing gestures, most of which are connected to questions of either time or game design conventions. The game's dual avatar structure calls into question the usually transparent and naturalized illusion of presence (Calleja 2011: 18-19) in the virtual worlds of digital games. The game equally problematizes the notion of agency through its metaleptic structure. In numerous instances, the player is explicitly informed that they are not in control. At the end of every level, the screen is filled with the words SUPER and HOT, which are simultaneously spoken by a distorted voice and underscored with a flashing of the screen and pulsating background noise. To leave the level, the player has to press the 'fire' button once more, which, as a caption on the screen reads, means to "hand over control". The climax of the metaleptic disturbances is the moment when the second-order VR-avatar discovers a figure with VR glasses that is identified as the first-order avatar. The only way to end the level is for one avatar to execute the other and, in classic Gibsonian Cyberpunk fashion, be "freed from the flesh."

Figure 3: The culminating metalepsis of the second-order avatar shooting the first-order avatar

The game furthermore produces epistemological uncertainty through its user interface. Upon starting *SUPERHOT*, the player is confronted with a low-resolution menu screen styled like a 1980s file explorer. Only after some exploration of this interface, it is possible to 'install' "superhot.exe" within this mock-UI. Even though the metaleptic gesture is transparent enough, the homonymy between the game and the game within the game provokes the question of when the game actually starts and what "the game" is – a question prominent enough in formal game ontology, yet rarely raised explicitly in games themselves. The interface design is another defamiliarizing element. While its function diegetically is that of a BBS download interface, its design is more reminiscent of the *Norton Commander* file

manager. The combination of the 1980s interface aesthetic and the VR-themed gameplay does not quite gel and raises yet another question of time, namely that of which socio-cultural period is supposed to be referenced in *SUPERHOT*. It fits the not-quite-ness of the game's aesthetic and its puzzle logic that there is a hidden temporal clue in an achievement ("Can't get enough") that is awarded for scoring 1987 hits; yet *Norton Commander* was originally released in 1986, not in 1987.

Figure 4: *SUPERHOT*'s main menu screen

The least amount of temporal defamiliatrization is present in the well-hidden secret passages of every level. Here, movement through time and space approximates models known from other digital games, because there are no enemies in the secret areas. Without the constant threat of enemy fire, continuous movement is possible, giving the game a dynamic much closer to that of a common "real-time game." The level design of the first two secrets appear as a reminder of the freedom of exploration that digital games traditionally offer (and which is the basis for the initially mentioned emphasis of spatiality over temporality in the theories of Murray, Aarseth, and others). Yet the secret in level three counteracts this impression (as do many later levels). Here, the secret area, a long hallway, is reached by clipping through a wall that appears solid. The floor of the long hallway appears equally solid, yet has sections through which the avatar will drop to his death. In general, the existentialist dimension of *SUPERHOT* is emphasized strongly in the secret areas by the circumstance that all but a few secret areas can only be left by plunging the avatar to his death. Space and 'real-time' exploration, the secret areas suggest, are fraught with hidden dangers that are directly correlated to free and instantaneous movement. The contrast these areas create with the rest of the levels is jarring, and serves to underscore the epstemic difference between them even for a seasoned player.

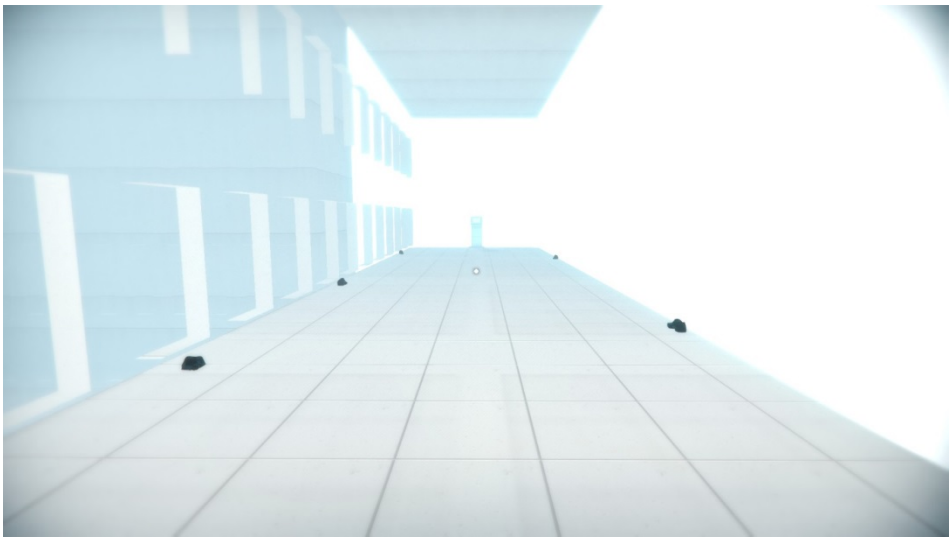

Figure 5: Secret number 3. The wall on the left has no collision detection and is partially transparent when seen from within the secret area

The secrets in the stricter sense that hide in these hard-to-reach portions of the levels are computer terminals that supply background information about the gameworld, delivered as diegetic communication. Upon interaction with a terminal, the Superhot system allows the avatar to ask a question. The player has no influence on the question, so the question asked in the first secret always is: "What is SUPERHOT?" The system replies to this: "'superhot.exe' IS A SIMULATION DESIGNED TO TAKE YOUR TIME AND SHAPE THE WAY YOU THINK. 'SUPERHOT' IS SOMETHING ENTIRELY DIFFERENT."[6] The claim that the game will "shape the way you think" might be taken as an allusion to *Portal* (Valve 2007) and its insistence on "thinking with portals", while the typographical distinction between the capitalized name of the game and the name of the program reaffirms the motif of metaleptic mystification. The ambiguity of "take your time and shape the way you think" is impossible to ignore, though, in the context of *SUPERHOT*'s emphasis on time and the necessity of understanding its intricate workings in the simulation.

[6] Several later secrets contain similarly oblique references to time, such as "[Q:] Why can I control time? [A:] YOU CAN CONTROL TIME?" and "[Q:] Does time flow differently inside the system than outside? [A:] TIME FLIES WHEN YOU'RE HAVING 'FUN'."

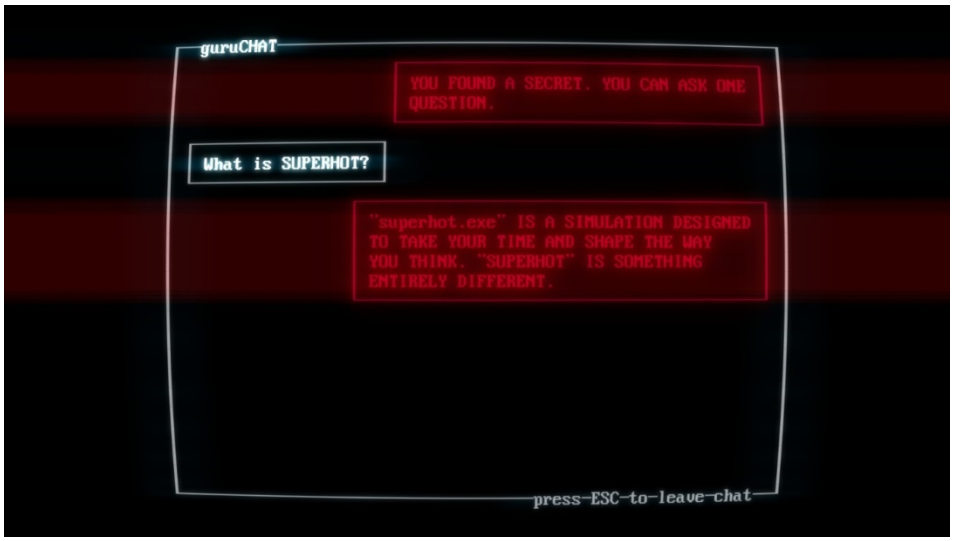

Figure 6: A clear mission statement about time epistemology in the first secret area.

The Untimeliness of *Metal Gear Acid 2*

MGA2 is the second *Metal Gear*-game for the Playstation Portable. Mechanically, MGA2 is a turn-based single-player, tactical 3D game with a strategic trading card component. The tactical mode adapts many mechanics from the *Metal Gear Solid* games. Sneaking past, distracting, and overpowering guards works analogously to the real-time stealth game, albeit in a completely discrete fashion, i.e. on a rectangular grid and in turns. Movement and actions are controlled by cards, of which the game offers 565 in the style of a collectible trading card game. The cards are themed after characters and equipment of the previous games, from the then-current *Snake Eater* (Konami, 2005) back all the way to the original *Metal Gear* (Konami, 1987). As players advance through the game's campaign, they unlock additional booster packages as immediate rewards and can use the points earned by completing main- and side-missions in an in-game card shop. Integrating increasingly more efficient cards and otherwise optimizing the deck for various play-styles and challenges is an important factor throughout the game, especially in the regularly interspersed boss-fights.

Figure 7: MGA2 in-game, using an equipment card for movement

MGA2 epistemologically challenges our understanding of time in a way that is more similar to *SUPERHOT* than immediately apparent. In both cases, the reason for inquiries into time is ludic engagement and a foregrounding of distinction between real-time and turn-based game systems. Where *SUPERHOT* calls into question the 'real-time' experience of the First-Person Shooter genre by introducing a time differential between real-world and gameworld time, MGA2 is unquestionably a turn-based game; it derives its similarly defamiliarizing effect primarily from the contrast to the genre-defining stealth games it is based on. The significance of time is further stressed because it has an exposed role in the game's rule system.

Coordination time in MGA2 is determined by a resource called Cost. Although the resource's name indicates a certain neutrality, the manual explicitly identifies it as a measure of time:

> "Actions and cards are all assigned a value called 'Cost' that represents a length of time. The higher the total Cost of a character's actions, the longer it takes for his/her turn to come around again. Cost is calculated when a character acts. At the end of a turn, the same amount is deducted from all characters' Cost, and the character whose Cost reaches 0 moves next. So, the higher your Cost at the end of your turn, the longer it takes for you to move again." (Konami 2005)

The manual description of the Cost mechanic happens to resemble *SUPERHOT*'s implementation of time with its stress on actions resulting in a limited unavailability of the avatar. Cost is, however, used as a measure of time not only for turn order. Many objects use it to indicate the duration of actions or effects beyond the immediate Cost value of the card. The card "Aim" increases hit probability by adding 4 Cost to the firing of a weapon, indicating extra time taken in aiming. Similar cards are often distinguished further by different Cost relations: playing a "Grenade+" card has a Cost value of 6, and the hand grenade will

detonate 8 cost after use, while attaching a timer to an explosive has a Cost of 0, giving a time-delay of 10 Cost.

Figure 8: Cost as equivalent of time passed

There are, however, other time-equivalents, as cards can last for a certain number of turns, or combine both measures, e.g. the card “ADA+”, which reduces the cost of movement to 1 for 5 turns. The coexistence of different measures of time complicates the understanding of *MGA2*’s temporality significantly, as these different measures of time form a set of interrelated resources that need to be efficiently managed.

Figure 9: The card “ADA+” modifies the Cost of movement to 1.

The epistemological challenge is aggravated by the existence of Cost reducer cards that allow to subtract a number of points from the avatar’s current Cost. Played strategically, these keep the cost at or close to 0, allowing the player several turns in a row.

Figure 10: The -10 Cost reducer card.

With regard to ludic engagement proper, these cards are relatively unproblematic. They allow for Cost to be a resource that can be strategically manipulated, and their implementation has far-reaching influence on both the missions and the deck-building portions of *MGA2*. Cost reducer cards are essential for the use of some high-powered actions that incur great Cost, yet their use is limited to this one dedicated function. Most other cards can be 'misused' for character movement (see above, Figure 7), which is not as efficient as the use of dedicated movement cards, yet offers an alternative to discarding a card (which is only possible by forfeiting a turn and incurring a cost of 6). Prohibiting the use of Cost reducer cards for movement is an important element of MGA2's game balance.

However, if one stops to consider the relationship between Cost, turns, and time, questions about the persistence of time arise: If Cost is roughly equivalent to time, what does it mean to 'reduce Cost'? Is the avatar simply acting unusually fast when using such a card? Or is time actually manipulated? The total Cost used to solve a mission is one of the factors that determine the score for that level. When calculating points, the game subtracts the Cost saver cards, thus suggesting that this 'net Cost' is the time that has elapsed. Yet the avatar and the player have used and experienced a 'gross Cost' that is considerably higher. The situation is made more complex in that the player controls not one, but two avatars throughout the majority of the campaign, each of which plays Cost reducer cards individually, not only for him- or herself, but for the other, as well. The perceived 'gross Cost' is, therefore, not identical for the two avatars.[7]

[7] With its two avatars that can constantly influence each other's position in time, the game problematizes another philosophical concept with high relevance for traditional discussions of time, namely Aristotle's distinction between essential change (that is absolute and non-relational) and accidental change: Paul grows (essential) to be taller than Peter (accidental) (Fraassen 2013: 19). When one of the avatar's plays a Cost reducer card for the other, they change the relation between each other and thus submit the other to accidental change, which is, however, also an absolute change. While obviously no highly unusual situation, this still seems to be worth pointing out as another element that supports the topical coherence of *MGA2*.

Figure 11: The score screen shows the total accumulated Cost.

The time paradoxes of MGAs subvert the nature of memories. When I trigger an action that has an effect, I remember playing that card and it taking effect as a past action and a past event. I remember doing something and seeing the meaningful effect of this action, i.e. remember having exerted agency. When I then play a Cost reducer card and thus cancel out the passing of time in the gameworld, can the avatars and NPCs still remember what has happened? This question may initially seem pointless; we are dealing with simulated characters in a virtual world who do not actually have minds capable of memory processes. At the same time we are aware that computers operate with information that we traditionally (if metaphorically) call memory, and that the artificial intelligence algorithms governing NPC actions access information on past events as well as the current situation for their strategies and actions. As such, the question of whether or not an agent remembers what has happened after playing a Cost reducer card is relevant both on a strategic and a fictional level, and it furthermore points out the division between those two notions, the fictional character's memory and that of the computer governing its actions.

Ludic engagement thus is, similarly to the situation in *SUPERHOT*, closely connected to enquiries into the 'unnatural' time model of the game. The problematic role of memory in *MGA2*'s time paradoxes is ultimately directed at our epistemic position towards time because of the essential function memory plays in all epistemic processes (Audi 2003: 58). Striving for a full strategic understanding of *MGA2*'s rules forces the player into a recursive inferential process that has to negotiate their own memory with that of the in-game characters and relate both to the rules, which should be static "general truths":

> "But even if it should be true that all memory beliefs are produced at least partly by events in the past, past events are not the only objects of memory or the only things it 'stores.' We remember, and thereby retain and believe, general truths, such as mathematical theorems." (Audi 2003: 59)

Far more than other games, trading card games only disclose the significance of rules for strategic decisions step by step, because of the often near-infinite number of card combinations. They blur the distinction between memories and general truths because we only arrive at the latter through iterative processes in which strategic possibilities will emerge from the application of simple rules to unpredicted situations, which will, in turn, be often memorable.

Just as *SUPERHOT*, *MGA2* leaves no doubt that its defamiliarizing strategies are well-calculated, because the topic of epistemologic challenges and undecidability is a central motiv of its narrative. The game's story deals with a protagonist who is called Snake and who resembles the 'legendary hero' of the other *Metal Gear* games. Yet the narrative is set in an alternate universe (or timeline) which makes it impossible to tell if it is 'the same' character – which is, of course, only consequential in a franchise that deals prominently with cloning and transsubstantiation. In addition, *MGA2*'s avatar suffers from amnesia, which mirrors the player's insecurity about his identity on another level. Even the cards refer to the previous games in an obscure fashion: there are several different "Solid Snake" cards, one for each game, which have completely different functions. The game's narrative thus makes memory and identity topical and connects both intrinsically to time, because it all but forces the player to try and insert the events of *MGA2* into the timeline of the franchise with its complex chains of causes and effects.

Conclusion

The argument presented here should have pointed out that the handling of time in digital games can be just as foregrounded as that of space, and just as challenging and involved. *SUPERHOT* and *MGA2* challenge both our real-world epistemology of time as well as our generic understanding of play behavior, termed player repertoire by Jesper Juul (Juul 2005: 5). They do so in a way that is coherent with their narratives, thus offering up a meditation on ludic possibilities of knowing.

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