Profiling:
A traversal between the player and the game system

Pedro Cardoso
ID+, Faculty of Fine Arts,
University of Porto, Portugal
pcardoso@fba.up.pt

Miguel Carvalhais
ID+, Faculty of Fine Arts,
University of Porto, Portugal
miguel@carvalhais.org

ABSTRACT
In video games the player's personal experience is shaped by the dialectic relationship she establishes with the game system. This experience consists of a journey that is in constant transformation, of a narrative that emerges from that relationship.

This paper explores how the player traverses the ergodic landscape of video games, examining different kinds of tension between emergent and scripted/hardcoded narratives. Elsewhere, we proposed four types of traversal in video games: 1) that in which the player is able to choose from mutually exclusive paths; 2) that in which the player is able to engage in optional activities; 3) that in which the traversal is determined by the disposition of game elements towards the player and towards themselves; and 4) that in which the player resorts to a hidden side of the algorithm, exploiting glitches and errors in the game system, journeying through a world of unpredictable behaviours.

This paper aims to further contribute by introducing another type of traversal: 5) that in which the game system's actions are based on an analysis of the player's behaviour and on the interpretation of the patterns that from there emerge. This type of traversal moves action onto the system side, consisting of a reflection of the player, of her actions and behaviour.

Author Keywords
Ergodic media, Game System, Interaction, Player, Profiling, Video games.

ACM Classification Keywords
Design, Theory.

INTRODUCTION
While journeying through a game, the player's personal experience emerges from interactions with the game system [1, 2]. It is this dialectic relationship that determines the course of events, that makes the game progress and narrative emerge.

This relationship is extremely dynamic, ranging from A) moments where the player assumes the role of spectator, as

are the cases of cinematic interludes or cutscenes and of what Alexander Galloway calls the *ambience act* [3]—where the game goes on but the player is away, or in other words, where the player does not provide input; and B) to moments where the player develops a non-trivial effort [4] in order to be able respond to the game system.

The events that emerge from this relationship consist of what Marc LeBlanc calls the *emergent narrative* [5] and of what Tom Bissel names as *ludonarrative* [6]. This type of narrative is volatile, unstable, dynamic, and sometimes unpredictable, albeit bound by rules, by the algorithms that govern the game world. As the events within the emergent narrative are ruled by the player-system relationship, they are difficult to be re-enacted and re-experienced [6] because the conditions that allow them to occur may not be able to be recreated with exactness. The emergent narrative is thus fluid.

The "framed"—as Bissel calls it—, scripted, or hardcoded narrative is fixed, unchangeable, and it is imposed to the player. It usually consists of the story of the game, with all its multiple ramifications. Comparing the fixed or scripted narrative with the emergent narrative, one may say that the former is more data intensive [7], and that the latter is more process intensive [8]. Yet, despite their divergences, they are bound to work together, and the ratio between hardcoded and emergent narratives in a video game is what determines how much of the game is static, predetermined, and bound to scripted events, and how much of it is volatile and run by procedural occurrences. It is this that determines when it is necessary for the player to follow a specific narrative path and when she is free to go astray [9].

This experience, this journey, is what we call *traversal*. And the types of traversal proposed in this paper explore different forms of tension between emergent and hardcoded narratives.

1. TYPES OF ERGODIC TRAVERSAL
Firstly in *Traversing the Emerging Narrative in Interactive Narratives and Video Games* [1] and later in *Breaking the Game: The traversal of the emergent narrative in video games* [2], we already presented this perspective on the emergent and on the hardcoded narratives, proposing four types of ergodic traversal: *branching, bending, modulating*, and *exploiting*. But, with the intent of providing a better

understanding of the conceptual field explored in this paper and for the sake of offering a proper context to the reader, we will start by describing each of these in a summary manner, as we just did introducing the concepts of emergent and hardcoded narratives. So, for a deeper and expanded reading on those subjects we recommend consulting the mentioned articles.

Afterwards, we will describe a new type of traversal: *profiling*, that constitutes the core purpose and the original contribution of this paper.

1.1 Branching

Branching is one of simplest forms of traversal, occurring when the player is *asked to choose between mutually exclusive paths*. This kind of traversal resides at the core of video games, and of ergodic works in general, as in them the player is constantly reminded of the paths not traveled [4].

In *Bioshock* (2007) and in *InFamous* (2009), for example, the player is asked to choose between performing self-centered deeds or selfless actions. While playing *Bioshock* the player either opts A) to kill the *Little Sisters* and collect the ADAM they possess (a valuable substance in the game that is used to power up a variety of super-human skills) killing them; or B) to help them, amassing much less ADAM, resulting in less resources.

In *InFamous* the player controls a character with super-powers, choosing to become a hero or a villain, an outcome that depends on the kind of quests she undertakes. If she completes quests that promote the hero side, the quests that promote the villain side are blocked, and vice-versa. Depending on these choices the character evolves disparately, with unique sets of skills and abilities, conditioning the overall experience of the game world.

This is also very evident in *Super Mario Bros.* (1985), as several choices for traversing the game level are frequently shown to the player. And as the playable character cannot go back (to the left), unchosen paths become inaccessible.

Branching is also very apparent in games like *Mass Effect* (2007) or *The Walking Dead* (2012), famous for having multiple story branches.

1.2 Bending

Games contain more than the player may eventually experience [6]. When the player accesses optional non-mutually exclusive events [10], lengthening the game [11], either to increase her knowledge of the game world or to experience parallel narratives, *bending* occurs. Ian Bogost [11] affirms that if the verb that defines cinema is *to edit*, then video games should do the opposite: *to prolong, to lengthen*.

Bending is consistent with that statement (actually we borrow this term from that particular article). Bending reveals optional and sometimes hidden elements of the game, such as areas of play, objects, characters, actions or abilities, etc.. Games like *The Legend of Zelda: A Link to the Past* (1991), *Final Fantasy VII* (1997), *Grand Theft Auto IV* (2008), *Borderlands* (2009), *Heavy Rain* (2010), *The Elder Scrolls V: Skyrim* (2011) are just a few examples that implement bending to engage the player in exploration and expand their game worlds.

Not all of these games are considered open-world games. Those fit very well into this category, as the player is able to explore them, sometimes spending much more time in side activities than on the ones that guide the game to closure. *Heavy Rain* is not an open-world game, but still fits this category, as it allows the player to engage in side-activities, some of them consisting of mundane chores [11].

But, if these side activities do not contribute in some way to the game (and we are not referring to its closure), they risk becoming dull, pointless, and even painful to undertake. At that moment they become *fillers*—features that do not meaningfully contribute to the overall experience.

1.3 Modulating

While traversing the game world the player engages with many other objects, characters, actors, etc.. These usually have a determined affinity towards her and towards each other, sometimes expressing themselves in the simplest of terms: friend or foe. When the player is able to regulate the disposition of these game elements towards her and/or each other, she performs what we call *modulating traversal*. This type of traversal consists of moulding the social fabric established between these game elements.

The 'Karma system' in *Fallout 3* (2008) is an interesting example because it works in a way so that the actions of the player affect the disposition of non-playable characters towards her. Helping or hurting them not only directly affects their affinity towards the player but also the attitude of the ones in their social network, also towards her. [12]

While *The Walking Dead* (2012) is heavily based on branching, the game also forces the player to make choices that have meaningful consequences on the relationships that other characters have towards hers, such as who lives and who dies, who eats and who has to wait, etc.. Consequently, some actions will please some and displease others.

Action thus becomes meaningful through the consequences that emerge from it [12], and that becomes rather evident in this kind of traversal. As the social fabric changes, it shapes the narrative, influencing the player's progression in the game.

One of the main differences between branching and modulating can be expressed and summarised considering the following situation: in a given game, the player is granted the choice to kill or to help a given game character: 1) by killing it its friends become the player's enemy; 2) by helping it its friends become the player's friends. There is a considerable difference if this situation is experienced by

means of a branching traversal opposing to a modulating traversal. In branching the consequences (antagonising or befriending the group) are static, are written in the *hardcoded narrative*. In a modulating traversal those consequences are dynamic, they are an expression of the *emergent narrative*. Although both seem similar, their expressions differ significantly and their experience as well. In a branching traversal the player is submitted to the story of the game, to the hardcoded narrative, unable to dynamically change it, experiencing it only by choosing between predetermined events, static, fixed. In a modulating traversal the described situation is emergent, dynamic, and in alternative play-throughs the outcomes may eventually be subject to change, from minor alterations to more radical ones.

1.4 Exploiting

Exploiting is a kind of traversal a bit set apart from all of the others.[1] All the other types of traversal—including profiling—have one thing in common: they operate in a planned or a designed part of the system. Exploiting does not, as it is not exclusively bound to the intentionally designed part of the system. It makes use of the dysfunctional, untested hidden side of the algorithm. While exploiting, players traverse the game by exploring manifestations of specific malfunctions in the game system, of glitches and bugs that usually are the result of unforeseen and unresolved problems. These are, for the most part, not supposed to exist and thus tend to be eradicated over time in contemporary video games. On the other hand, some errors come to be adopted by developers, as is the case of the 'double cherry' power-up in *Super Mario 3D World* (2013), that creates another instance of the playable character that is controlled simultaneously. Once it became an actual official feature of the game, it also be became part of the designed algorithm.

Some glitches may cause malfunctions that may even prevent the player to play. Others eventually open a door to an unpredictable new set of possibilities. In the beginning of *Final Fantasy IV* (1991), thanks to a glitch, the player is able to skip a major section of the game. When following the story of the game she is forced to visit a town called *Mist*, the hometown of an important character. But by skipping it, a crucial sequence in the hardcoded narrative never occurs, and the game breaks altogether. [13]

Also thanks to a glitch, in *Final Fantasy VI* (1994) the player is able to travel to certain locations too early in the game's narrative, something that not only allows her to further explore the game world, but also permits her to experience story-based events out of the intended order [14]. The game assumes that if the player is at a given location, it is because she has already experienced specific

key events in the game, and tries to keep on developing the narrative. But when those key events are bypassed through the use of glitches, the game may break.

Players usually resort to glitches to explore inaccessible or not so easily reachable areas. *Tomb Raider* (1996) has a glitch that permits the player to cross closed doors, reaching closed areas. Also, in *Tomb Raider 3* (1998) the player is sometimes allowed to jump from the floor straight to the roof of Lara's (the playable character) house.

But glitches are also used to exploit other things. In *Super Mario Bros.* (1985) the player is able to jump on a Goomba[2] from below, an unforeseen event that consists of a stunt that kills the enemy while Mario survives.[3]

1.5 Profiling

Profiling essentially aims at the discovery of patterns in data in order to identify or represent something or someone, be them individuals or groups. While *profiling,* the system analyses a player's behaviour and interprets the emerging patterns in order to establish a course of action. Profiling is not just about activating or collecting particular objects, or accomplishing quests. It features a much deeper and complex design. It is about what collecting that object or accomplishing that quest *means*. It is about understanding what it means to undertake tasks, about understanding *how* the player plays the game, *how* she accomplishes a certain goal or *how* she acts in a given situation, throughout a specific section or even for the duration of the entire game. It is about interpreting behaviour, analysing sets of actions and understanding even the most subliminal behavioural patterns, and acting based on that.

Silent Hill 2 (2001) features an interesting, although rarefied approach to this type of traversal. As its predecessor and many video games, it features several possible endings. What is new here is how the player accesses each ending.

Silent Hill 2 is a horror game that tells the story of James, right after receiving a letter from his recently deceased wife, Mary, telling him that she is waiting at their special place—which James interprets as being Silent Hill. Summarising, James is traumatised for euthanising his wife (something that he is not aware of at the start of the game) and the city of Silent Hill where he meets Maria—a woman with extreme physiognomic resemblance to his wife—becomes a manifestation of his inner struggle between selfless love and selfish passion, making the player reflect on the reasons behind his actions: did he kill Mary because

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[1] In fact, the only reason that it is not listed last is because the focus of this paper is on *profiling*.

[2] A Goomba is a common and classic enemy in Super Mario games.

[3] This glitch was found by *Playfun*, a computer software that plays *Super Mario Bros.* (1985), created by Tom Murphy VII [25].

he loved her and wanted to end her suffering, or because he wanted his life back and to end his own suffering?

This not only sets the mood of the game but also seeds the mechanics for accessing one of multiple endings. There are three main endings that can be accessed depending on "James behavior and by extension, the player's behavior [that] is monitored to judge what ending makes sense based on their actions." [15] The player can access one ending if she meets specific requirements, consisting of sets of actions that she must or must not execute along the game [16-19]. Some relate to specific one-time events and others to recurring patterns of behaviour. Meeting one of those requirements increases the chances of accessing the ending that corresponds to the group in which that particular requirement is included. Each of the three groups of requirements configures itself as a specific psychological profile within the context of the game, a profile that is associated with a given ending.

Lets briefly examine each of the three main endings. The ending entitled "Leave" consists of James accepting Mary's death, and making peace with himself. For accessing this particular ending, the player must meet most the following requirements:

1. Listen to the entire hallway conversation;

2. Occasionally examine Mary's picture and letter;

3. Heal immediately after being hurt;

4. Exceed maximum health limit;

5. Do not try to return to the apartment;

6. Do not stay close to Maria. [18]

One may say that in the context of this game, these requirements point to a profile that is characterised by expressing love or at least fondness for Mary (points 1[4] and 2), having self-esteem or at least a regular sense of self-preservation (points 3 and 4), and not expressing affection towards Maria, a character that antagonises the memory of Mary (points 5 and 6).

The ending named "Maria" consists of James reliving is passion for Mary, now in the form of Maria, that at the end starts to cough, which is understood as presage. One may say that Maria represents all that James wanted his wife to be, but that she was not. She represents his inner, most selfish desires, his idealised mate, the passion without commitment, compromise, dedication, selflessness and ultimately sacrifice. All of the requirements needed to access this ending either aim at protecting Maria or ignoring the memory of Mary.

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[4] The hallway conversation features the voice of Mary in her sickbed, in an advanced stage of her illness. This happens right before the final boss of the game.

1. Try to return to Maria's jail cell after James finds her dead;

2. Stay close to Maria;

3. Revisit Maria's hospital room when she lays down;

4. Make sure Maria receives very little damage;

5. Do not attempt to return to Nathan Avenue after the bowling ally;

6. Do not examine Mary's picture and letter;

7. Do not stay far away from Maria;

8. Do not bump into Maria often. [18]

The ending labelled "In Water" is where James is unable to make peace with himself and commits suicide, being that the only way he conceived for him and Maria to be together again. These requirements all point to depression, and negligence in self-preservation or self-care:

1. Examine Angela's knife often;

2. Read the diary on the hospital roof;

3. Stay at low health throughout the game;

4. Listen to the entire hallway conversation;

5. Listen to the headphones in the reading room after watching the tape;

6. Read the second message to James in Neely's Bar;

7. Do not heal right after taking damage. [18]

As we have mentioned, we discerned between two types of requirements. *Type A* requirements consist of actions to be realised in one-time events, such as "1. Listen to the entire hallway conversation". And *type B* requirements that comprise behaviours that need to be incorporated by the player along the game, such as "3. Heal immediately after being hurt", "2. Occasionally examine Mary's picture and letter" or even "6. Do not stay close to Maria". In opposition to type A requirements—that are defined by hardcoded narrative events—these are strictly expressed by the posture and attitude of the player towards the game itself. For example, by immediately healing after being hurt the player has to always have healing items with him, which means that she cannot be constantly hurt, meaning that she has to ponder her decisions carefully and avoid unnecessary risks. Which, in turn, may also mean that she cares about her character, her representation in the game world, thus expressing self-care, and eventually self-esteem. Consequently, the behaviour of the player within the game may be an expression of the player's own personality or, at least, of her current state of mind.

And to conclude, what is even more important here is that it is not a single action or requirement that aims at a specific profile, it is the entire set. So, taking this into consideration, if the conditions for attaining a specific ending, such as

"Leave", would only be to "1. Listen to the entire hallway conversation", we would be witnessing a branching traversal: either the player does that or she doesn't. If we add another *type A* requirement, such as "5. Do not try to return to the apartment", we are witnessing a slightly more complex branching traversal. Although, adding more requirements could eventually translate into forms of profiling. But, by simply adding a *type B* requirement, such as "3. Heal immediately after being hurt", profiling would emerge. So, as long as the player's behaviour possesses a meaning in the game, capable of meaningfully alter the game's state, a profiling traversal is present.

The endings in *Silent Hill 2* try to reflect the player's profile, behaviour, and decisions. This fosters a hidden potential towards a deeper intertwinement between the scripted/hardcoded and the emergent narrative, based on the player's behaviour. "No more could players play like a renegade for the entire story and then select the good ending just because they wanted one. This could open the potential for the player to actively become a story component as much as its main characters, which is an exciting idea." [15] Here, both play and narrative are deeply connected and interdependent, establishing a set of narrative possibilities based on their tension. And although *Silent Hill 2* is a somewhat simple example, this type of traversal is capable of setting a web of possibilities that may easily become unfathomable.

1.5.1 Explicit & Implicit
This type of traversal differs from the previous in a fundamental aspect: it features an indispensable need to *collect and interpret data*. This is something that can be more or less evident to the player. Data may be collected by various means and methods, and even while performing other modes of traversal. For example, the system may be collecting data based on the specific choices the player makes while performing a branching traversal. From that data, the system may understand that, when confronted, the player often opts to go with the choices that imply least conflict, for instance. And this is data that may be useful in the future.

The same may occur with bending: imagine that the system uncovers that the player is usually interested in pursuing optional content that is related with a specific character, but not with others. And also to modulating: where the system may figure out that the player is more interested in befriending characters with specific alignments, sets of beliefs, levels of wealth, occupations, gender, race, equipment, etc.; or the opposite, where the player usually modulates her character in a way that consistently antagonises that particular set of non-playable characters. With this in mind, we may state that profiling is pervasive, as it has the ability to occur along with other types of traversal.

Contributing to its potential pervasiveness is the fact that collecting data may be a pretty *implicit* process to the player. She may not be aware of it at all. Especially when the system collects data from more mundane acts. In *The Elder Scrolls IV: Oblivion* (2006), *acrobatics* is a skill that influences the ability of the player's character to jump and determines its resilience when falling. The higher the acrobatics skill level the farther and higher that character is able to jump—among other abilities. And the more the player's character jumps, the higher the acrobatics stats get. This is not easily noticeable. However, when the player becomes aware of this process, she is able to take advantage of it. And upon realising how the acrobatics system works, players may change their common behaviour, jumping more often than they traditionally would, in order to increase the acrobatics stats. Their behaviour may even drastically change to the point that they alter the type of traversal altogether, e.g. *exploiting* the game: finding places where their characters get stuck performing continuous jumps automatically. [5]

There are other situations where data is collected implicitly. Where the player may not be fully aware of the consequences of her behaviour. Where she is unaware of being monitored, or at least, of what is monitored. *Silent Hill 2* (2001) is again good example, as the game itself doesn't provide clues on how to achieve all of the possible endings. The system silently collects data and only at the end manifests the due consequences.

What is considered implicit or explicit monitoring not only depends on the disclosure on behalf of the game system or the game itself, but also on the perceptiveness of the player. Some actions are of course more explicit than others, and some are more controllable than others: consider e.g. differences between voluntary and autonomic actions [20-22]. Ultimately, if the player perceives it and how it works, profiling becomes explicit; which is something that may or may not be intentional.

1.5.2 Balance & Unbalance
Interpreting the collected data may consist of a straightforward process or of a very convoluted procedure of a high algorithmic complexity. Let us imagine a game in which the player usually looses when fighting a specific type of non-playable character (NPC). This is a pretty simple case where the player is unprepared for a given challenge and looses the game. Upon verifying this fact, the game system may try to help the player to overcome that particular challenge, either by lowering the level of difficulty or by instructing her in how to overcome the NPC.

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[5] For more information consult:
http://elderscrolls.wikia.com/wiki/Acrobatics_(Oblivion).

Lets develop this example a bit further, conjuring that the player usually looses not to a single type of NPC, but to several others. By comparing their traits, the system may conclude that the player usually looses to NPCs that share a specific set of characteristics. With that information the system may better regulate the balance of the current state of the game, either by lowering their presence across the game or by providing means to promote their defeat: abilities or items, things that can be either found, fought for or even purchased.

This kind of behaviour is perceivable in some games and is known as *dynamic game difficulty balancing*, implemented with the goal of avoiding player frustration due to high difficulty, or boredom due to the opposite situation. By unbalancing the game, the system may create novelty, surprise, suspense, break the continuity of flow [23], set new paces, establish new challenges, present the necessity for alternate styles of play, etc.. We have previously [1] used *Left 4 Dead* (2008) as an example of modulating traversal, but now we are aware that what we were trying to explore was already an expression of profiling. This game cannot be overcome by memorising the location of the enemies in an attempt to anticipate their moves, because the game system dynamically adjusts their presence according to the performance of the player. In this context, the player experiences "a series of found narratives" [6], that ensures that she is not always attacked in the same place and by the same number of enemies. This is an element of surprise that creates a certain unease and novelty upon each play-through, thus unbalancing the game. In summary, profiling may be expressed by balancing or unbalancing the common and the uncommon, the known and the unknown, the much and the least, now and then, the here and there, thus contributing to the emergent narrative.

1.5.3 Shallow & Deep
Another expression of profiling emerges from the player's play history. In *Super Mario 3D World* (2013), if the player looses five times in a row, she is granted a special power-up, known as the *invincibility leaf,* from the sixth try onwards. This power-up grants the playable character special abilities—such as partial invincibility and momentary hovering[6]—that ease the difficulty of the game and consequently the effort of the player while traversing that game level.

This is also an example of *dynamic game difficulty balancing* as an expression of profiling. But, now we are interested in another thing: the player's play history. Independently of how useful this particular feature is for maintaining enthusiasm and retaining players in the game, losing five times in a row in a level of *Super Mario 3D*

World consists of a short play history—as each common level in this game is usually concluded in less than 300 seconds, which is the their time limit. In this example, the actions are simple and the consequences are straightforwardly implemented: if the player looses five times in a row, offer her a special power-up to ease the game. This is *shallow profiling*, focused on a short play history.

As profiling heavily consists in collecting data, the longer the player's play history is, the higher the volume of data collected may eventually be. And a high volume of data allows deeper and more profound analyses, that in turn may return more accurate results or at least more complex outcomes. On the other hand, a high amount of data may take longer to analyse—leading to delay in responsiveness or, at least, to the implementation of the due consequences in farther futures. This is *deep profiling*, focused on long play histories.

The demonstration of the forthcoming *Metal Gear Solid V: The Phantom Pain* at Gamescom[7] 2014 revealed a particular feature that is of interest to this discussion. This presentation consisted of exhibiting a subsequent play-through of the mission that was firstly displayed at their E3[8] 2014 demo. So, while infiltrating the same military base, the player discovered some differences from the first play-through. Two of them are of our interest: 1) there were many more guards patrolling the area; and 2) many of them were wearing helmets. The reason for this, as explained in the video, is that in the previous play-through the player performed several head-shots with a tranquilliser gun. The system acknowledged that behaviour and reacted in this round, by placing helmets on the heads of the next batch of enemy soldiers and by increasing their numbers.

"The developer noted that this demo is actually the player replaying an already completed mission, so this time your foes are ready for you. Where last time they were susceptible to tranquilizer darts in the head, this time they wear helmets. Where last time their numbers were thin, this time they've bulked up their manpower." [24]

So, ultimately, profiling is not just about measuring the player's successes or failures. It is also about understanding her competencies, either to facilitate or difficult, to propose new challenges, or to dynamically shift or adapt the narrative. *Shallow profiling* usually results from monitoring simple actions in very specific situations, something possible in a short play history, such as loosing five times in a row. On the other hand, the outcomes of *deep profiling*

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[6] For more details, consult
http://www.mariowiki.com/Invincibility_Leaf and
http://www.mariowiki.com/White_Tanooki_Mario.

[7] Gamescom is a video games trade fair that has been realised on a annual basis in Cologne, Germany.

[8] E3 is the diminutive for Electronic Entertainment Expo, which a video games and computer industries trade fair realised annually at Los Angeles, USA.

stem from more algorithmic complexity, interrelating the obtained data in order to analyse the behaviour of the player and to identify patterns, which is something that may require a longer play history.

1.5.4 Prefiling vs Profiling

It has been a very common strategy in western RPGs—but not exclusive to these—to provide, usually at the beginning of the game, a set of options for the player to parametrically customise her character[9]. This is noticeable in games such as *Fallout 3* (2008)*, The Elder Scrolls V: Skyrim* (2011), *Kingdoms of Amalur: Reckoning* (2012), *Dragon Age: Origins* (2009), *or Mass Effect* (2007), just to mention a few. In these games, the player builds up her character by assigning specific values for parameters such as gender, age, race, social or historic background, physical and mental attributes, occupation, vocation or craftsmanship, among others… Each divergence potentially generates alternative playable characters, which will affect the way the player will play the game. These choices will help in determining which actions will be available or not to the player, thus encouraging alternative play styles. For example, if the playable character is incompetent in face-to-face combat but is an expert at sneaking and breaking and entering, that certainly promotes a style of play more based on furtive activities than on all out action. This shapes how the player devises her strategies, as the chances to succeed increase if she plays in accordance to the previously created profile.

Although in these cases the player creates a determined profile for her character(s), this is *not profiling* in terms of ergodic traversal as we have previously defined it [1, 2]. In some of these cases the profile is created before play, beforehand by the player. In these cases, no data is collected by the system, as it only asks the player what kind of profile she desires. With all the risks that are usually appended to the introduction of new terminology, instead of profiling we call this phenomenon *prefiling,* as the creation of the playable character's profile is done before playing the game itself, being forced upon the player, imposing the specific play styles that emerge from that. Opposing to profiling, *prefiling* is thus an action of the player, where she essentially establishes a determined profile with the intention to promote certain behaviours and particular play styles. While prefiling the player acts based on the her expectations about the game world—expectations that are seeded on her current knowledge of the game and on her own personal experience—, creating a profile that she believes to best meet her needs and desires.

In *profiling* the system interprets and analyses the player's actions, the player's behaviour. In *prefiling* we may say that

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[9] Probably, a trait inherited from Dungeons & Dragons table-top games that heavily influenced western RPGs in video games.

it is the player that analyses herself, that looks into her own history, makes choices based on her expectations, aiming towards a particular experience that she idealises as favoured. So, within this framework, prefiling doesn't constitute an experience of traversal any different from that of *branching, bending* or *modulating*—depending on the complexity of the system.

In *modulating* the player regulates the values of a series of parameters in order to influence the character's and object's social network. While *prefiling,* the player accomplishes the same. She preemptively makes a series of choices, regulating the disposition of other elements of the game towards her or the character she controls. This even happens in games that allow the player to constantly optimise or modify the playable characters' profile, which is a pretty common feature in many video games, such as *Final Fantasy XIII* (2009), *Borderlands* (2009)*, Dishonored* (2012), or *Fantasy Life* (2012); but also in *Super Mario Bros.*(1985), *R-Type* (1987), or *Contra III: The Alien Wars* (1992), if we think of the power ups as enablers or disablers of particular abilities that in turn reflect changes in play style, even if their effect is momentary.

This is not profiling in the context of traversal as we have stipulated. From the player's perspective, her experience, her *journey,* her traversal is nothing more than what we have defined as modulating, where she regulates the disposition of the game elements.

We have also realised that in certain situations *prefiling* is also attainable by *branching*—in which the player is asked to choose from mutually exclusive paths. This is what happens in some games that feature pre-established profiles. In other words, the characters and their specific traits are already created, and, just as in a branching traversal, the player is only requested to mutually choose from the available options. In this case, one may say that if *customisation* is a job for *modulation*, *pre-customisation* is a task for *branching*.

Many examples can be found for this particular situation, from *Street Fighter* (1987), *Streets of Rage* (1991) or *Tekken* (1995) to more contemporary games such as *Dungeon Siege III* (2011) or *Hyrule Warriors* (2014), where the player chooses from various characters with dedicated special actions. But a more interesting example comes to mind. At the beginning of *Tales of Xillia* (2011), the player is forced to choose one of two possible main characters: Jude Mathis (a medical student proficient at martial arts) and Milla Maxwell (a being from another dimension). This choice will not only determine which parts of the story the player will witness, but will also condition the player into a certain the style of play as each character supports a particular set of abilities.

Another example in which a single action, a single choice, affects all or a great number of elements in a game occurs in the difficulty level options screen. Choosing between

easy or hard modes is also branching prefiling, as that alters the profiles of the involved various game elements.

Fantasy Life (2012) features the same basic example, but substitutes branching for *bending*. In this game the player is able to choose and at any moment alternate from 12 occupations (called *lives* in the game), each with unique abilities: angler, alchemist, blacksmith, carpenter, cook, hunter, magician, mercenary, miner, paladin, tailor, and woodcutter. Each occupation offers alternative ways of playing and consequently experiencing the game. The implementation of a job system is not something new in video games, neither is that kind of newness of interest here. What is in fact of our particular interest is the fact that the player is able to alternate between each occupation and to retain the learned skills when doing so. By being able to change occupation, the player is able to access parallel or optional content, expanding her knowledge of the game world—a defining characteristic of bending traversal—customising her playable characters at the same time.

In conclusion, while profiling, the system adapts to the player, basing its actions on her behaviour. On the other hand, while prefiling it is the player that adapts to the system, explicitly choosing from the available options. *Profiling* is an act of the system. *Prefiling* is an act of the player.

CONCLUSIONS AND FUTURE WORK
In this paper, we defined another type of traversal besides the other four previously enunciated: *profiling*. In this model, profiling happens when the system monitors the actions of the player, whether she is aware or not of that. Profiling may be pervasive, as it may be enacted along with other types of traversal. Its procedures may or may not be perceived by the player, while other types of traversal require her attention. Profiling is executed by the game system, while the others are executed by the player.

The potential pervasiveness of the profiling traversal makes us ponder on how all of these types of traversal relate with each other. What kind of relationships may be established between them? No doubt that many video games consist of diverse types of traversal, but an understanding of how they function together is necessary. Grasping this could aim at a better understanding of gameplay dynamics and deeper discernment about player experience, an experience that is promoted by distinct concurrences between scripted/hardcoded and emergent events.

Considering the fields of game design and of game development, one could say that profiling is similar to what is called *player behaviour modelling* (PBM). But, although they operate in overlaping fields, they diverge in perspective. PBM is a game design technique that is often put in motion with a main goal of creating models/abstractions of players in order to raise overall player satisfaction, regulating predictability, difficulty, etc., something that occasionaly happens before actual play.

As a mode of traversal, profiling consists of an experience that emerges from the relationship between the emergent and the hardcoded narrative, and as such it is a phenomenon that occurs in runtime, that is solely witnessed while playing. Profiling may result as an expression of some PBM techniques in action, but profiling doesn't solely rely on PBM techniques, and neither do the results of the implementation of PBM techniques solely express profiling traversals. In fact, the outcomes of several procedures in PBM are the result of activities seeded in other kinds of traversal, namely through what we defined as *prefiling*.

Considering these facts and despite their divergences, a thorougher study on what kinds of modeling procedures can be classified as profiling needs to be developed.

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