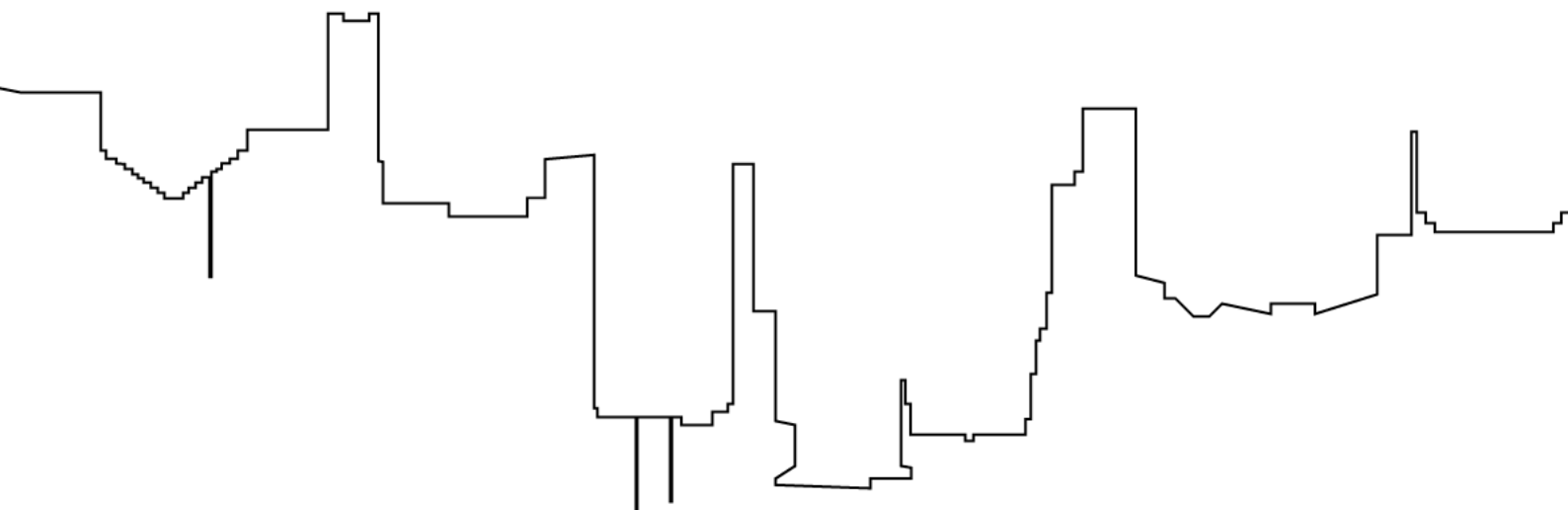


ENVIRONMENTAL STORYTELLING IN A NEW AND UNEXPLORED WORLD



ABSTRACT

This paper is aimed at artists, designers, writers or anyone else who is interested in the application of environmental storytelling in games. I have described applicable design methods, existing or new, originating from games, theme parks, film and books. The paper explains in detail the goals a designer may have with environmental storytelling and has visualized these goals in a flowchart. The flowchart can be used as an aid to finding which method, or group of methods, are ideal to accomplish particular goals. The flowchart may also be used to define a not yet existing goal. Besides describing the goals and their accompanying methods, an encompassing definition of environmental storytelling is outlined and essential guidelines for applying environmental storytelling are explained. Finally, a supporting level is bundled with this paper that acts as a case study and illustrates the methods in this paper.

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INTRODUCTION

On the morning of the 23rd of January 2013, *Scott Olson* shot this photograph: A scene of a Chicago warehouse and its materials totally covered in ice. From the first glance you notice something is not right. In temperatures as low as in the depicted picture it is impossible for rain to fall. Below zero temperatures make it snow. So where did the water come from? How did it cover the whole warehouse and then suddenly freeze? Was it rain caught in a flash freeze? The picture invites the viewer to think about what it is, he or she is seeing and ignites the following crucial question:

“What happened here?”

Before understanding the scene, the viewer needs to interpret what it is he or she is seeing. It is a puzzle whereby different elements are combined to create the solution. Notice that there is steam in the background of the image; are you already able to decide upon the history of the image?

The viewer is actively filling in the whitespace, and creating his or her own story by adding up the different elements to create a whole. Just like in Scott McCloud’s *Understanding Comics* (McCloud, 1993: 60-69). The whitespace, which in comics is the area between panels, are the parts that are unknown to us. The blanks that we need to fill in for ourselves. But how do you know the recipient of your environmental storytelling will successfully fill in the blanks? In the photograph we are able to fill in the whitespace because we are experts of the world we live in. We know ice is frozen water, we know water freezes below zero and we know steam is generated by heating up water to high temperatures. But what if -which is often the case in games- the world’s rules are fictional and we find ourselves traversing an unexplored world? Are we still able to add two and two and create our own stories?

As the used example is set in a non-fictional world, there is a chance you have already been able to create your own version of the history of the photograph by using your own pre-existing knowledge to fill in the whitespace. If this is not yet the case, the next photograph adds another element to incorporate in this story.



We recognize a fire-fighter and by now we are able to answer our initial question about what happened here. It is a cold winter in Chicago and we are witnessing the aftermath of a great fire. The fire has already been extinguished and the water used to douse the flames has frozen rapidly in the below zero temperatures. The heat is however still apparent, thus evaporating the water and creating steam.

More complicated instances of environmental storytelling are prone to be interpreted in many different ways. Even this example could have led you to imagine a very different story than the one I just told. We need to ask ourselves: is the personal interpretation ever wrong? The player has the leading role in the game and its story. Who are we to say they aren't doing it the right way? We designers provide opportunities for players to create their own stories, but if that is the case, how do we incorporate environmental storytelling that is mandatory to progress further?

There are many different ways to classify, define and practice environmental storytelling depending on the approach of the designer and the goals of the game. I believe that, besides all having their own strengths and weaknesses, that all of these approaches and definitions inadvertently result in a deep and immersive game-world.

This paper is aimed at designers, artists, and writers within the games industry or anyone else interested in this subject. I will provide clear guidelines about how to apply environmental storytelling as well as help decide which method is best suitable for whatever goal you might have. I will explain the different techniques and present examples of them being used in the industry. Effects on the experience of these techniques will be documented and finally this paper presents a first-person shooter level that successfully applies all methods that will be brought to light in the following pages.

This level will, like any other level that correctly makes use of environmental storytelling, portray a living and breathing world. A detailed world that, incites exploration, immerses and creates a lasting memory.

THE POWER OF (ENVIRONMENTAL) STORYTELLING

The importance of telling of stories in society has been set alongside the importance of food and sex (Gopnik, 2012). However, we are unable to prove this due to a reason that in itself proves this comparison: No society exists that does not tell stories. Humans are constantly experiencing stories – from fantasies, to religious myths, to dreams and nightmares, to pro-wrestling, videogames and children's make believe (Gottschall, 2012).

Compared to storytelling, ES does something powerful that is exclusive to this means of storytelling: it lets each individual consumer of the content, be it book, game, etc., fill in the gaps their own way. For instance, author Richard K. Morgan has a knack for wrapping up wide scopes into mere sentences. "The rusted hulk of a beached warship was pocked with holes and doors of human habitation. Overhead, a rusted frame of a long spanning bridge long since gone, an ancient monument from the 20th century." Basically he is describing the 24th century equivalent of a beached aircraft carrier turned into an apartment complex sitting beneath the rusted remains of the Golden Gate Bridge. This image presented here says a lot about the environment in which this story takes place; but it lets the reader form whatever conclusions they desire about how it came to be. He paints the picture, you find the meaning.

ES is a way of telling an incomplete story which the receiver of the story needs to actively interpret. It incites participation by omitting certain aspects of the story. If the story is interesting enough, the receiver of the story will go to great lengths to find out about the missing elements that are not presented. ES is a form of storytelling that incites participation. It makes sure the player is constantly connected to, and reminded of, the story.

One of the main uses of ES is the placement of visual, auditory or textual clues (also called indices) that, when put together tell a story. Telling a story by revealing indices that still need interpreting is called indexical storytelling (Fernández-Vara, 2011) and the creation of this kind of ES is elaborated upon further on in this document.

Indexical storytelling does not necessarily need to be interpreted in chronological sequence, making the order in which the player finds clues often irrelevant. We can just place them within different areas of the level. This means we do not force the player to listen to 'this' character or watch 'that' cut scene. It is integrated within the playable area, the video game space. Therefore players are able to review the information as they want and seamlessly interpret the stories they want to experience whilst playing a game.

ES however, does not always need to be as obvious as a placed clue explaining what happened somewhere. ES can instead, be used to subtly influence a decision by creating better guidance or suggesting a certain action. Clearly communicating areas in which the player cannot be seen (be it through blocking line of sight through cover or hiding in the shadows) can have so much influence that without it, the game would not be fun to play. Another often used and highly successful way of guiding the player is to use unmistakable clues that stay within the fiction of the world. Instead of using an interface arrow that shows us the way, in-game green exit signs or arrows pointing toward "pump-control room" can successfully guide the player without him or her having to leave the fictional world.

There are many more applications of ES, like creating an emotion or teaching the player about something, which will be outlined later on in this paper.

Hopefully by now, we have been swayed into thinking about the possibilities of ES and perhaps are even scheming about ways of incorporating it into our own games. But before we do that we will need to know how other designers are employing it and what types of ES exist today.

RESEARCH METHOD

Before defining all the different methods of incorporating ES, this chapter describes which methods I used to get the results in the rest of the paper.

This paper started off as a summary of methods that designers use to apply ES to their games. I read many papers, watched keynotes and talked to people in the industry about the subject. I also played a selection of games that use ES in a strong or remarkable way and eventually I was able to create an elaborate list of examples of ES being used in today's games.

The games I researched are:

The Last of Us
Half-Life 2
Portal
Mass Effect
Guild Wars 2

Heavy Rain
Left 4 Dead 2
Dark Souls
Metro 2033
Tomb Raider (2013)

L.A. Noire
Fallout 3
Dishonored
BioShock Infinite
Minecraft

I used this list to look for weaknesses in ES and find out in what areas ES is less effective. The questions I asked myself were: "In what situations would a designer refrain from using ES?" and "Which recurring problems present themselves during the application of ES?" By answering these questions I was able to find certain weaknesses of ES, like the world being an unresponsive place, or different players interpreting something the wrong way. I came up with solutions and aimed to prove the solutions with the creation of multiple small test levels.

During the creation of these test levels I ran into an overarching issue: I was working on very specific situations whilst the ultimate goal of this paper was to create something broad that any designer interested in ES would want to read. So, instead of solving particular problems, I examined what ES really is. Besides clearly showing what different methods are being used today, I decided I should document why a designer would want to use one method over another.

This made me define all the different goals a designer might have with ES. I categorised all existing methods within the eight resulting goals. To help a designer with finding which goal (and thus which methods) are ideal for the situation he/she find him/herself in, I also designed a supportive flowchart.

Through using the flowchart myself I created a promotion level that presents all of the different methods of ES covered in this paper. During the creation of this promotion level I continuously organised and further defined the methods based on findings that occurred when building the level and observations/interviews held with players of the level.

My approach can be labelled as design research; I have researched the phenomenon of ES by building working prototypes and used the findings in these prototypes to further define my research about ES. For more information and examples of this method, refer to the book *Design Research through Practice* (Koskinen et al. 2011).

For the creation of all the levels I used the Hammer Editor, which provides the possibility to create levels for existing games on the Source engine. I decided upon using the Hammer editor because of previous experience with the tool and the convenience of being able to use assets from the already existing Source games.

RECCURING OBSTACLES AND ESSENTIAL GUIDELINES

Before continuing and defining which methods of ES exist, it is important to know about what can go wrong whilst designing instances of ES. This section describes two crucial obstacles that you could run into. The first obstacle is that many players have the tendency to be oblivious to ES and the second obstacle is that every player can interpret ES in a different way. After the two obstacles, I also dedicate an important chapter to the use of sound in ES.

Remember that the obstacles do not always pop-up. Depending on the situation, some of these obstacles will not be applicable. It is even possible that these obstacles surface during the design process but do not have a negative impact on the desired experience. Therefore these obstacles do not always have to be solved.

MAKING SURE THE PLAYER NOTICES ENVIRONMENTAL STORYTELLING

At least once, every designer must have dealt with this issue of a player missing an important clue. This clue does not necessarily have to be related to ES, but perhaps the player got stuck, not knowing what to do, due to missing a spoken line of another character. Or perhaps he/she got lost, not knowing where to go, because the quest description was not read.

This is a constant obstacle encountered when designing games or levels and I am pretty sure many of us have a great metaphorical ‘box of solutions’ at the ready for exactly this issue. We know about composition through the creation of contrasts, like well-lit areas or highly saturated objects of interest. We can instantly think of the many different objective markers, with their systems, which games employ. We are able to utilize our understanding of the players mind as to predicting which decisions will be made. All of these methods are effective and are applicable when wanting to make sure the player notices an instance of ES. This has been proven to work by Team Bondi and their title *L.A. Noire* (see example 1 to the right). There are however a couple of other, less apparent, techniques which can be just as effective. Choosing the best method for the situation depends mainly on the importance of the player noticing ES.

As ES is part of the game-world itself and the player is able to traverse the world at his or her own pace, the issue of the player walking past a clue without giving it another glance will always be present. Some players actively scour the area for clues, but others have the opinion that if something does not move it is of no importance.

One technique we can use is the repetition of clues to give the player multiple chances to discover a certain story. The more chances the player has to find out about something, the less likely it will be overlooked. What’s more, repeating certain clues multiple times can have a great effect on the overall experience of the game as the player is constantly reminded of the goal and kept on the right track (Carson, 2012). These clues do not need to be the same to tell the same



Example 1: ES is a vital part of *L.A. Noire*, making it essential that players are aware of clues that are scattered around. There is a unique and dynamic soundscape that tells the player he/she is on a crime scene and subtly hints with a sound when he/she is near a valuable clue. From a distance the position of a clue is made clear by placing the objects in places they are not supposed to be and often giving them a yellow tint. Additionally, *L.A. Noire* tells the player to actively scour for clues right before entering a clearly bordered area, through spoken dialogue.

story. Multiple clues can have different smaller stories. For instance whilst the player is exploring a prison the player encounters two corpses: one of them was the result of suicide and the other one was killed by prison overseers. Both instances tell a different localised narrative but can still serve the same overarching story of desperation and corruption within the prison.

Another technique which is effective, is to call in the help of other well established forms of storytelling. We can have NPC's commenting on instances of ES through spoken dialogue so that they help explain what has happened, or we can have notes and quest descriptions to help explain what the player is seeing. Examples of this technique can be found in *Left 4 Dead 2*, where the player avatars comment on scenes, and in *Fallout 3*, where the objective description changes as the player sees an instances of ES.

The easiest solution, however, is making sure ES is optional and use it as a reward for the players that are looking for this enhanced experience. This way we can make sure both of the previously mentioned types of player will have a good time whilst playing the game without limiting any of their freedom. Even when ES is not required for progress' sake, the aforementioned techniques will still immensely aid our ultimate goal of creating a detailed world.

"MY WORLD IS NOT YOUR WORLD!"

Something we run into as soon as we start thinking of ES is that it has different meanings for different people. This is inevitable because, as a form of indexical storytelling, a large part of ES happens in the mind of the player.

This issue does not immediately call for a solution because if environmental storytelling is not required to progress but instead adds an extra layer to the experience, the interpretation of ES does not need to be definitive. If one player thinks that the burning house he encounters in the game was lit by a dragon that was just slain nearby, and the other player thinks it was an unruly mob burning a suspected witch's cottage, who is the designer to say one of the player is having a 'wrong' experience? Everyone has a different experience, and giving players the possibility to fill in the blanks the way they want can create additional immersion. These blanks, also called whitespace, are the video game equivalent of negative space in other art forms. Jordan Thomas talks about different interpretations in an interview: "As you're trying to build the meaning of your work you have to embrace the idea that meaning is participatory. Even more so than decoding a piece of art or text, the act of physically participating in the work is going to alter its meaning." (Thomas, 2010; see also McCloud, 1993)

If it is necessary we are, fortunately, able to influence what happens in the players mind when he or she is interpreting a scene. We can do this by exposing indices (Fernández-Vara, 2011) that influence the interpretation of future ES. In other words, we can condition the player so that, in advance, the player is prepared for upcoming ES. (For additional info about player conditioning refer to method A.) Which obstacle is important for which goal becomes clear in the next chapter of this paper (the main methods of applying environmental storytelling).

DECIDING UPON VISUAL OR AUDITORY CUES

Though not an obstacle, it is essential to be aware of the possibilities that surface when sound is used together with ES so that we have the possibility to combine auditory and visual cues together and create the perfect instance of ES. If we look at how sound is combined with ES in the games of today, we can see sound does a lot more than telling a story through speech or adding an epic soundtrack.

Imagine that the player is searching for a train station and we want to aid the player through the use of ES. Without sound the player can stumble upon a set of tracks that eventually lead toward the station, but, instead we could play the sound of a train whistle, coming from a certain direction, and have the same desired effect.

Both means are able to successfully lead the player towards their goal but by combining them we are able to envision the breathing world we set out to create.

As with physical environmental cues, we are able to make sound cues easier to notice. Just as large and well lit objects can become an important part of a scene, loud or distinct sounds can create emphasis or readability if they need to be. For example, in *L.A. Noire* sound cues and music are used to show the player when to pay attention to the environment. In *Heavy Rain* music is used to support the environment by subconsciously enhancing the atmosphere and in *Left 4 Dead* it is used in the form of dialogue to help find scenes that often contain useful loot.

Instead of the world creating environmental storytelling for the player in the form of sound, it is also a possibility to turn it around and have the player create sounds at which the world reacts. We have returned to the overarching technique defined as history of the player (see method H for more on this subject). If the player creates a sound, enemies hear it and are alerted to the protagonist's presence. These sounds can also be used to distract guards by deliberately creating sound at a desired location elsewhere. This is done a lot in Naughty Dog's *The Last of Us* and is a great application of ES as it combines an engaging world with gameplay mechanics.

Sound clues are able to tell the player about something without the need of showing it. This means an unseen part of the world can still be part of the story and certain elements, like for instance a waterfall, can be suggested in advance.

THE MAIN METHODS OF APPLYING ENVIRONMENTAL STORYTELLING

There are many goals a designer may want to fulfil by making use of environmental storytelling in his or her games.

The designer may want to teach or tell the player about certain mechanics or dynamics so that the player is able to progress in the game. Or maybe the designer is working on a sandbox-style game and wants to make the player aware of all possibilities. Perhaps the player needs to be guided toward these possibilities or something else like a reward? It is of course also possible the designer just wants to create a believable world. A world that seems real and generates great immersion.

Whatever this goal is, even if there is no goal to start with, chances are the following chapter will help you attain, outline and expand upon it.

The following eight goals are the main goals a designer might have when wanting to use environmental storytelling:

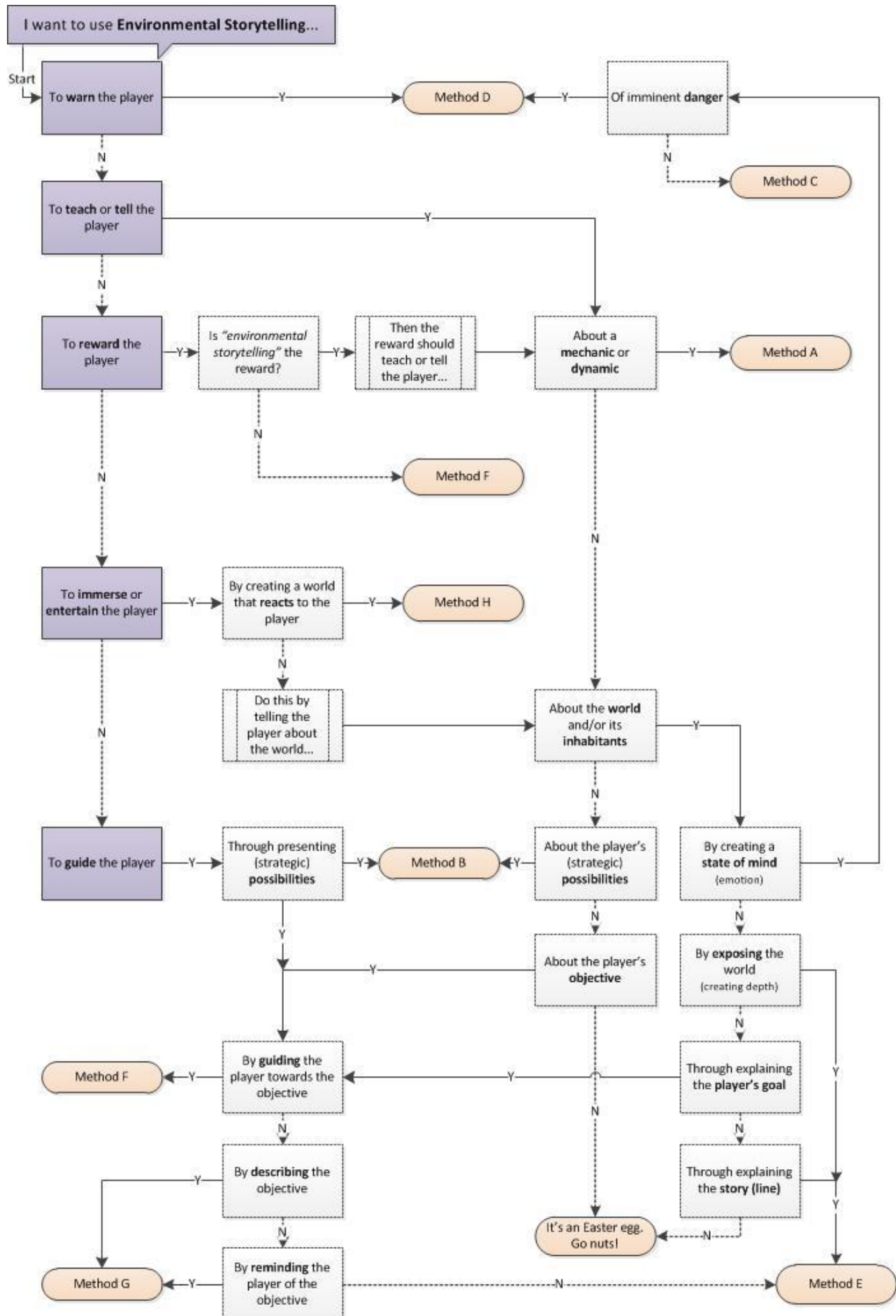
- A. "I want to use ES to teach or tell the player about certain mechanics or dynamics."
- B. "I want to use ES to show the player his or her (strategic) possibilities in the level."
- C. "I want to use ES to create a certain state of mind."
- D. "I want to use ES to warn the player of upcoming or imminent danger."
- E. "I want to use ES to create detailed world that feels alive and breathing."
- F. "I want to use ES to help guide the player to the desired goal / reward."
- G. "I want to use ES to explain or help remind the player of his or her objective."
- H. "I want to use ES to immerse the player by creating a reactive world."

Every goal mentioned here has its own dedicated chapter that elaborates on which methods can be used to attain the goal as well as presenting examples of (not only) games that utilize these methods in an admirable, unique and/or interesting way. I have set these goals up as broad as possible so that examples of ES that have not been documented in this paper can still be used within the framework presented here.

There is some overlap between goals and, likewise with understanding ES, different readers may interpret some of these goals differently. This is the reason why the next section in this paper contains an optional flowchart that can aid the designer settle upon goal A to H.

Keep in mind that these are no rules but guidelines. Combine or ignore whatever you deem best or non-applicable from what is mentioned here.

FLOWCHART



METHOD A

“I WANT TO USE ES TO TEACH OR TELL THE PLAYER ABOUT CERTAIN MECHANICS OR DYNAMICS”

ES is built around explaining anything from ‘character relations’ to ‘history of a specific area’ by presenting environmental clues which the player can string together to create their own image of the situation. This means that ES is completely subjective and depends largely on what the player already knows in this or comparable (game-) worlds. If the world the player faces is unique and without any resemblance to real world phenomena (which is often the case with games) the player becomes a blank slate and environmental storytelling, I presume, is impossible. Player conditioning is a tool that makes sure players are no longer blank slates by preparing the player before they encounter certain environments.

In the real world, people are already being conditioned from the day that they are born. If, for instance, someone sees a puddle of blood on the floor they can conclude a wounded human being or animal was here because, as humans, we have been conditioned to know where blood comes from. For people who have grown up in the Western world a stained glass window with a rounded top is associated with a church but a member of an aboriginal tribe will not see this connection.

Player conditioning should be used when creating environmental storytelling in the same way a tutorial is used to explain the mechanics the player needs in the rest of the game. This means that, before creating a set-up where the player should use a certain mechanic, the player must be able to witness the mechanic beforehand or in one way or another be prepared for the set-up.

When we apply this method of ES we need to make sure players are conditioned successfully before they encounter a setup that can obstruct progress. (For information about making sure required ES is noticed refer to “Obstacle 1: Making sure the player notices ES” in the previous chapter.)

Example 1, player conditioning: In the game *Half-Life 2* there is a contraption that the player can use to kill enemies. When the player first encounters this contraption, it is spinning and slices through a couple of enemies. At a later point the player encounters this contraption again, but this time a part has come loose and it is turned off. The player, by now, knows what this contraption does and how it should look because the player is conditioned and the player is able to use this knowledge to repair and use it to his or her advantage.

Example 2, teaching the player through tutorials: In the *Portal* series, the player encounters many mechanics (Hunicke et al.) that one is required to use in order to progress. Therefore, Valve makes sure that when a player encounters a mechanic for the first time, its use is always straightforward, the environment gives hints as to how to use it and the player is unable to progress before finding out how to use the mechanic. After this introduction the mechanic is used in more advanced puzzles that can only be solved by combining multiple mechanics. This technique is not directly an ES technique but it is directly translatable when aiming to teach the player about something through use of ES.

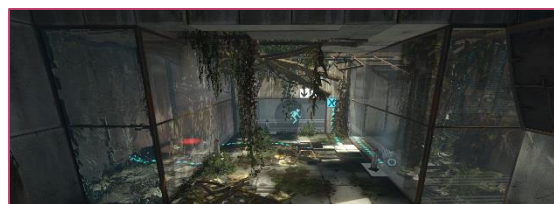


Image: Teaching the player through using hints situated in the environment in *Portal 2*.

Recommended supportive method: B

Games that utilize this method: *Half-Life 2*, *Portal*, *L.A. Noire*.

METHOD B

“I WANT TO USE ES TO SHOW THE PLAYER HIS OR HER (STRATEGIC) POSSIBILITIES WITHIN THE LEVEL”

By showing possibilities to the player, this method can make people perform something, like choosing a direction, taking cover behind a car, hiding in the dark or even refraining from doing something. This method is used constantly in stealth games like *Thief* and *Dishonored*. In these games light and dark is used to tell the player, like in the real world, where enemies can and cannot see you. The environment guides the player, creates safe areas or proposes effective strategies. Another way of using this approach is done in Bioware's *Mass Effect* series in which the level clearly communicates areas in which the player can take low or high cover. Spiked surfaces or red glowing lasers are also an example of this type of ES. Because a player knows about the damaging properties of lasers and spikes, but also because the player is conditioned (see method A) as to how lasers and spikes (in games) react.

Instead of showing the possibilities to the player, ES can on some occasions give the player the wrong idea. It is possible for an environment to suggest to the player that something is possible but if there is no mechanic that enables that action the player will be disappointed due to being misled (Smith and Worch, 2010). An example that comes into mind is a toilet stall in *Deus Ex: Human Revolution*. Here the player is presented with a toilet packed with drugs suggesting it was in the process of being flushed. When the player flushes the toilet however, nothing happens to the drugs. The player is invited to do (or shown) something which he/she is unable to do, thus creating a crack in the fictional world. As something like this can still greatly add toward the story it is up to the designer to decide if the pros outweigh the cons in every specific case in which an action is suggested that the player cannot do.

This effect is worse if these deceiving instances of showing the player's possibilities are of a strategic nature. If an area that seems dark or fully covered, actually isn't, the player will possibly die as a result.

(Depending on how important it is for the player to find out about his or her possibilities refer to “Obstacle 1: Making sure the player notices ES” in the previous chapter.)

Example 1, using the real world and/or other games as a reference:



Image: Deadly red lasers from *Beyond Good & Evil* (left) and spiked surfaces in *Prince of Persia*.

Example 2, showing optional tactics: In *Half-Life 2* there are certain moments where enemies are positioned upon wooden supports. Instead of killing the enemies by shooting them, it is also a possibility for the player to use explosives to break the wooden supports under the enemies. This is communicated to the player through the convenient placement of explosive barrels at the base of the structure. Additionally, the player has been conditioned about how wood works in this game-world: it is often destructible.



Image: Here we see an enemy in *Half-Life 2* that can be killed by destroying the wooden supports.

Recommended supportive method: A, F

Games that utilize this method: *Thief*, *Dishonored*, *Mass Effect*, *Prince of Persia*, *Beyond Good & Evil*, *Portal*, *Half-Life 2*, *Machinarium*, *The Last of Us*.

METHOD C

“I WANT TO USE ES TO CREATE A CERTAIN STATE OF MIND”

Subconsciously the emotions and feelings of the player are greatly influenced by the atmosphere of a game and by carefully manipulating the atmosphere a designer can incite a state of mind in the player. An atmosphere in which the player feels safe will for instance slow a player down and adjoining that area with an unsafe area creates, through juxtaposition, a hidden barrier that effects the feeling, hence decisions, of the player (Totten, 2011). This works just like the effect in which a room can seem a lot larger than it actually is when the player enters the area after being in a small and cramped area.

A lot of different ES elements like lighting, sound, colour, or in *Heavy Rain*'s case, weather, can help construct the atmosphere, but as a consequence, these same elements can also break it. Choosing the right elements can be a hard task and limit the choices of the designer because perhaps that awesome idea based on sunlight cannot be used because the atmosphere must be scary.

Atmosphere has the ability to encapsulate all elements of a story and contain it within one single feeling. One feeling against which all other aspects of the game are placed and manipulated.

When designing an atmosphere it is important to find which elements have what effect on the emotions of the player. Many of these elements are universal like rain dowsing the mood and bird sounds inducing relaxation, but other elements can, like all methods of ES, be interpreted differently. A cradle can trigger happiness to a new and happy father but can also trigger sadness in a parent who has lost a child at young age.

These subjective emotions can however be controlled by the designer through the use of player conditioning (see method A). If the player is taught that the player's avatar has a known backstory (e.g. the avatar has recently lost a child), the player is able to emphasize with the avatar and reflect those emotions on him or herself.

Example 1, affecting mood through atmosphere:



Image: In Quantic Dream's *Heavy Rain*, the setting greatly influences the mood.

Example 2, creating fear: The game *Amnesia: the Dark Descent* is a great example of scaring players. To do this many elements need to work together. A couple of these elements are darkness, toying with the unexpected and sounds. It is interesting that game mechanics, like time based systems (flashlight) and visibility modifiers also support creating the terror *Amnesia* instils upon its players.

Example 3, creating sense of oppression or suppression: *Half-Life 2* uses many different ways to evoke a sense of suppression: there is a totalitarian police force that tortures people behind (not so) closed doors and propaganda is spewed through big television screens and posters. Security cameras, barbed wire fences and overall dirtiness are all factors that create an environment where even the player feels oppressed.



Image: Elements evoking a sense of suppression in *Half-Life 2*.

Recommended supportive methods: A, E, G

Games that utilize this method: *Heavy Rain*, *Half-Life 2*, *The Walking Dead*, *Amnesia: the Dark Descent*, *The Darkness 2*

METHOD D

“I WANT TO USE ES TO WARN THE PLAYER OF UPCOMING OR IMMINENT DANGER”

A remarkable method used to attain this goal has been done in the Demon / Dark Souls series. In these single player games, players are able to create messages on the floors and walls that also appear in other players' copies of these games. These messages usually contain warnings of upcoming bosses or hints about how to find a nearby secret. An up- and down voting system ensures the messages are trustworthy.

Besides writing about upcoming enemies by 'writing it on the walls' as used in *Dark Souls*, there are more subtle ways of warning the player something is coming. The environment can warn players about impending doom by having blood leak out from under a door the player needs to go through, or by showing the player distinct scratches created by a 'big something' that lead towards a, still hidden area. By increasing the frequency of these warning signals the player can be told he or she is getting nearer to the source of the violence.

Warning the player about certain enemies is usually done by creating distinct enemy noises like the special infected in *Left 4 Dead*, Creepers in *Minecraft* or any other enemy that has its own unique and recognizable sounds. However, as the sound originates from a game actor instead of the environment, these warnings are not a form of ES. It would be though, if these actors would be walking on creaky wooden planks that are audible to the player. The actors are still telling something to the player but it is conveyed through the environment. The noise originates from the wood.

Combining warnings in the environment and through sounds can for instance create great immersion by way of tension. Imagine after following a trail of scratches and torn up corpses,

suddenly a scraping sound can be heard from around a corner.

Example 1, foreshadowing a boss: A great example of foreshadowing a boss can be found in the level "Black Lake Lodge" in the game *Condemned* ²¹. In this level, whilst approaching a lodge, the player encounters multiple torn up corpses. As the player closes the distance to the lodge, the bodies become more frequent and other signs start pointing towards something huge that is on a rampage. Upon entering the building the player is alerted of a presence by hearing a roar from the floor above. Heavy footsteps shake the house and create dust clouds originating from the floorboards above. Suddenly a heavy thud is more than audible behind the player....

Example 2, shadows on the wall: In *Metro 2033* the player is occasionally warned about an upcoming fight by, before showing the enemies themselves, showing shadows of those enemies on the wall. This way the player already knows what is coming from around the corner and has a short opportunity to prepare.



Image: In *Metro 2033* these shadows warn the player in advance of approaching enemies.

Recommended supportive method: C

Games that utilize this method: *Condemned*, *Half-Life*, *Metro 2033*.

²¹ *Condemned 2*, created by Monolith Productions in 2008 is a first person horror game that makes great use of warning the player about an upcoming event by the aid of ES. A play through of

this level can be found here:
<http://youtu.be/FjNS5vXRNYQ>. [Accessed on 20-03-2013]

METHOD E

“I WANT TO USE ES TO CREATE DETAILED WORLD THAT FEELS ALIVE AND BREATHING”

Note that this includes characters, story-setting and events that happen within this world.

This is the most commonly used method for incorporating ES and is therefore also one of the most important methods listed here. It is also very broad and can be done in many different ways. The designer places clues that, when put together, tell a story, answer a question or explain something about the game-world. This kind of storytelling, by revealing elements that still need interpreting is, as we already know, called indexical storytelling (Fernández-Vara, 2011).

Think about which part of the world or story you want to convey. Is it a backstory that further develops a character or do you want to show the player how the enemies were able to get those fabulous haircuts? ES can be used to create localised narratives (standalone backstories), support existing narratives, explain how the world works or explain the history of a certain area.

You are trying to create an immersive and deep backdrop to the world and environment which you, as a designer, envisioned. Keep in mind that, depending on the importance of the clues, a player should always be guided towards the essential ones (see Obstacle 1 and example 1 to the right) and properly prepared (see Method A).

Example 1, presenting backstory of a character with the aid of other storytelling techniques: In *Mass Effect 2*, Jack, one of the player's companions, asks the player to help her destroy the facility in which she was held prisoner and experimented upon. During this mission you encounter areas and clues like bloodstains or sunbeams that mean something to Jack. These clues remind her of what happened back here and when the player stumbles upon these clues and investigates them, Jack will explain the story that accompanies that clue.



Image: A chair in which Jack tells us she was interrogated.

Example 2, using ES to tell a story in multiplayer: *Left 4 Dead 2* has incorporated ES in a way that fits the replayable nature of multiplayer games by presenting the history of the world through elements like corpses or posters that are not required to decipher for the sake of progress. Because the player is not actively searching for clues it is highly possible that not all instances of ES are noticed on his first playthrough, especially since the routes differ every session. This creates depth and the sense that there is still something to be found in the level even after playing it numerous times. *L4D2* also uses messages on the walls (another way of telling the history of an area) in waiting areas. These give the player something to read whilst waiting for their teammates to finish organizing.

Recommended supportive method: C, H

Games that utilize this method: *Gone Home*, *Metro 2033*, *BioShock* series, *Mass Effect 2*, *The Last of Us*

METHOD F

“I WANT TO USE ES TO HELP GUIDE THE PLAYER TO THE DESIRED GOAL / REWARD”

When a player encounters ES it is usually a unique setup which makes it naturally catch the player's eye. This makes ES, even though it is expensive asset-wise, a great means of drawing the player towards a certain area. Signals like footsteps in the sand or blood spatters on the floor are also a strong means of creating the same desired effect of leading the player to a certain place. As usual, depending on the importance of the player noticing the signs, it can be useful to use additional means of storytelling to point out the signs.

A frequently used method of guiding the player toward a certain goal that is not lighting, architecture or composition is the use of land marks. Huge landmarks (like the Citadel in *Half-Life 2*) are often visible and thus make for a great tool that players can use at any time to see if they are still going in the right direction. It also gives an overall sense of positioning within the game-world. This means landmarks can be used, like in *Half-Life 2*, to lead the player towards his or her ultimate goal, but they can also be used to guide the player to a more immediate secondary goal.

Gameplay systems enable the player and other game actors to change the environment drastically on the fly by creating their own recognizable signs / landmarks for future reference. Games with heavy destructibility like *Red Faction* or the first *Crysis* do this as well as *Killzone 3*, where enemy bullet holes are very obvious so that the player can instantly recognize he or she is going in the wrong direction because of all the visible bullet holes. Persistent corpses of killed enemies are also a means for the player to create history of the game-world that makes it easier to navigate the level.

The environment can also, by cleverly using the expectations of the player, tell something about what an area can provide for the player. If the

player is looking for a deer, the forest would be a great place to start searching and whilst exploring a military base, following the arrows leading to the armoury will most certainly reward the player with a new gun or some additional ammo at the least.

Example 1, using ES to guide players to a reward:

In *Left 4 Dead 2* there are many localised narratives scattered around the levels. These interesting scenes are able to evoke the interest of the player and therefore these instances of ES are often supplemented by a reward like ammo or a grenade. To aid players with noticing and understanding these scenes, the playable survivor characters will often voice a comment relating to it.

Example 2, using player expectations to reward logical thinking:

In most MMOs players will at some point need to find a vendor because they are required to buy certain items. Because people buy stuff in the real world, they are able to reference the real world and thus expect to be able to find the desired goods in the corresponding place in the game-world. Therefore a king will always be found in a castle, vendors always occupy the market area and the poisonous mushrooms can be found in the deep forest cave.



Image: A market in *Guild Wars 2* where the player can find multiple vendors.

Recommended supportive method: G

Games that utilize this method: *Left 4 Dead 2*, *Guild Wars 2*, *World of Warcraft*, *Red Faction*, *Killzone 3*, *Crysis*, *Half-Life 2*, *Spec Ops: The Line*

METHOD G

“I WANT TO USE ES TO EXPLAIN OR HELP REMIND THE PLAYER OF HIS OR HER OBJECTIVE”

Reminding the player of where they are, or are going can seem redundant if it has already been explained to the player, perhaps even multiple times. However, it is important that this stays fresh in the player’s mind. By reminding him or her through the use of ES we are able to unobtrusively nudge the player back into the desired mind-set (Carson, 2012).

Using this method of reminding the player we have the opportunity to further develop a goal or narrative element by, for example, showing the player additional reasons for pursuing this goal. We can also use this method to support narrative presented, for instance, by a quest giving NPC. If the player finds clues that back the NPC’s story up, the player is able to better understand the story and can find additional information relating to it. Referencing to environmental scenes through other forms of storytelling does result in instances of ES being more objective than subjective: the designer chooses what has happened and eliminates possibilities of alternative interpretations. This is not a bad thing but something to keep in mind nonetheless.

I do not recommend that a required objective is exclusively communicated to the player through ES, as a considerable number of players will easily miss out on the information if not correctly guided. See method A for directing players.

Example 1, presenting additional and optional clues that support player objectives: *Fallout 3* uses ES that shows the history of the world to create additional backstory. This backstory is often referred to (or hinted upon) by NPCs or notes that are in the vicinity. An example of this technique can be observed in a quest where the player is told to collect an item from some skeletons in a nursery.² After talking to one of these nearby NPCs, it

appears that at the start of the war³ Mr Gibson went to find his two children. When the player finds the objective his skeleton can be found in a room hugging two smaller skeletons. Seeing the skeletons is not vital in any way but does provide additional, though optional, depth.

Example 2, supporting the setting: In *Disneyland Paris*, the park is divided into multiple different areas that each have a unique theme. Everything within these areas remind the visitor of the theme: the rides, the stalls and even the rubbish bins. Though this does not always refer to the specific goal of the visitor it can be sufficient to remind him or her of the goal at hand. This is also a strong way of creating and retaining a certain state of mind.



Image: *The Pirates of the Caribbean* attraction continuously reminds players about the setting by using iconic elements that visitors associate with pirates: Parrots, rum, skulls etc.

Example 3, reminding the player through sound: Sound is a great sense that can instantly remind a person about the environment. Imagine being on the beach on a warm summer’s day and closing your eyes. You can hear the waves crashing into the rocks, children playing in the sand and seagulls flying overhead. Perhaps you even hear a propeller plane sporting a banner too far away to read. There is no mistaking where you are and you do not need eyes for that.

Recommended supportive methods: A, C, F

Games that utilize this method: *Fallout 3*, *Tomb Raider* (2013)

² This example has been altered to make it easier to explain.

³ The war is a fictional nuclear war that sets up the game’s environment: a wasteland.

METHOD H

“I WANT TO USE ES TO IMMERSE THE PLAYER BY CREATING A REACTIVE WORLD”

Usually the game-world is a pretty unresponsive place. The player is able to trash the room of the quest-giver without any comment and after breaking all the windows of a farmers house as well as killing all of his livestock, the farmer will still greet you with a “Good to see you again!” or “Thanks for your help!”.

In these instances, instead of the world, the player is creating history, which can also be described as affecting the world. When this is the case, instead of the player being the recipient, the game reads the environment and acts accordingly. To create a truly immersive world, we must make sure that the world that we present should be a reactive one, meaning that different player actions have different consequences. If the player does not have this freedom of choice we do not create a reactive world but the illusion of a reactive world that in reality is a detailed one (method E). In both cases the effect on the experience of the player can be identical.

Example 1, history of the player: In *Minecraft* instead of finding history of the game-world, the player is able to create his or her own. History can for instance be created by the creation and placement of torches and towers in a trail so that the player will be able to find the way back again. On multiplayer servers players are able to find each other by being able to recognize areas that have been traversed by other players.

Because ES is created by the player, the designer has little means of conveying their own story into the game-world. With careful consideration, though, the designer is able to influence the created stories by choosing which building blocks are available for the players to play with. What is interesting is that in *Minecraft*, some building blocks are capable of telling a story through their

position in the game-world. Diamond, a block the player is able to mine in this game, is for instance only found in the deepest parts of the world and therefore, these blocks tell the player that he or she is very far down and will not see the sun anytime soon. Note that this environmental clue is only existent because of the less-random placement of the diamond blocks. Something that is created by chance has no reason as to why it exists and is therefore unable to convey a story.⁴

Example 2, the world reacting to the player: In *Dishonored* the player can move corpses of enemies he or she has killed or knocked out. If the player doesn't hide the corpses other enemies can find them and become alerted of your presence.

Example 3, the world reacting to the choices of the player: In *Dishonored*, the player often returns to previously traversed areas and thus the game creates a chance for the player to create a lasting impression on the world. *Dishonored* embraces this opportunity by giving the player the choice to finish objectives in a lethal or non-lethal way. Depending on the play-style of the player the next time the player traverses an area, the area has changed accordingly.

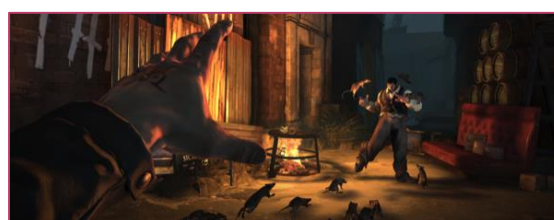


Image: In *Dishonored* the more the player kills in one area, the more plague and rats the player will encounter upon returning to this area.

Recommended supportive method: E

Games that utilize this method: *Minecraft* (multiplayer only), *Dishonored*

⁴ *Diablo III*, combines randomly generated environments and ES by creating level chunks that

can randomly be stitched together. Some of these chunks contain environmental stories.

WALKTHROUGH SUPPORTING LEVEL

This chapter explains how and where I applied the different methods of ES in the supporting level. Other general level and game design techniques have been applied in necessary areas but this walkthrough will only cover the instances of ES. After every instance, I mention the letter of the method that is used, and, if applicable, mention which essential guidelines I followed.

If you want to play the level make sure you have the accompanying files (that should be bundled with this version of the paper) and have access to a Steam account that contains *Half-Life 2: Episode 2*.

To install this level you should follow the following four steps.

1. Make sure you have played the game at least once, so that the correct folders have been created.
2. Place the folder in the archive (named *Half-Life 2*) in Steam *common* folder and merge all folders.

The common folder can be found here: "C:\Program Files (x86)\Steam\steamapps\common\"

3. Start Half-Life 2: Episode 2 and enable the developer's console from the (keyboard) options.
4. Press [=] (tilde key) to open up the console and type: "map jongeneeljethro_garden_part1" and hit enter.

I recommend playing the level before reading the walkthrough. Alternatively you can watch a video play-through of the level here: <http://youtu.be/gmL6q4oBGxE>.

PART 1

The level starts off with a short scene of the player's avatar, named Keyon, sliding down a disposal chute together with some mutilated corpses. The walls are unpainted concrete, there is a lot of rust and the overall lack of proper lights creates a sense of obscurity (C). At the end of the chute, where Keyon hits the water, the player assumes control of the avatar and is slowly taken downstream towards a big grinder.

The grinder looks pretty 'effective' and uses a red light to show that it is dangerous (B). As the player is brought closer to the grinder the noise becomes deafening (deciding upon visual or auditory clues).



At the last moment, just before being swallowed by the grinder, Keyon is able to climb out of the water and states to himself, his and thus the player's goal: get out of here. He then follows the corridor inside or takes the

chute he slid down at the start. Both routes end up in the same area where more of the mutilated corpses skid by (E). After climbing out of the disposal area Keyon finds himself in a room that contains a large machine. If the player looks closely he or she can find that mutilated corpses are being led into the machine to be burned and processed (E).

The only exit of this room is an elevator on the opposite wall, but a sign makes clear that it is out of order (E). As the player reads this sign Keyon says: "Hmm... there has to be another way up..." (Making sure the player notices environmental storytelling).



The player will need to make use of the machine and its moving parts in order to be able to advance to the floor above. Notice that the player is constantly forced to move upwards: this reminds the player of his or her goal of finding a way out, shows progress (G) and also tells the player he or she is in an underground area (E).

Keyon has found a way out of the machine room and finds himself in a huge expanse surrounded by rocky walls which create a sense of being in a cave (E)(G). This room is full of conveyor belts that are moving a great amount of corpses into the machine-room you just came from (E). The player needs to traverse these conveyors towards a building that contains another way to get higher up. The moment the player opens the door of this building a hostile overseer sees the player and presses a big red button (A)(making sure the player notices environmental storytelling).



This button triggers an alarm and all the doors around the player start closing: the area is now in lockdown. A couple of other overseers have entered the area to provide backup and Keyon has no other option than run towards the only remaining opening: the stairs. Signs pointing towards the stairs (F) aid the player during the resulting chase.

During the chase the player encounters and recognizes another one of the red buttons and because the player has already seen what the button does through player conditioning earlier, he/she is able to use it to close a door behind him or her, locking the overseers out (A).



In the next area Keyon encounters a fork in the road. Luckily it is signposted. The left road will take Keyon towards an elevator and thus towards the exit (F), but the right corridor leads towards an armoury. Going towards the armoury is not required but if the player decides to go to the armoury to find some gear (F), it will greatly help the player during his or her next encounter with the overseers.



With or without grabbing the additional supplies the player ends up at the out of order elevator.



The elevator has a couple of tools scattered around, of which one of them is a crowbar that Keyon picks up. The controls of the elevator are open and it is emitting a lot of sparks (making sure the player notices environmental storytelling). It seems broken (E). Due to a lack of other options the player then has to press the controls of the elevator but instead of riding the elevator up the brakes break loose and the elevator plummets down the shaft. Keyon survives the drop and the only option that remains is taking an air vent towards another lift. This lift is intact and Keyon slowly makes his way up. Whilst riding the second elevator, the player can see blue barrels being led out of a machine that looks a lot like the other machine in which the corpses were being transported (E). During the rise Keyon is constantly shot at by overseers from below. Successfully dodging bullets during the elevator sequence brings us to part 2.

PART 2

As the elevator grinds to a halt and the doors open, Keyon enters an area in which some of the blue barrels are stored. Some of them have fallen over blocking the path. After clearing the path a small encounter ensues and afterwards the player finds some grenades, ammo and a pile of posters about living in a Garden (E). In this area there is also a window, of which one pane is broken.



Looking through the window the player can see that a group of overseers has set up a barricade just beyond the exit of the room. The hole in the window creates the opportunity to toss in a grenade (B) and deal with them without them even noticing. If the player chooses not to deal with the overseers through the window and wishes to deal with them head on, the player is warned of the overseers in advance by a shadow on the wall right before turning a corner to face them(D).

The next area is a hangar in which the blue barrels, containing humans are loaded into trucks to be transported elsewhere. There is a huge blast door marked with surface access. This is Keyon's goal (G). As Keyon approaches however, an alarm is triggered by an overseer in an overlooking control room to the right. The door closes before Keyon is able to reach it. The goal changes: Keyon needs to shut down the alarm and open the door.

If the player explores the hangar area he or she will eventually find an inaccessible duct. After stacking some of the blue barrels that are waiting for transport the player is able to reach the duct and enters the building marked with “detainment” (E). Following the corridors eventually leads the player to the control room but the door is closed. The player needs to follow the electricity cables to find out where the alarm can be turned off (D). On the way there the player needs to climb through a boarded up window. Like in many other games the player has to use the crowbar or another weapon to break the wood (A).



The area reached after climbing through the window is a large room with a large corridor through the centre that strongly contrasts with the rest of facility (C). This corridor looks new, neat and is very well lit. Multiple plants decorate the area (E).



When the player approaches the door at the end of the corridor multiple signs teach the player that this corridor leads towards a new life in the Gardens. A promised land full of fresh air and food. A sign above the door at the end of the corridor says: "Your new life is about to begin" (E). However, it isn't what it seems: instead of an 'Eden-like' area, the next room is totally dark. After a couple of seconds blinding lights switch on and the player is confronted with the real purpose of the room.



In this room volunteers for the Garden programme are killed in cold blood and thrown on the same conveyor belts we recognize from previous areas (A)(E)(making sure the player notices environmental storytelling). When the player gets behind the mounted guns that are used to kill the volunteers and takes care of some additional resistance, the player finds a small security room in which the alarm can finally be disabled. Disabling the alarm opens all the doors in this section of facility.

Keyon can return to the control room of the hangar and opens up the surface access door. This creates an intense confrontation with a significant amount of overseers but, upon successfully defeating the overseers the player is almost done. After walking up the hallway there is only one option: going through the door on the right.

The next area is a lobby area in which the player can see volunteers filling in forms and waiting for their place in a Garden (E). The lobby and the player are however separated by a glass window that does not let any sound through. Here the player, again, can see a lot of posters about the Gardens (making sure the player notices environmental storytelling) and one more crucial poster: a poster containing the blue barrels with the text: "GenFresh, too good to be true!" and "Available in a store or restaurant near you." Here the player finds out, at last, what really happens in this facility (E).

Climbing into an air duct is the only option from here on and at the end of the duct the sun is shining and Keyon will be free.

Notice that it is never explained where the volunteers come from. It is also unclear who made the facility (only *IDPC* is noted) and we also do not know why this facility was created. These questions are left unanswered intentionally so that every player is able to create their own image of the exact story of this world (my world is not your world).

CONCLUSION

In this paper we have been able to create a clear definition of ES that not only encompasses all of its uses today, but is also wide enough to stay relevant for future developments due to being set up in a comprehensive way. I have documented the most important reasons a designer might have for wanting to use ES and have shown how designers have created their own methods to attain these goals. These methods use ES to teach, tell, show, warn, guide, explain and immerse the player, but can even create a certain state of mind.

We have learnt general guidelines that are always applicable, like being aware of the different interpretations different player might have, and other guidelines that are more specific, but equally important, like making sure the player notices an instance of ES. Additionally, we have found out about other methods, new, like player conditioning, or reinterpreted from other mediums like books and films where they have taught us how we can create a certain state of mind.

Examples have been shown to illustrate developed methods and to inspire designers to think about new methods of ES. A supporting level had been created and documented to enforce, challenge and help the research conducted in the course of this paper. Without a doubt there are many more great methods of how to use ES to solve certain problems, and the goals have been defined with this in mind. All the goals a designer might have when wanting to apply ES have been structured in a way that makes sure any new methods conveniently fit within the eight outlined goals.

ES is telling a story through the environment that can be incomplete without causing any issues. By leaving enough blanks we create an opportunity for the recipients to fill parts of the story in for themselves. The number of details that should be left out will, naturally, depend on who it is that is receiving the story and your own interpretation as a designer. During the writing of this paper and the creation of the supporting level I found out that not every player is equally interested in finding out about the story. And if, as is the case with ES, the player needs to do some work before being able to understand the story, the clues will elude them and they will be unable to interpret what it is you are trying to tell them. I know a lot of people who despise movies that keep the ending open for your own interpretation, like David Lynch's *Mulholland Dr.* And perhaps if the player is tired after a long day's work or just not in the mood to focus attention, it can be a lot nicer to be able to set the brain aside and do some mindless shooting. Just like being in the mood for an action or comedy flick.

Generally speaking, ES is a great technique that has been proven to create a living and atmospheric world, but should not be brought to the front and made essential for understanding the main plot if your aim is to create a game or level destined for a wide audience. It should reinforce the main plot, and tell localized, but related, stories to add depth. Make sure it is optional and/or supported by or, game mechanics, or, other forms of storytelling.

Something that only became clear during the writing of this paper is that we should not be afraid to use ES together with other forms of storytelling. The different forms support each other and result in reinforcing each other. This makes it a lot easier for the designer to tell a story with the available resources or tell a story that is hard to convey with only the use of environmental clues. ES often relies heavily on custom assets and it is a fact that it is cheaper to write "There are three skeletons hugging on a bed" on a note on the floor instead of modelling and texturing the lot.

Environmental storytelling has countless ways of being implemented and it is usually created by projecting yourself in the game-world to think about how the world would look and react. Finding the ideal solution is a combination of common sense, the aim to create a believable world and keeping the goals, methods and general guidelines of this paper in mind. This way I hope I have informed the reader about some of the possibilities in the field of ES. And I also hope this paper has helped solve whatever ES related issue she or he may have had.

SUMMARY

The goal of this paper is to create guidelines and inform anyone who wants to use ES in games, about some of possibilities that exist to attain this goal. This paper also presents a first-person shooter level that has been used as a case study, but also shows the different methods of applying ES in action.

First of all the concept of ES is introduced and a comprehensive definition of the technique is given. ES is a means of conveying anything, be it a story or an emotion, through presenting clues from within the environment. This leads to the player having to interpret multiple clues as well as fill in the parts that are not explained: just like indexical storytelling. Whatever the reason is that the designer has to use ES, we learn that any application of ES will inadvertently lead to a more living and breathing world.

Storytelling is a pass-time that is important for every society on earth. It is compared to food and sex. As well as having all the advantages of regular storytelling, ES does something else effectively: it lets each consumer of the content fill in the gaps the way they seem fit. This leads to participation, an important part of interactive media.

The name of the research method used in this paper is 'design research', a method in which prototypes are created to further develop the research. To find out about how ES is applied in the games-industry at this moment, a selection of games have been evaluated.

It is important for the designer to know that, when applying ES, he or she may run into two recurring obstacles.

A. The first obstacle is that, depending on the type of player and his or her mood, the player may miss out on clues that are important for understanding the story. A solution to this obstacle may be the repetition of important clues, having other forms of storytelling (like spoken dialogue) support the clues, or making sure that ES is not required to understand to be able to move forward in the game.

B. The second obstacle is that, because different people think in different ways, certain clues may be interpreted differently. The designer needs to make sure that interpreting the story differently does not cause any issues with the overall story. The designer may want to use the guidelines from the previous obstacle to make sure the player does not miss any important clues.

Auditory cues can be just as strong as visual cues, and any in-game object that can make a noise, can be replaced by its corresponding sound. The use of sound saves budget because the originator of the sound does not necessarily need to be shown.

After these general guidelines this paper defines eight different goals that a designer may have when wanting to apply ES. These defined goals are broad so that any goal a designer might have will always fit within one of the goals. The eight goals are:

- A. "I want to use ES to teach or tell the player about certain mechanics or dynamics."
- B. "I want to use ES to show the player his or her (strategic) possibilities in the level."
- C. "I want to use ES to create a certain state of mind."
- D. "I want to use ES to warn the player of upcoming or imminent danger."
- E. "I want to use ES to create detailed world that feels alive and breathing."
- F. "I want to use ES to help guide the player to the desired goal / reward."
- G. "I want to use ES to explain or help remind the player of his or her objective."
- H. "I want to use ES to immerse the player by creating a reactive world."

Every goal has a chapter that explains how a designer may want to attain the goal, shows examples of methods used in existing games to attain the goal and recommends a couple of games that have done this successfully.

Finally, the paper concludes that when using ES, this paper can help inspire designers through the presentation of all the different methods and examples. It is important to use all information presented in the guidelines as it is intended: As guidelines and not as rules of thumb. As there are so many different ways of incorporating ES, depending on the situation, the ideal solution may be a new combination of already existing methods, or perhaps different methods that are undocumented in this paper.

If your target audience is broad, there will always be players that are not in the mood for ES, and because of this it is generally smart to keep ES optional. Don't be afraid to use ES together with other forms of storytelling, like the use of text in a quest description or the spoken lines of a non-playable-character. This way you are able to eliminate the weaknesses of ES, without the being forced to give anything up.

APPENDIX – TERMS

These terms are also explained as they are encountered in this document. It is therefore not mandatory to understand them prior to reading. Use this section to fall back on to or as a summary of the terms that are employed in this work.

Avatar – The avatar is an actor within the game-world that the player can directly control and project upon. It is essentially the player's physical representation in the game.

(Player) Conditioning – The preparation of the player that has to make sure that future in-game scenes or setups are correctly interpreted. Player conditioning functions like game tutorials but instead of teaching game mechanics, player conditioning teaches the fictional game rules.

Dynamic – A dynamic describes the behaviour of mechanics reacting to player input or other mechanics (Hunicke et al. 2004, pp. 2). An example of a dynamic can be crossing a gap by using the player's momentum together with a well-timed jump. Forward-speed and up-speed are both mechanics that when combined give the player the ability to pass an otherwise impassable obstacle.

Environmental Storytelling – Referred to as ES in the rest of this document, is a way to create compelling narrative experiences by requiring player participation. The player is presented with in-game elements that he/she must consciously or unconsciously interpret in order to, for example, be able to piece the story together or experience a specific feeling. A comprehensive definition of the term is explained in the first section of this document (introduction and the power of (environmental) storytelling).

Game Actor – Actors in games are all characters, regardless of faction, that appear in a game besides the player. They do not necessarily have to be humanoid: critters like squirrels and rabbits as well as robots are also regarded as game actors. Actors share the game-world with the player as they can traverse and interact with it.

Game-world – The definition of the game-world in this paper is the (perhaps fictional) world in which the game is situated. Everything within this world: characters, objects, non-traversable areas and also areas that are only mentioned in notes or dialogue. The game-world is the dimension in which the game takes place.

History of the Game-world – ES is a great way to explain past events that happened in the game space. When exploring an area in which certain events have passed, the world creates depth and the illusion that the game-world lives on, even without the presence of the player. Other characters, perhaps unrelated to the plot, have a place in the world and this place can be uncovered. The game-world has a history.

History of the Player – If certain gameplay mechanics allow the player to make changes to the game-world, a possibility exists for the player to make their own history in the game. Perhaps even for other players. When backtracking into a previously traversed area and seeing the rubble of the building you destroyed the environment reminds the player of the past events and reinforces the importance of the role he plays. Characters can react to the history of the player, which the player creates through making choices and therefore this adds weight to the choices made. In multiplayer games the player is often able to leave history in the level for instance in the form of bullet holes.

Indexical Storytelling – Storytelling by revealing elements that still need interpreting is called indexical storytelling. ES is a means of indexical storytelling. If we talk about indexical storytelling, the elements or clues that need interpreting are called indices. (Fernández-Vara, 2011)

Juxtaposition – The act of placing together side by side. Especially in order to create a contrast. Examples in games are for instance leading the player from a cramped area into a large area (resulting in the large area feeling even larger) or presenting a bright area before the dark area to make it stand out more.

Localised Narrative – Also known as micro-narrative. Often a memorable moment, localised narrative is a local story that does not necessarily have to support the main storyline. An instance of localised narrative is usually used to create melodrama or additional background information (Jenkins, 2004). Examples of localised narratives are abundant in *Valve's Left 4 Dead* series. In these games the player encounters areas in which something, unrelated to the (game) characters, has happened, giving the player additional information about the game-world. A car packed highway tells us about how at the beginning of the infected outbreak masses of people tried to flee toward the countryside. This is a classic example of a localised narrative as it fits with the overall story of the game-world but is not directly related to the story of the survivors.

Mechanic – A mechanic describes particular systems of the game at the level of data representation (Hunicke et al. 2004, pp. 2). An example of a mechanic can be that a player is able to jump four feet high or, that a certain weapon does an x amount of damage on every hit.

Readability – Readability is a term used for the process of making sure the player knows what to do and does not get lost. If the player is accurately guided through the game-world, this game-world is readable and the process has been applied correctly.

Video Game Space – The area of the game in which the gameplay happens. The player is able to navigate and interact within these areas.

Whitespace – The blanks the players need to fill in themselves before being able to interpret a scene. Just like the whitespace in between panels in comic books.

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