

Cognitive tools for game world designers

By

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Abstract

What is exactly level design? It is juggling 12 balls in the air at the same time, it is solving differential equations with 12 variables, it is trying to realize a vision when everybody is tearing at it. Artists, programmers, marketing PRs, scripters, designers. People from very different backgrounds and with even more varying motivations converge with their vital contributions and it is up to the level designer to manage all of these different issues and create a memorable playing experience. It is not a mystery that the role and tasks of a level designer are the most difficult to describe in a few words. Paraphrasing Elvis Costello “talking about level design is like dancing about architecture”. And yet a sentence that I hear confirmed more and more every day is: “Level designers create experiences by providing spaces for players to act.” Players act in a space that causes experience to emerge and this experience affects the players, closing the magic circle (see figure 1).

Keywords

Game worlds, level design, aesthetics, ludology, phenomenology, engagement, Flow, Play-modes, Emotemes, Play-personas.

1 INTRODUCTION

The sentence “level designers create experiences by providing spaces for players to act” was synthesized starting from the concepts of evocative spaces and acted stories as outlined by Henry Jenkins in his article “Game Design as Narrative Architecture” [2]. Taking into consideration players when designing levels means to a greater extent avoiding the dangers of solipsistic design: games where the designers have most of the fun, where players feel constrained, on rails and in general have difficulty buying into the game world. I will try to read and deconstruct an existing game level using these analytical tools: spaces, actions and experiences.

By spaces I mean every element of the location that can be experienced through the senses: architectural elements, shapes, textures, lights, sounds, even the underlying narrative. As Don Carson says “it is the physical space that does much of the work of conveying the story the designers are trying to tell” [1]. It is the domain of aesthetics, the study of sensori-emotional values.

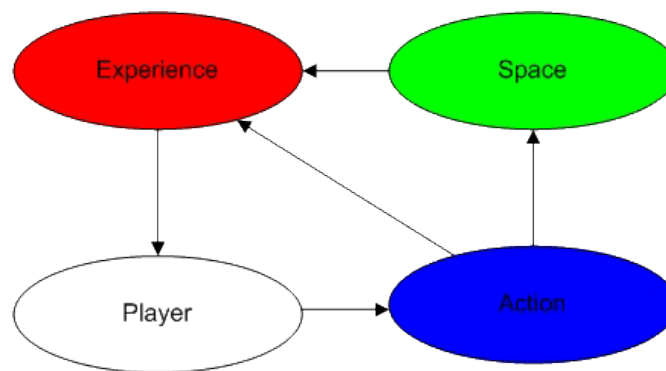


Fig. 1 Player, action, space and experience

By actions I mean all the events, game mechanics, possible interactions, Ludo-types. It is the domain of ludology, the study of games in terms of rules, interface, and in terms of the concept of play. “The focus of such study should be on the rules of the game, not on the representational or mimetic elements which are only incidental.” [3]

By experiences I mean Emot-emes, play-modes, play-personas, it falls under the wide umbrella of phenomenology, a current in philosophy that takes experience as its starting point and tries to extract its essential features.

2 STRUCTURE OF A GAME LEVEL

The first step in our analysis is to segment a game level and individuate its sub-sections. A sub-section is defined as a contiguous, uninterrupted, isotopic space that shares aesthetic, ludic and phenomenological features. After the level has been divided in subsections it will be easier to apply the three different filters I discussed earlier: aesthetic, ludic and phenomenological. As an example I am going to use the second level (“A vintage year”) from the game “Hitman - Blood Money” [5]. A brief introduction to the level: Codename 47 has to get rid of Fernando Delgado, a retired colonel from Pinochet's intelligence service, who is now running a vineyard in Chile. While the vineyard provides him with a decent income it is his cocaine factory that really brings in the cash. In order to make the hit look like an attack on the drug trade, 47 also needs to kill his son Manuel Delgado, cocaine addict and partner in crime. The escape route is provided by a sea plane. The individuated subsections are: “Outdoor open”, “Party”, “Loading area”, “Hacienda”, “Wine cellar”, “Drug lab” and “Hangar” (see figure 2).



Fig. 2 Sub-sections and relative connections

The analysis of a level is structured in three parts: aesthetic analysis (histograms, symbolical reading and architectural deconstruction), ludic analysis (rules and mechanics, tools for interaction) and phenomenological analysis (play-modes, emot-emes and play-personas).

3 AESTHETIC ANALYSIS

3.1 Histograms

For each subsection a 360 deg. panorama is taken. If it is an enclosed area, a panorama picture would not be very representative; instead a screenshot is taken every 5 seconds during a walk of the area. The images are edited together in a strip of fixed size (see figure 3) and analyzed with the histogram tool in Photoshop.



Fig. 3 strip ready for histogram

The histogram tool gives us information about the average luminosity and colour dominance of each subsection (see figure 4).

As expected the outdoor sections are the brightest, but there is a surprise: the loading zone, the most guarded and dangerous subsection is the brightest area, possibly to induce a false sense of security. To underline Fernando's rank the second floor of the hacienda is fairly bright for an indoor scene and the rooms where he is located, with their balconies and open windows, are the brightest of all. Unexpectedly the first floor of the hacienda is even darker than the wine cellar, but this makes it easier to sneak around, enhancing the stealth feeling.

	luminosity	red	green	blue
outdoor open	61,96	61,76	63,8	52,54
outdoor party	58,43	60,11	59,59	47,63
outdoor loading	65,96	69,2	66,73	53,07
hacienda 1	30,31	34,36	28,25	30,78
hacienda 2	37,17	41,35	35,43	35,63
wine cellar	31,09	40,1	27,2	27,41
drug lab	42,87	48,33	40,93	38,81
hangar	38,53	37,58	39,55	35,5

Fig. 4 Comparative chart of luminosity and color dominance

The generally warm palette (red dominance in 6 out of 8 sections) is motivated by the hot and dusty South American atmosphere and reinforced by the motif permeating the whole level: wine. The green lush exotic forest accounts for the green component of the outdoor open area, while stagnating water, mould and musk explain the hangar.

3.2 Symbolical Reading

The movement between father and son is inevitably a vertical one (see figure 5). The father is located in the highest section of the map, while the son is in the lower areas: the drug lab and the wine cellar. Don Fernando's corruption is so old and inveterate that it becomes almost respectable. Hints are the dusty, neglected environments and at the same time the tasteful décor, the collection of old prints and the old man's hobbies: playing music, collecting butterflies and wine tasting. The son on the other hand dwells in the lower "dungeons" of the farm. He is decadent and depraved, has a strong coke problem and spends his time water-skiing, playing tennis or downloading porn from the internet. His environment is damp, rotten, old and dark. Independently from what hit the player chooses first, there will be a descending or an ascending movement that, even unconsciously, will be registered.

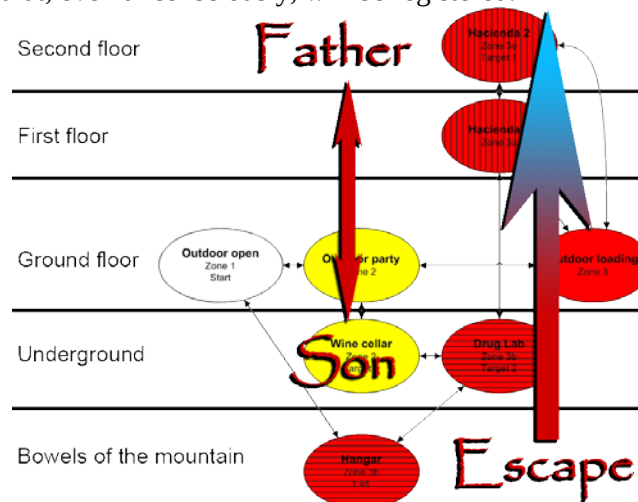


Fig. 5 Symbolical reading

The escape is even more symbolically loaded because it is through a sea plane located in the deepest location of the map, in a dark, moist, damp recess close by the waterfall. The player has to descend even

more into the bowels of the farm in order to escape through an air route with the waterfall as a backdrop: an ascending movement accompanied by the subliminally cleansing power of water. The last comment regards the whole mansion: it is built on the very edge of a high cliff top, very dramatic but also very “unstable”: the roots of this old family mansion are undermined by the risky business of the drug trade.

4 ARCHITECTURAL ANALYSIS

4.1 Macro Circulation Patterns

Players express themselves by picking a path. Keeping track of the possibilities given to the player to move, holds a wealth of information regarding the ways a level can be played. Examining Macro Circulation Patterns means analyzing all the possible access points to and from each subsection. As an example I am going to look at the “Outdoor open” section. From here the player can chose to crash the party (1), infiltrate the loading zone (2) or sneak into the hangar (3).

1) Crashing the party will inevitably mean mingling with the tourists and partygoers; the player has two routes to enter the party, each with different implications:

- through the main gate; it is the easiest path, it involves good visual feedback, nothing is compromised, no disguise is needed, there is no risk;
- through a service door; it implies a sneaky approach and could lead to the acquisition of a guard or worker disguise; little risk is involved;

Both paths could lead to the wow moment “Utility Box” in the guard house. By breaking some electrical fuses the player can manipulate the light distracting the guards and obtain their disguise, which grants easy access to the loading area.

2) A second choice is to head directly for the loading area where the mansion is clearly visible and obviously pointing towards the fact that our main target is in there:

- through the truck entrance; suicidal, very difficult sneaky approach and nearly impossible frontal assault;
- through a broken wall; suicidal, quite difficult sneaky approach; eventually requires disguise;
- through a crashed truck and hole in the roof; the designer prepared this approach as a preferential entrance; it rewards brains (observation of hole in roof) and brawn (climbing moments); it provides a choice of two disguises (guard or worker) and it incorporates the wow moment “Broken Roof”;
- through a service door and then straight over some boxes; fairly easy entry and easy acquisition of worker disguise; good visual feedback in terms of climb animations but hard progression due to the high security area.

3) The third possible path takes us through a steep, winding path down into the hangar, allowing us to access the farm rising from the bowels of the earth:

- exploring the jungle, through a downhill path before the drop-off; definitely rewarding exploration, important sneaking moment passing by a guard in jungle.

The hangar is open for workers and it leads to the wow moment “The Lift”, where we have the possibility to ambush and strangle a VIP guard. Acquiring his disguise guarantees access everywhere in the farm.

4.2 Micro Circulation Patterns

A closer exam to “Micro Circulation Patterns” tells us how the player can move within a section (see figure 6). There are four types of constraints or choke points:

- architectonical (walls, doors, gates etc); static choke points
- security zones, the player requires a disguise to move freely into higher security zones: modal choke points
- guards standing in critical positions to block access to certain areas unless disguised; modal choke points
- patrolling guards represent dynamic choke points, meaning that there are no absolutely safe paths, but only dynamic, changing safe paths.

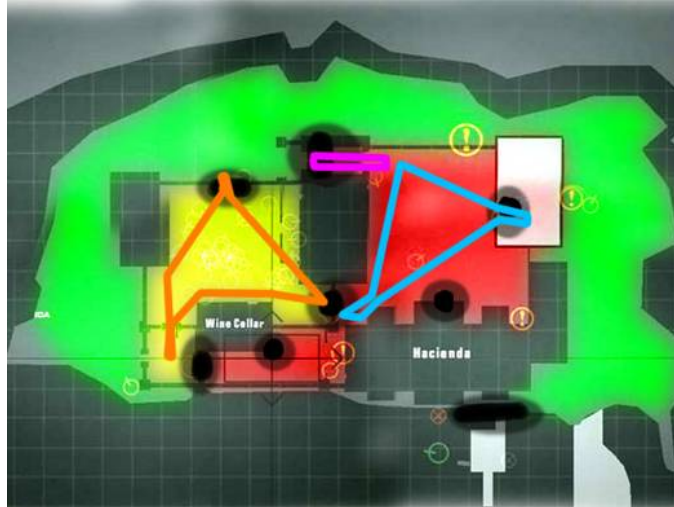


Fig. 6 Micro Circulation Patterns: architectural choke point (black), security zones (red yellow green), patrolling guards (orange, pink and blue)

4.3 Landmarks

Landmarks are graphical, functional elements or traits that are mostly visible everywhere from within a section of the level and provide a visual/mental backdrop to the action and cues both for physical orientation and planning the next move. For the “Outdoor open” area it is the perimeter wall, constantly providing a blocking challenge to overcome (literally). For the “Party” area it is the cellar entrance, the party revolves around it and the two big doors beckon the player to cross the threshold. For the “Loading” area it is the mansion. Leaning over the yard, it is a symbol of the whole mission: grand, once magnificent and baroque from the outside but decaying from the inside, it reminds us of past glories much alike the father himself, a once respected general but now drug producer. For the “Wine cellar” it is the barrels, they don’t exactly point towards an objective but represent the whole duplicity of the cover winemaking operation under which the real business happens. The metaphor becomes real when we notice that a big barrel conceals the secret entrance to the drug lab. In the “Drug lab” the landmark is the big percolator tank, while in the “Hangar” it is the water plane, physical way out and metaphysical symbol of cleansing.

5 LUDIC ANALYSIS

If players express themselves almost unconsciously by navigating the game world, they do it completely openly by choosing how to interact with it. “Hitman – Blood Money” provides plenty of tools to negotiate interactions with the NPCs: distracting, disabling, killing and for each type of interaction there are several ways to accomplish it. Collecting this kind of information and triangulating it with the possible paths chosen by the player will help the designers understand what kind of experiences players are after and what they actually get from playing the game.

5.1 Tools for the player

The designers embodied “play-values” [4] in a system of rules that eventually translated into the set of tools that players can use to express behaviour in the game world.

Security zones: the player cannot walk indiscriminately around the level; some areas allow only certain types of people, creating progressively restricted areas, therefore disguises are rated accordingly to the security they grant.

Disguises: the player can change disguise stealing them from unsuspecting NPCs, drag the bodies of the victims and dispose of them as he/she see fit.

Close combat: the player is given a wide arsenal of moves to negotiate close combat: head butt, punch, disarming, concealing weapon, fiber wiring, elevator ambush, knives (slashing and throwing), narcotic and poison syringes, human shielding and pushing.

Agility moves: the player can jump walls and balconies, climb through windows, walk ledges, climb drainpipes and ladders.

Breaking in: there are many tools to earning access to restricted areas, such as spying from far away with binoculars, observing NPC's patterns of movement in the maps, talking to NPCs to gather info, spying through keyholes, lock-picking, using keycards, shooting locks and hiding in closets.

Distracting: it is also possible to disable NPCs in non-confrontational manner by throwing a coin or manipulating lights.

Bomb: the player has, at all times, access to a small bomb with which can kill NPCs by direct explosion or secondary effect of explosion (accidents such as falling objects or exploiting environment).

5.2 Kill Fernando & Manuel

To see how all the tools can be put to use in the game I am going to list all the locations where our two targets dwell and all the modalities that are available to the player when planning the hit on Fernando Delgado (see figure 7) and Manuel Delgado (see figure 8).

Kill don Fernando Delgado					
Location/type	accident	accident	accident	accident	accident
	(push)	(bomb)	(sedate&throw)	(poisoning)	(hostage&throw)
second floor piano room			X		
second floor central sitting room	X			X	
second floor top of staircase					X

close combat	close combat	explosion	sniper
(wire)	(knife)	(bomb)	
X	X	X	X
X	X	X	X

Fig. 7 Possibilities to kill Fernando Delgado

Kill Manuel Delgado					
Location/type	accident	accident	accident	accident	accident
	(push)	(bomb)	(sedate&throw)	(poisoning)	(hostage&throw)
under the barrels in the wine cellar		X			
steps leading down the wine cellar	X				
ground level entrance room of the wine cellar			X		
central room with desk in wine cellar			X	X	
hallway between central room and steps					
"secret barrel" entrance to drug lab					
hallway between "secret barrel" entrance to drug lab					
courtyard in front of wine cellar entrance				X	

close combat (wire)	close combat (knife)	explosion (bomb)	sniper
X	X	X	
X	X	X	
		X	
X	X	X	
X	X	X	
X	X	X	
X	X	X	
		X	X

Fig. 8 Possibilities to kill Manuel Delgado

6 PHENOMENOLOGICAL ANALYSIS

6.1 Play-Modes

Looking at the data harvested during the aesthetical and ludic analysis allows us to make assumptions about “play-modes”. Play-modes are preferential attitudes towards navigation of the world and interaction with characters. There are four navigation attitudes emerging:

- BRAWN, physical prowess, climbing, making use of force, always moving
- BRAIN, observation skills, finding holes in the surveillance system, patterning behaviours, waiting
- ROLE PLAYING, dressing up like other characters and acting the part
- HIDING/SNEAKING, keeping the suit, walking in shadows (and closets)

The interaction attitudes are structured according to four binary variables (see figure 9):

- Lethal / non-lethal
- Silent / loud
- Clean / bloody
- Single / multiple effect

Playing modes (interact with NPCs)								
Type/attributes	Non Lethal	Lethal	Silent	Loud	Clean	Bloody	Single	Multiple
Distraction (coin, light)	X		X		X			X
Knock Out	X			X		X	X	
Sedative	X		X		X		X	
Accident (push, poison)		X	X		X		X	
Accident (bomb)		X		X		X		X
Close Combat (knife)		X	X			X	X	
Close Combat (wire)		X	X		X		X	
Explosion blast		X		X		X		X
Sniper		X		X	X		X	
Gunshot		X		X		X	X	

Fig. 9 Play-modes

Each one of these playing modes triggers some basic emotional response in the player. Emot-emes, or basic emotions, are emotions that are impossible to deconstruct further. When a player behaves consistently in the game he/she uses only play-modes that share a similar pattern of emot-emes: the player identifies completely with a certain profile.

6.2 Play-Personas

I am going to define these consistent profiles “play-personas”. In spite of the fact that players tend to mix play-modes, it is clear that the designers themselves acknowledge the possibility to play out a persona since they reward the “Silent Assassin”. Playing as the Silent Assassin means only killing the target and getting out with the suit. All targets should preferably die by “accident”. Beside the Silent Assassin, looking at the play-modes shows other possible play-personas emerging:

THE BUTCHER: up, close and personal. Did I mention he likes it bloody?

THE SNIPER: this persona loves to camp and take out the victim from far away.

DIRTY HARRY: a gun-toting extrovert that relates mostly to lead-ridden bodies.

THE PARTY ANIMAL: also known as “the transvestite”, he likes nothing more than changing outfits.

THE SHADOW: sticking to stealth movements.

UNABOMBER: not satisfied unless it involves explosions.

IN-AND-OUT: rushing through as fast as possible, the keyword is speed.

SAM FISHER: the main priority is to show off cool animations as much as possible.

THE AESTHETE: inconsistently looking for “interesting” scenarios.

The game designers did not plan the level for them. As I found out comparing internal design documents and walkthroughs on the net, they might not even have been aware of all the play-modes. These personas emerged from the tools that the players were given. Play-personas provide ways to customize the playing experience and allow players to express themselves with no additional cost, requiring no redundancy of assets or expensive adaptive technology.

7 FROM ANALYSIS TO DESIGN

The analytical work operated until now on an existing game level has definitely helped recognizing players’ behavioural patterns and has its uses as a tool for evaluating the success of a level by comparing goals set by the designers with the actual experiences that players are having. But the real impact of this method can be fully appreciated if it is applied from the beginning in order to proficiently plan, orchestrate and map out player experiences in the level. Now how can we use the mental tools defined so far to actually help in the design phase of making levels instead of just an evaluation tool? EmSense, a San Francisco-based company, was hired by Epic Games to help fine-tuning the level design for the game “Gears of War”. What they did was to turn Csikszentmihalyi’s Flow diagram 45 degrees and chart on it the biological feedback of people playing the game. They asked players to wear a head band that can record EEG, skin conductivity response, heart rate and blood pressure. Through their patented algorithms they turned the raw data into an engagement graph so the designers could watch a video of the playing session and spot when the player was exceedingly frustrated or bored and eventually adjust the layout of the level to fix problems (see figure 10).

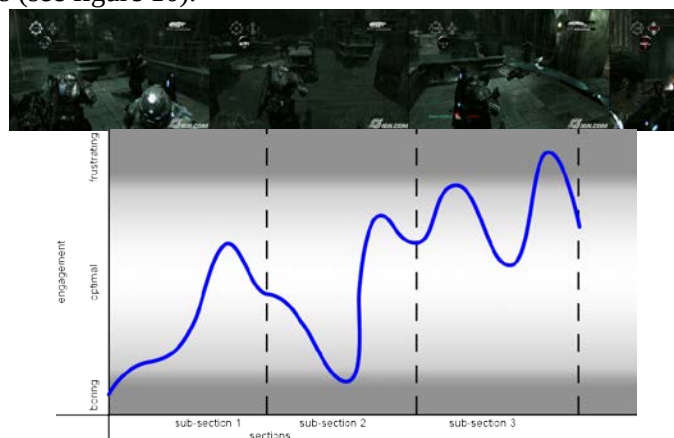


Fig. 10 Emsense’s engagement Flow

7.1 Weaving Play-Personas

I suggest reversing this approach and making use of hypothetical engagement curves from the very beginning to chart out the potential player experiences, as shown in figure 11. This has to be done not for just one play-persona, but for all the ones that the designers want to include in the phenomenological set of the game. As an example let's assume that beside the Silent Assassin the designers also chose to reward other play-personas and accommodate for them in the design of the level.

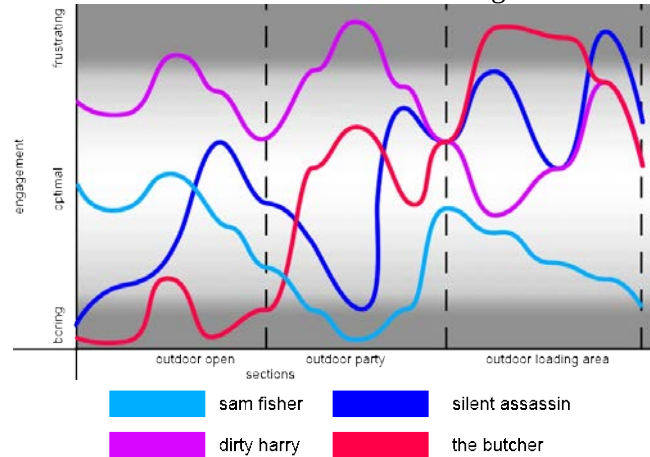


Fig. 11 Pre-emptive Persona paths.

The Butcher persona would have quite a boring experience if he wants to see blood at the beginning of the first section, but as soon as another NPC enters the area there would be something to be butchered. The Party would provide a perfect backdrop for a bloodbath while in the outdoor loading area things will get extremely tricky since the guards clearly overpower the player. The Sam Fisher persona will have a lot of chances to show off his physical prowess in the open, while his gymnastic abilities will not be much used at the party, he will have to wait to enter the loading area for some more occasions to show off.

Players might choose to move from one persona to the other when it gets too difficult or too boring to maintain a profile, or just change for the sake of it.

8 CONCLUSIONS

The role of the designer is no longer limited to dealing rewards and punishments, disseminating challenges and skills for a general undifferentiated audience. The designer is now an orchestrator of experiences, a weaver of play-modes, a pimp of personas.

These tools can help during the preproduction phase of level design by informing the realization of aesthetical and ludic categories and sharpening the production of the level. As a consequence the time spent in different iterations with player testing can be considerably shortened. Nevertheless this model can't substitute the iterative process intrinsic to any successful level design as it cannot substitute play-testing. I feel it is important to stress how this method does not claim to make accurate predictions on players' behaviour, but it represents much more than an inspiration or an error proofing tool: it provides a way to plan and design levels thinking concretely in terms of what kind of experience the players are likely to want and to offer them alternatives consistent with the game world.

9 ACKNOWLEDGMENTS

I would like to thank the gaming community as a whole because I made extensive use of walkthroughs and guides written by very skilled players, much better than me anyway. I have played this level many times but without the help of the gaming community I would not have been able to complete this analysis so thoroughly, although I did manage to kill the party (quite literally) by poisoning a glass of wine. I also am in debt towards IO's designers that allowed me access to internal documentation material and, most importantly, their precious brains.

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