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Prospect and Refuge: Modulating Level Pacing Through Spatial Composition

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Abstract
This thesis examines the concepts of Prospect space and Refuge space in video games and their influences on game pace. Based on the assumption that a Prospect space increases pacing while a Refuge space decreases pacing, the researcher created a custom level artifact (using both space types) to achieve an ideal pacing curve. By analysing playtesters' experiences, the researcher was able to examine the influence of Prospect and Refuge space on pacing and formulate a set of best practices to help game designers modulate pacing through spatial composition.

Keywords
Level Design, Spatial Composition, Combat Design, Refuge Space, Prospect Space, Level Pacing, *Left 4 Dead 2*

1 INTRODUCTION

Prospect and Refuge spaces are architectural concepts initially created by architectural theorist Grant Hildebrand and later introduced into video game design theory by game developer and professor Christophor W. Totten at Kent State University. Totten's article explores different types of spaces/architecture and their influence on player psychology. In this thesis, the researcher expands on Totten's ideas and explores several best practices in order to understand how to effectively use Prospect and Refuge space to modulate level pacing.

2 TERMS DEFINED & THEORIES

2.1 Prospect Space

In Totten's article, "Designing Better Levels Through Human Survival Instincts," he states that the term "Prospect space" is an architectural concept that typically describes a wide-open space. As a result of its openness, the space exposes those individuals residing within it to potential danger [1]. Historically, this type of space is often "unpleasant" for humans due to their survival instinct. The fear of open space originates from ancient times when humans had to hunt for food, stay in shelter and avoid spaces which exposed them to potential predators [1].

Totten claims that Prospect spaces appear in video games. Prospect space may assume two different forms – "enclosed" or "unenclosed." An example of an enclosed Prospect space is a "boss room." In the *Legend of Zelda* series, each dungeon often ends with an epic boss fight in a room, known as the "boss room."

Figure 1: Boss Room in *The Legend of Zelda: Skyward Sword* [2]

As shown in Figure 1 above, the boss room is a big wide-open room with little to no cover objects. The room is enclosed. There are no doors, windows, or openings to adjoining areas, which means the player cannot exit once they enter. The player in this instance is forced to move around and avoid the boss's attacks. This type of encounter is fairly stressful for the player and often brings the level pacing to its climax.

Prospect space can also appear as unenclosed space. Unlike enclosed spaces, in unenclosed spaces, the player is not trapped in any sort of structure. They can move freely from one point to another. For example, in battle royale games, such as *Apex Legends*, the maps are designed as a giant Prospect space. The space does not have a single permanent shelter. As the game progresses, the designated safe zone on the map shrinks every round. Players who stay outside of the safe zone for too long die instantly.

Figure 2: Minimap in *Apex Legends* shows the boundary of a safe zone [3]

To survive, teams must leave their shelters and move through the wide-open Prospect space fighting other teams to get inside the shrinking safe zone. This type of Prospect space, unlike the enclosed ones, "must be travelled through to reach goals or hiding places" [1].

No matter if the space is unenclosed or enclosed, the core defining element of all Prospect space is that it encourages player movement and flow.

2.2 Refuge Space

In contrast, Refuge Space is the exact opposite of a Prospect Space. Refuge Space offers safe shelter to humans within a large and dangerous open area [1]. Compared to Prospect space, the definition of a Refuge space is much more flexible. Refuge space can appear as an enclosed or a half-enclosed space. These spaces serve as a safe spot for players to investigate any nearby Prospect space. Players may rest at these locations before venturing into the unknown/more dangerous areas [1].

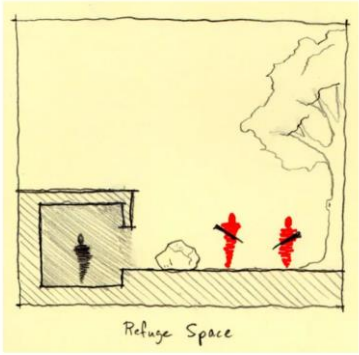

Figure 3: Enclosed Refuge space [1]

However, Refuge spaces are not always "spaces." A cover object (an object that provides protection for the player from an enemy's line of sight or attack) can also be defined as Refuge space. Refuge spaces act as temporary shelters. These shelters, be it space or a cover object, give the player an opportunity to stop and evaluate potential threats.

Figure 4: Drake hidden in shadow from *Uncharted 4.* This chimney crouch cover is Refuge space. [4]

2.3 Level Pacing

In general, level pacing is defined by *The Level Design Book* as "the…order and rhythm of activities and events in a level" [5]. Pacing measures the intensity of both a player's emotional state and a player's actions.

In his article "Examining Game Pace: How Single-Player Levels Tick," veteran designer Mark Davies breaks down the complex concept of pacing into four simple elements [6]:

1. Movement Impetus: The player's desire/willingness to move through a level.

2. Threat: The actual danger the player sees in a level, for example, an enemy in the distance.

3. Tension: The atmosphere or perceived danger in a level. The player's own sense of anxiety in a space even if there is no actual threat.

4. Tempo: The intensity of player action. For example, how many times the player clicks a mouse button within a certain instance.

By examining these four pacing elements, designers can better understand and determine the pacing of an entire level or a specific area. To adjust the pacing of a level, designers simply need to manipulate one or multiple of the four pacing elements to achieve a desired result.

2.4 Ideal Pacing Curve

A pacing curve is a curve that shows people's engagement with a film or game at any given time [7]. In Extra History's YouTube video, "Pacing – How Games Keep Things Exciting," channel creator Daniel Floyd explains that an ideal pacing curve shouldn't be a constantly increasing straight line. If the game tries to constantly engage and excite the player, it will only lead to player exhaustion. Instead, a good pacing curve should alternate between "periods of intense engagement and periods of rest" [7]. Figure 5 shows a pacing curve with various lows and highs. These builds and releases in tension keep the player engaged without overtaxing the player.

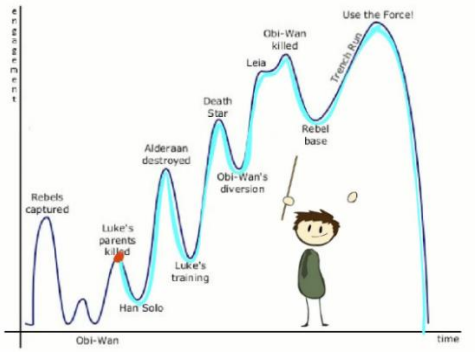

Figure 5: Ideal Pacing Curve [7]

2.5 Pacing within Prospect and Refuge Spaces

The researcher examined how to effectively predict pacing within Prospect and Refuge spaces. As a result, the researcher created a pacing comparison chart

breaking down the player's expected experience within a "typical" Prospect space and a "typical" Refuge space - based on the previous definitions of the two spaces.

Prospect Space	VS	Refuge Space
 [1]		 [1]

Parameters of pacing	Prospect	Why?	Refuge	Why?
Movement Impetus (Desire to move)	High	Unsafe to stay. Few or no safe hiding spot.	Low	Safe to stay. Takes time to evaluate potential threats.
Threat	High	Enemy presence	Low	No enemy presence
Tension	High	Potential enemy. Difficult to defend, less knowledge of the entire space due to it being wide-open.	Low	No potential enemy, easy to defend even if there's enemy. More control over the space due to it being small and enclosed.
Tempo/Action	High	Shooting, running	Low	Looting , healing, resting

Figure 6: Pacing Comparison Chart [8]

All four elements of pacing within a Prospect space will have higher intensity than all four elements within a Refuge space. Based on the comparison, the researcher concluded that a typical Prospect space fosters faster pacing, while a typical Refuge space fosters slower pacing. However, Prospect spaces and Refuge spaces vary in their layout and construction. These spaces may not be "typical," basic Prospect and Refuge spaces. If an individual only examined the surface definition of a Prospect or Refuge space, they may overlook many nuances.

In fact, the researcher's goal is to reveal and understand the subtle influence of Prospect and Refuge space on pacing and formulate best practices that help level designers modulate pacing through spatial composition.

3 LEVEL DESIGN PROCESS

3.1 Planning for an Ideal Pacing Curve

The artifact level "After Dark," is a *Left 4 Dead 2* (L4D2) campaign made in the Hammer Editor (Source Engine). It consists of three chapters/maps and 30-40 minutes of gameplay. Though the campaign can be played in a four-player co-op setting, for the purpose of this study, the artifact is designed for a single player, plus three artificial intelligence (AI) teammates. The researcher can more accurately control game pace in a single player level rather than in a multiplayer level. A multiplayer level introduces new, additional considerations.

In this campaign, the four survivors seek refuge in a zombie-infested shopping mall. Many areas inside the mall are either dark or locked, the survivors must find power switches to turn on the lights and gates of some areas to proceed. The maps are designed to test a variety of Prospect and Refuge spaces with different spatial compositions. The researcher's goal is to understand how the player's sense of pacing differs within these spaces.

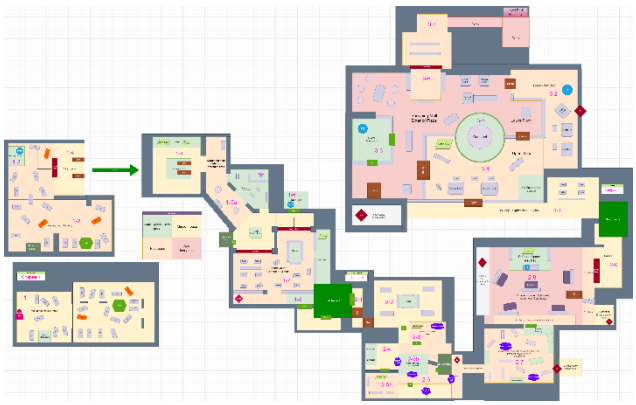

Figure 7: Map overview with expected pacing [9]

To measure the player's pacing experience, the researcher must define a standard or expected pacing curve for the artifact. The researcher created an overview map and gave each area an initial, expected pacing intensity, color-coded by green (low pacing), yellow (low-medium pacing), orange (medium-high pacing) and red (high pacing) (Figure 7). These pacing predications were based on the previous assumptions that Prospect space increases pacing while Refuge space decreases pacing.

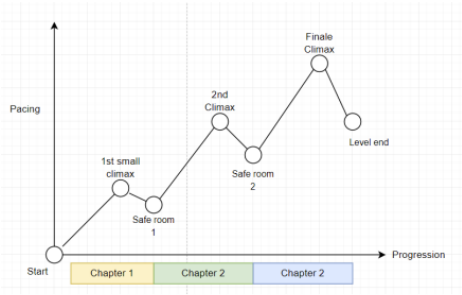

Figure 8: Simplified pacing curve for the campaign [10]

Since the campaign consists of three maps, pacing is expected to increase throughout the first two maps and reach a climax at the third map. A simplified ideal pacing curve for the campaign matches the image above (Figure 8).

	Level Sections		Pacing (1-10)	Movement Impetus	Threat	Tension	Tempo	Overall (Total 20)	Conversion (Total 10)
2	Chapter 1-1	Ground Parking	4	3	2	1	2	8	4
3	Chapter 1-2	Underground Parking	6	4	2	3	3	12	6
4	Chapter 1-3	Security Room	2	1	2	2	2	7	3.5
5	Chapter 1-4	Mall Entrance	4	3	2	1	2	8	4
6	Chapter 1-5a	Mall Hallway	5	3	2	3	2	10	5
7	Chapter 1-5b	Kids Toy Store	5	2	2	3	2	9	4.5
8	Chapter 1-6	2nd Security Room	3	1	1	2	2	6	3
9	Chapter 1-7	Food Court	8	4	4	4	4	16	8
10	Chapter 1-8	Near Safe Room	5	3	2	2	2	9	4.5
11	Safe Room		0	0	0	0	0	0	0

Criteria	Number Value
None	0
Low	1
Low-Medium	2
Medium - High	3
High	4
Very High	5

Figure 9: Calculating pacing value for each section [11]

To better represent the pacing changes in different map sections, the researcher calculated and assigned a pacing value for each section of the map based on the 4 elements of pacing. For example, in the second map section (the underground parking lot), the researcher assigned a value of 4 (High) to Movement Impetus, 2 (Low-Medium) to Threat, 3 to Tension (Medium-High), and 3 to Tempo (Medium-High). The researcher added the four pacing values together, which resulted in a total pacing value of 12 out of 20 for this section. The researcher then converted the value to be on a scale of

0-10: 12/20 multiplied by 10 equals 6. The final pacing value assigned to this map section is 6/10.

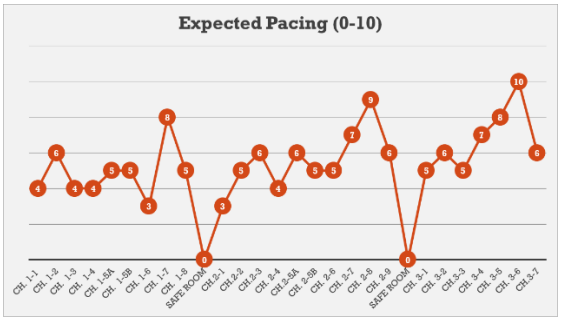

Figure 10: Expected pacing curve for the campaign [12]

Using this same method, the researcher examined all the map sections throughout the 3 chapters and calculated their pacing values. Based on the results, the researcher created a more precise pacing curve to represent the campaign level pacing.

3.2 Overcoming Challenges Created by AI Director

The researcher encountered a major challenge when trying to achieve an ideal pacing curve in the artifact: the AI Director system used in the *Left 4 Dead 2* (L4D2) series. Unlike most game engines, which allow the designer to manually place and spawn enemies, L4D2's enemy spawning is controlled by an AI system known as the "Director." The designer may manually place enemy spawns, but most of the enemies and their spawn locations are controlled by this Director. As a result, the designer does not have direct control over combat encounter pacing. The designer must work with the Director. It is relatively easy to predict where the Director will spawn enemies because it follows one simple rule: an enemy must spawn outside of a player's line of sight.

The designer must first identify ideal locations in which to increase pacing. They subsequently create potential spawn "closets" (a spawn location hidden from the player) to encourage the Director to spawn AI in those areas. By creating spawn closets along the critical path, the designer is ensuring that the AI Director is helping to adjust pacing in a predictable, somewhat controllable manner. A successful L4D2 map layout needs to synergize well with the existing AI controlled encounter system.

3.2.1 Adjusting Level Pacing Through Scripts

Leaving most of the combat encounters to the AI Director does not mean that the designer loses control of level pacing. Since this research is focused on space and layout rather than combat design, there are many ways to tweak the level to achieve the ideal pacing curve.

3.2.2 Scripting Combat Encounters

The first method for adjusting the level pacing is through scripted combat encounters. There are two types of scripted encounters. One type of scripted encounter is a manually scripted encounter in which the designer places an enemy spawn by hand. Throughout the level, the researcher primarily placed enemy spawns with the intention of creating small climax or surprise moments.

Figure 11: Charger ambush attack in the hallway [13]

For example, in the second chapter of the "After Dark" campaign, the researcher placed a Charger spawn at the end of a narrow hallway. Charger enemies, as the name implies, barrel toward the player on sight. When the player walks into a nearby trigger, the wall breaks, and the Charger rushes out to attack the player. The player has a short reaction time. They must either take the hit by standing in the hallway or back off immediately into a small side room.

The second and final type of scripted encounter is an encounter created on a larger scale through scripts. In L4D2 Hammer Editor, creating a script involves writing a script in a text file outside the editor and asking the Director to run the script in-game. The researcher created two main custom scripts for the artifact. The first script is an infinite panic event, which is a scripted event with never-ending zombie waves. The other script is a modified version of the Finale script. The Finale script is a series of scripted events/zombie waves that leads to the end game or the final rescue of survivors in every L4D2 campaign.

Because the researcher wanted each section of the campaign to end with a mini-climax (a faster paced situation with significantly higher stakes and tension), both Chapter 1 and Chapter 2 ended with an infinite panic event.

When it comes to the Finale (Chapter 3 of the campaign), the researcher took a different approach to scripting. The default Finale script has five combat stages. After a few playtesting sessions, the researcher observed that the playtesters often died at the fourth or fifth stage of the finale. To mitigate the difficulty spikes created by the default finale script, the researcher decided to make a 3-stage Finale instead of using the default 5-stage Finale script. Instead of pushing the pacing to an unrealistic, frustrating level, the researcher chose to decrease the pacing and make the overall pacing curve feel smooth.

3.2.3 Modifying the Rules for the AI Director

The researcher implemented a secondary method to adjust pacing and prevent the Director from changing the intended pacing curve. This method involved the use of a "brush entity," which helped to prevent enemies from spawning in unwanted locations. A brush entity is an object with scripted functions. The researcher also used nav blocking volumes (volumes used to block AI navigation) to prevent an enemy ambush from happening before the player arrived at the intended trigger location.

In addition, the researcher adjusted the Director's behavior and stopped the Director from spawning random Witches throughout the map. The Witch is an extremely difficult boss type enemy that can instantly incapacitate/kill a player. By removing random Witch spawns from the level, the researcher was able to gain more control over the pacing curve.

3.3 Use Prospect and Refuge to Adjust Pacing

Although the researcher can tweak the pacing through scripted combat encounters, most of the pacing curve is reinforced in this level through careful arrangement and composition of Prospect and Refuge spaces.

3.3.1 Control Pacing through Spatial Composition

As you can see in the map overview (Figure 12), the beginning/first map in the campaign consists of many low-paced Refuge spaces (Green) and medium-paced Prospect spaces (yellow/orange). The player is given plenty of room to stop, hide, and heal.

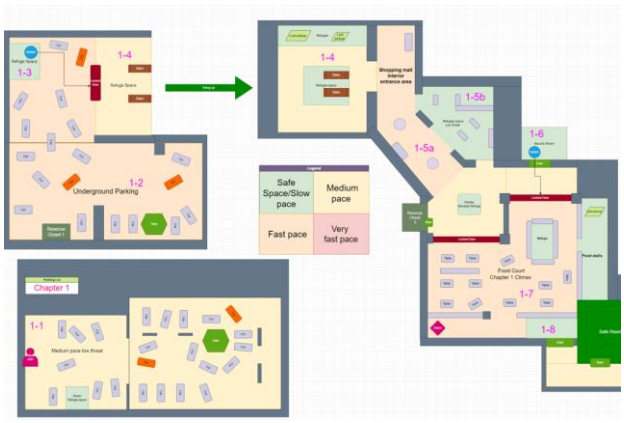

Figure 12 Chapter 1 overview map [14]

The second map, however, has fewer Refuge spaces and more Prospect spaces (Yellow and Orange) that take longer to navigate. The final area of the second map forces the player to defend a small Refuge space within a large Prospect space (Red), pushing the pacing curve to its climax.

Figure 13 Chapter 2 overview map [15]

The third and final part of the campaign is designed as a single giant Prospect space that contains only a few tiny Refuge spaces (Green). Because there is no single safe spot in the map, the most effective strategy is to constantly move around, finding temporary cover. The final map is the big climax of this campaign. This space is a single unenclosed Prospect space. By increasing the size of the Prospect space and reducing the availability of Refuge space, the researcher was able to adjust the level in a way that encourages a spike in pacing.

Figure 14 Chapter 3 overview map [16]

3.3.2 Use Prospect Space to Increase Pacing

All the Prospect spaces in this campaign are designed with the purpose of increasing pacing or creating high-tension moments. To match the ideal pacing curve, the researcher designed 3 different Prospect spaces for the mini-climax in each chapter. The researcher also made each Prospect space larger than the one in the previous chapter, based on the assumption that the bigger the Prospect space the higher the player's tension and engagement.

Figure 15: Prospect space for Chapter 2 mini-climax [17]

3.3.3 Use Refuge Space to Slow Down Pacing

The researcher also provided many Refuge spaces to prevent players from getting exhausted by the constant threat and high-tension events. For example, there are multiple small rooms located along the critical path which offer the player temporary shelter and item pickups.

Figure 16: Small Refuge Room with Pickups [18]

3.3.4 Compare Similar Spaces

Furthermore, the researcher created several similar spaces in the level, but varied the spaces' spatial components. The purpose of these spaces was to test the spatial components' impact on pacing. In Chapter 1, the researcher created two Prospect spaces with similar layouts (an above ground parking lot and an underground parking lot). The primary difference between the two spaces was that one space was an enclosed Prospect space, while the other was an unenclosed Prospect space. Due to the tension induced by claustrophobia, the researcher predicted that an enclosed Prospect space would increase pacing more than an unenclosed Prospect space.

Figure 17: Unenclosed (Above ground parking lot) [19] vs Enclosed Prospect space (Underground parking) [20]

3.3.5 Special Cases

The researcher also designed a few special encounters to test how subverting a player's expectation of Refuge and Prospect space affects pacing. Figure 18 shows a scenario in which a Refuge space turns into Prospect space.

Figure 18: Refuge space turns into Prospect [21]

The room appears to be a safe Refuge space, but once the player enters the room, zombies spawn from the ceiling. This sudden enemy spawning changes the room into a dangerous Prospect space. The researcher anticipated a surge in pacing and a significant shift in expectations following the unexpected encounter.

4 RESULTS & DATA ANALYSIS

4.1 Survey Results

The researcher gathered quantitative and qualitative survey data from a total of 17 playtesters who played the level artifact. The playtesters were asked to rate the pacing for each section of the campaign. Based on the average pacing rating for each section, the researcher created a pacing curve to represent the actual pacing for the entire campaign.

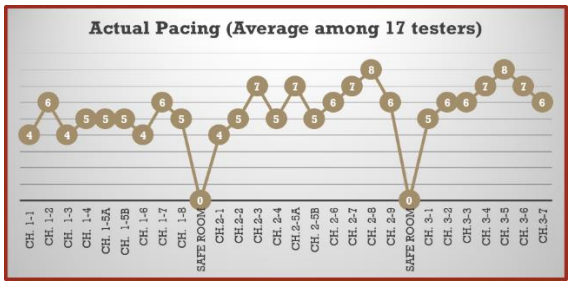

Figure 19: Actual Pacing Curve [22]

The researcher then compared this actual pacing curve to the ideal/expected pacing curve.

Figure 20: Expected Pacing Vs. Actual Pacing [23]

Overall, the actual pacing curve is very similar to the ideal/expected pacing curve. Almost all anticipated mini-climaxes and high-paced moments, designed to increase pacing, happened at the expected map section.

By comparing all 17 playtesters' pacing curves, the researcher observed that each tester gave drastically different pacing value to each map section - sometimes ranging from 1-8 for the same section (See Figure 21).

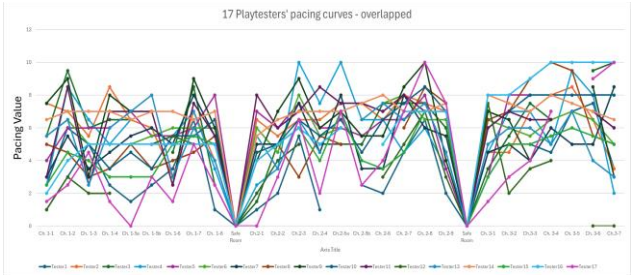

Figure 21: Individual playtester's pacing curves (overlapped) [24]

After converting this chart to a stacked area chart, it shows the sum of pacing values for each map section from all 17 playtesters instead of the overlapped pacing values. The researcher discovered that all playtesters experienced the same general builds and releases. The pacing increased and decreased at very similar points and in very similar ways. The researcher believes that each playtester has their own subjective scale for evaluating tension (for example, a max of 3 for one tester and a max for 10 for another tester), but they all experienced the same relative ebbs and flows. Additionally, most of the high points and low points matched the expected pacing curve.

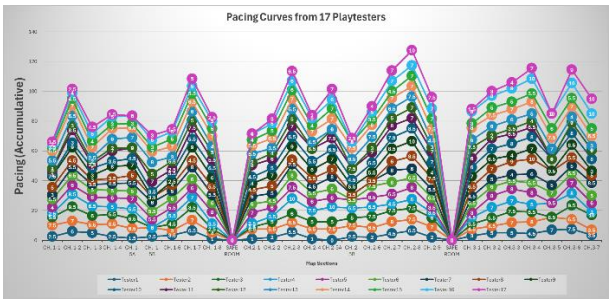

Figure 22: Stacked Pacing Curves [25]

The researcher asked the playtesters to rate pacing twice on two different scales: tension and intensity of action.

Firstly, the researcher asked playtesters to evaluate how tense they felt in a specific area of the map. This first question measured the player's level of perceived Threat (the enemies or hazards in the level) and Tension (the player's sense of anxiety about perceived threats). Secondly, the researcher asked the playtesters about their intensity of action. This second question measured the player's Movement Impetus (the player's motivation to move) and Tempo (the player's rhythm of action).

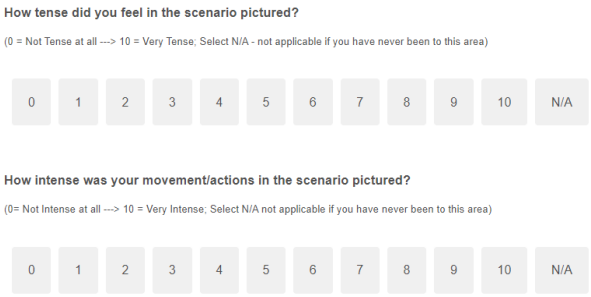

Figure 23: Survey Questions [26]

The results show that most of playtesters experienced lower tension & higher action intensity throughout the campaign. The researcher believes this result is due to the fact that most of the participants expressed having a higher tolerance towards tension-inducing scenarios. Based on the survey responses, 14 out 17 playtesters (82%) are either neutral or not scared of zombie horror games at all. They are unlikely to experience high-tension moments due to fear/anxiety about the in-game environment.

Figure 24: Tension Vs. Intensity Curve [27]

The researcher also compared the tension curve and the intensity curve individually to the actual pacing curve.

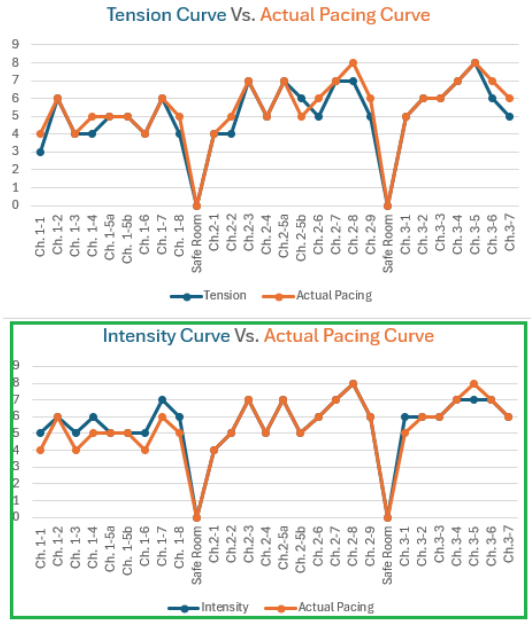

Figure 25: Tension Curve Vs. Actual Pacing Curve [28] and Intensity Curve Vs. Actual Pacing Curve [29]

The two curve comparisons appear to show that the intensity curve better resembles the actual pacing curve than the tension curve. Based on this result, the researcher believes that regardless of the player's emotional/mental reactions to certain spaces in the level, their experience of in-game actions plays a more important role in determining their experience of game pace. In other words, among the four elements of pacing, Tempo and Movement Impetus carry greater significance compared to Tension and Threat when evaluating the pacing of a level.

4.2 Best Practices: Data Analysis and Comparison

Overall, based on the survey results, the researcher was able to increase pacing using Prospect space and decrease pacing using Refuge space. In addition, there are some other spatial elements that also changed pacing in a subtle way.

4.2.1 Best Practices for Prospect Space

Unenclosed vs. Enclosed Prospect space

- **Expected Pacing**: 4 (Unenclosed) and 6 (Enclosed)
- **Actual Pacing**: 4 (Unenclosed) and 6 (Enclosed)
- The pacing prediction matched the actual results one-to-one. An enclosed Prospect space induces

higher tension than an unenclosed Prospect space even though both spaces have very similar layouts.

Figure 26: Unenclosed (Above ground parking lot) [19] vs. Enclosed Prospect space (Underground parking) [20]

Smaller vs. Bigger Prospect space

- **Expected Pacing**: 8 (Small size) vs. 9 (Medium size)
- **Actual Pacing:** 6 (Small) vs. 8 (Medium)
- The Atrium in the second chapter is bigger than the Food Court in the first chapter. The researcher assumed that when the size of the space is bigger, the pacing is also faster. The results match this prediction.

Figure 27: Small size (Food Court), on the left [30] vs. Medium-sized (Atrium) on the right [31]

However, when comparing the medium-sized Atrium to the large-sized Plaza at Chapter 3, most of the players rated the pacing of the Plaza equal to or even lower than the pacing of the Atrium.

- **Expected Pacing:** 9 (Medium) vs.10 (Large)
- **Actual Pacing:** 8 (Medium) vs. 8 (Large)

It appears that size of a space does not necessarily play a significant role in determining the pacing of a Prospect space.

Figure 28: Medium-sized (Atrium), on the left [31] vs. Large Prospect space (Plaza), on the right [32]

Long vs. Short sightlines in Prospect Space

- **Expected Pacing:** 5 (Short sightlines) vs. 7 (Long sightlines)
- **Actual:** 5 (Short sightlines) vs. 7 (Long sightlines)
- The pacing prediction matched the actual result. The grocery shop area, which has limited sightlines, seemingly created more tension than the shopping mall's second floor entrance area, which has a more open layout and longer sightlines.

Figure 29: Short sightlines [33] vs. Long sightlines [34]

Low vs. Higher Elevation in Prospect space

- **Expected Pacing:** 7 (Player has the high ground) vs. 9 (Enemies have the high ground)
- **Actual Pacing:** 7 (Player has the high ground) vs. 8 (Enemies have the high ground)
- The grocery shop area provided the player with elevated platforms (high ground). This area was found to be less intense than the Atrium, in which the enemies spawn from a higher floor and attack the player from above.

Figure 30: Player has the high ground, on the left [35] vs. Enemy holds the high ground in the Atrium [31]

In addition to the average pacing values, 15 out of 17 playtesters (88%) agreed that staying on high ground made them feel less tense. In a game level, giving the player a height advantage decreases pacing, while taking away the player's height advantage increases pacing.

Simple vs. Complex Layout in Prospect Space

- **Expected Pacing**: 4 (Simple) vs. 10 (Complex)
- **Actual Pacing:** 4 (Simple) vs. 8 (Complex)
- The researcher predicted that a simple layout would result in slower pace, while a complex layout would result in faster pace. The results match the researcher's prediction.
- Since a complex layout takes more time to understand, the player is likely to feel mentally overwhelmed when navigating through a complex space. In addition, different spatial elements, such as stairs and cover, provide navigational challenges that the player must overcome. Increased tension and movement results in an increase in pacing.

Figure 31: Simple [36] vs. Complex Prospect space [37]

4.2.2 Best Practices for Refuge Space

Less vs. More Enclosure in Refuge space

- The researcher created 4 types of Refuge rooms, each with a different degree of enclosure.

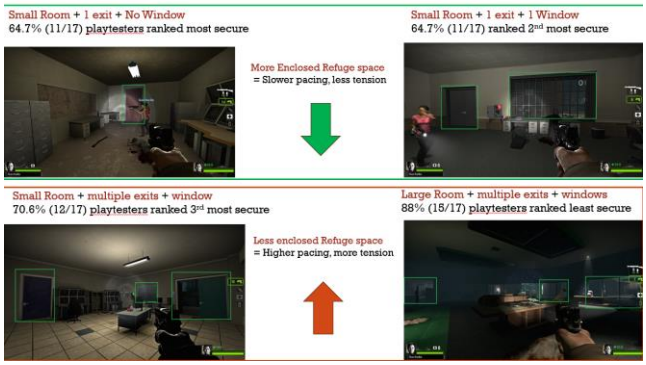

Figure 32: Less vs More Enclosure [38-41]

- Based on the survey results, a more enclosed Refuge room makes the player feel more secure, while a less enclosed Refuge room (with windows and other openings) make the player feel less secure.

Loot within Refuge Space

- Most of the players stayed longer in Refuge spaces with pickup items or loot.
- Stationary loot, which never disappears, incentivizes players to stay longer in certain areas.
- Spaces with stationary loot (ammo piles) slows down the pacing more than spaces with one-time pickups (grenades, pills).

Figure 33: Refuge room with loot pickup [42]

4.2.3 Special Cases

Refuge Space Turns into Prospect Space

- **Expected Pacing:** 6 (1st ambush) vs. 6 (2nd ambush)
- **Actual Pacing:** 7 (1st ambush) vs. 7 (2nd ambush)
- Chapter 2-3 room and Chapter 2-5a room initially appear as safe Refuge spaces but turn into Prospect spaces once the player enters (the player triggers a Zombie ambush from the ceiling).

Figure 34: Rooms with zombie ceiling ambush [43-44]

- The researcher predicted that when a perceived Refuge space turns into a dangerous Prospect space, the pacing would drastically increases. This predication seems to match the actual result. Most of the playtesters gave these 2 rooms higher pacing values than the nearby areas. The average pacing values are close to the level climax values.

Fake Prospect vs. Fake Refuge Space

- In Figure 35, the left room is a safe Refuge space which appears to be dangerous, while the right room is a fake Refuge room which appears safe. This fake Refuge room had enemies fall from the ceiling when the player entered.

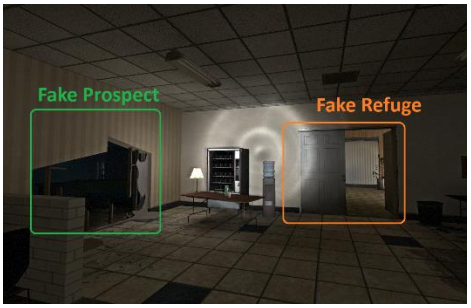

Figure 35: Fake Prospect vs. Fake Refuge space [45]

- Playtesters felt that their tension and movement intensity was high in the Dark Office Room (Figure 36). They perceived this room as a dangerous Prospect space even though no enemies were present in the room.

Figure 36: Fake Prospect (Dark Office Room) [46]

- The room has exits and entrances. The playtesters perceived openness and therefore threat. As a result, they found the space to be dangerous.
- Not all refuge spaces decrease pacing. Changing certain spatial elements can affect a player's tension level. A perceived (fake) Prospect space can increase pacing and induce tension as well as a real Prospect space.

5 CONCLUSIONS

5.1 Conclusions

In general, the results support the researcher's hypothesis. Refuge space slows down pacing and Prospect space increases pacing. However, there are a few other factors to consider.

Factors that decrease pacing:

- More enclosure
- Long sightlines
- High ground
- Simple layout
- More pickups

Factors that increase pacing:

- Less enclosure
- Short sightlines
- Loss of high ground/disadvantage
- Complex layout
- Less pickups

Other factors, such as lighting, audio, decorations, and difficulty of the enemies also impact pacing, but they were not examined in this research.

5.2 Lesson Learned

Overall, the researcher compiled several lessons from the research experience:

- A player's spatial perception has a big influence on their gameplay experience.
- Designers can manipulate level pacing through spatial compositions, using different spatial elements to create a well-paced level.

One thing that can be improved is the preproduction process. The researcher should have created a more detailed pacing chart before diving into level creation. As a result of an oversimplified pacing chart in the preproduction phase, the researcher spent a lot more time adjusting the pacing through playtesting. Though the Desktop APM data was gathered from the playtesters, the researcher was not able to create a pacing chart based on that data, due to playtesters having different lengths in playtest time. The researcher needed to spend more time researching the tool she used before committing to it.

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