Guiding Player Across a Large Environment Using Guiding Lines and Lighting

Zhi Yang

I. Introduction

Nowadays more and more games feature an open-world element. One of the primary challenges is that players can get lost in the open-world map without proper guidance. However, guiding methods shouldn't Thus, subconsciously navigate players in the open world is a topic worth mastering.

There are multiple guiding methods could help to solve the above problem, including affordance, guiding lines, guiding lighting, movement, landmark, and composition, etc. [1] Among these guiding principles, guiding lines and lighting are two most common types. Guiding lines are composition elements that lead the players' eye or focus his vision on an intended point of interest. [2] Guiding lighting is the lighting emphasizes composition elements that navigate the player. Subsequently, guiding lines and lighting enhance each other to help the player better understanding navigational choices.

The goal of this thesis is to create an artifact based on the Dying Light Developer Tool to demonstrate the mastery of using guiding lines and lighting to guide the player across a large environment.

II. Open World, Guiding Lines and Lighting

A. Open World

An open world in video games is a virtual world in which the player can explore, and approach objectives freely, as opposed to a world with more linear gameplay. [3] In the open world map the player could take the critical path, or the alternative path depends on personal preference to achieve goals. During this process, guiding lines and lighting let the player notice the potential paths and distinguish them from the environment.

B. Guiding Lines

Guiding lines are guiding composition elements include practical lines and virtual lines. Practical guiding lines are the linear or curved line shape composition elements such as roads or cables.

Figure 1: Practical Guiding Lines: Pipes [4]

Virtual guiding lines are the composition elements meeting Gestalt Laws which could be seen as lines, such as the outline of objects or blood on the ground.

Figure 2: Virtual Guiding Lines: Bloodstain [5]

Gestalt Principles is one of the attempts to understand these certain laws. Law of Proximity states that regional or chronological closeness of elements are grouped by our mind, they seem to belong together; Law of Closure states that our mind adds missing elements to complete a figure; Law of Continuity states that the mind continues a pattern even after it stops; Law of Common Fate states that elements with the same moving direction are seen as a unit. If certain elements all have the same direction, they are seen as one. [6]
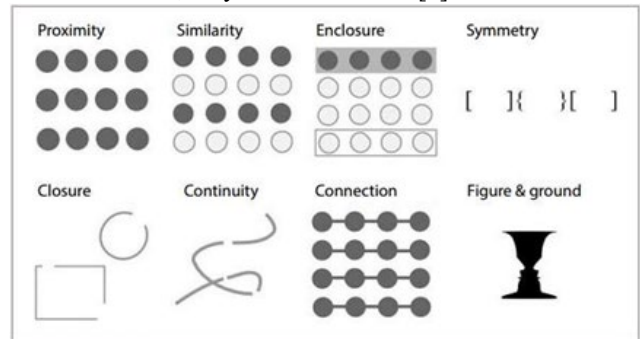

Figure 3: Gestalt Principles [7]

Practical guiding lines are usually obvious and easy to identify with a big scope and a dominant in the screen. They are usually used as the main guiding lines and to guide the player to the critical path. On the other hand, virtual guiding lines are more natural and are used as the supporting guiding lines to enhance the main guiding lines or guide the player to potential resource points or alternative path.

Guiding lines are often used in paint and photography, but it is more challenging to use in the open-world game where has

no fixed viewpoint. [8] However, there are techniques which can steer the player's viewpoint and ensure efficient guiding lines. First and foremost, the main paths including critical paths and alternative paths need to be set based on gameplay, and the observation spot needs to be built for the player. [9] Observation spots are the place where the player has to see the composition. For the linear level, there are the only one certain observation spots for one part of the critical path; For the open-world level, there usually are multiple observation spots since there are multiple potential paths. Second, in observation spots, layout or interactive items which can decide the player's direction need to be set. [10] These include certain layout or structure such as tunnel, vent, ladder, and stairs; and interactive objects such as a button or console plane. With the above techniques, the player's viewpoint is fixed, and the guiding lines and lighting can be set around its range and angle.

C. Guiding Lighting

Lighting includes directional light, spotlight, ambient light, and point light. Guiding lighting usually is a spotlight or point light which is easy to set its attributes to meet the guiding lighting's needs.

Research states that people's attention is attracted by changes or contrast in lighting perception, rather than static lighting properties such as luminance. Thus, guiding lighting usually has changes or contrast with ambient light in attributes including color, intensity, dynamics, or a combination of these attributes. The techniques mentioned above to steer the player's viewpoint also help ensuring guiding lighting is visible for the player.

D. Enhance

To make the guidance more effective, the guiding lines and lighting enhance each other and maintain consistency. In some case, guiding lighting provides sufficient brightness to allow the player to see the guiding lines. Guiding lighting also casts shadow to strengthen the guiding lines. On the other hand, guiding lines are the transition between different guiding lighting especially in the situation that the guiding lighting is limited by its radius and penetration.

E. Special Cases Breaking Guidance

There are special cases breaking guiding lines and lighting which designers should avoid.

1) When Gestalt Principles break
For the Law of Proximity, when elements are too far away, it breaks. For the Law of Closure, if the proportion of the missing elements is too large, players cannot identify the figure. For the Law of Continuity, the pattern must last long enough. For the Law of Common Fate, the moving direction must maintain consistency.
2) What are these special cases
According to the above statement and experiments in the artifact, the following special cases breaks guiding lines. When the elements of virtual guiding lines are too distracting or last too short, it's hard for players to identify them. If there are multiple guiding lines, they

must be consistent.
For the guiding lighting, it also should meet Gestalt Principles. Besides that, the following special cases which reduce contrast, break or weaken the guiding lighting. When players use the flashlight or other lighting props, it may break the guiding lighting. Some shaders which change players' visual effects also may break the guiding lighting.

III. GUIDELINES

With the field research done above, the guidelines that can be used to set up effective guiding lines and lighting in the open world are created.

A. Steer viewpoint
1) Set the main paths and build observation spots
2) Set the layout or interactive items in observation spots
3) Decide the player's viewport's range and angle

B. Set the main guiding lines and lighting
1) Guiding lines should conform to the Gestalt Principles
2) Guiding lighting should have changes or contrast in attributes

C. Set the supporting guiding lines and lighting
1) Guiding lines and lighting should enhance each other and maintain consistency.

IV. DESIGN

The artifact "Survival of the Dead Building" is a large environment map based on Dying Light Developer Tools. It focuses on and demonstrating how to navigate the player using effective guiding lines and lighting with the above guidelines. The player needs to go through the central building full of zombies and soldiers to fetch the Antizin. The in-game time is set at 7:30 pm to ensure the ambient light is dim to contrast with guiding lighting.
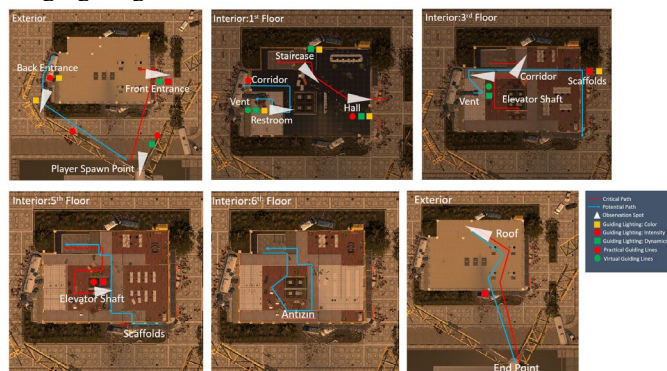

Figure 4: Survival of the Dead Block Walkthrough [11]

V. METHODOLOGY

The player starts the level on a platform with a broken crane. The player's viewpoint is decided by the spawn point. The player can see there are two pieces of crane hang down to the ground and the central building in the distance. In this scene, the two pieces of the crane are the main practical guiding lines

which show the player two potential paths leading to the front entrance (The critical path #1) and the back entrance (The alternative path #2).

Figure 5: Spawn Platform

For path #1, the catwalks on the cranes allow the player to walk forward along with them. At the end of the catwalks, I placed a dead body and a pole with cable. The cable hangs from the catwalks, and there is a spark at the end of it which draws the player's attention as the intended main guiding lighting. Also, the blood is leaking from the dead body directing in the same direction. Both guide the player to look down and find the garbage bags in the trash containers as the soft-landing point. In addition to this, the distant halogen lamps in the front entrance are the supporting guiding light to help the player planning the next goal.

For the path #2, there also are catwalks providing a guiding line as well as a path for the player. And the fallen tree, the fallen street lamp and the broken crane pieces direct to the same direction as supporting guiding lines.

Following the path #1, the player reaches the front entrance (#3). In this scene, the tables and barriers are placed as two big triangles pointing to the front entrance which are the main guiding line as well as background storytelling about how zombies broke through the blockade and invade the central building. The halogen lamps mentioned above are the main guiding lights, which appear much brighter compared with the ambient light in the scene. Other than this, there are bloodstain and dead bodies on the ground and barriers directing the player. This area also provides the player weapons and ammo for the following combat.
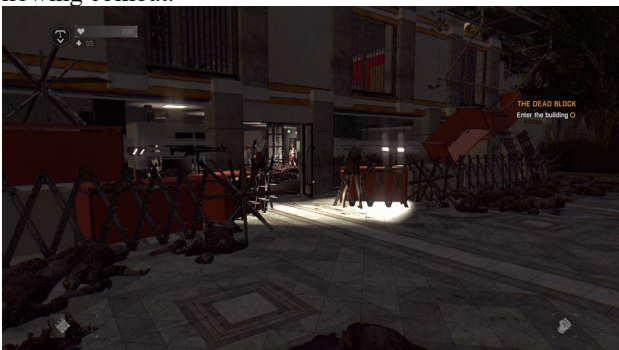

Figure 6: Front Entrance

When walking into the front entrance, the player's viewpoint is decided by the doorway and is facing the hall (#4). In the hall, there is a white cable linking with a fallen halogen lamp on the black ground. The halogen lamp keeps emitting sparks and brightens the ground a bit. To support the above main guiding

lines and lighting, One of the TVs on the wall also is set to show noises.

Figure 7: The Hall

If the player chooses the alternative path #2, the player reaches the back entrance blocked by a bus and barriers (#5). In this scene, the player sees the outside vent has destroyed by an explosion, and the left vent with broken pieces becomes guiding lines. The fire of a burning car as the main guiding lighting draws the player's attention. All these composition elements lead the player to notice the path to enter the bus and the building.

Figure 8: Back Entrance

After entering the bus from the sunroof, the blue UV lights which are used in the entire game to indicate the safety draws the player's attention as the next main guiding lighting. Weapons and ammo also are placed beside the UV lights. And the cables link to the UV lights as the guiding line helps the player to reach the back entrance.

After entering the building from the back entrance, the cables and the dead body on the ground attract the player to enter the restroom (#6).

Figure 9: The 1st Floor Corridor

The signal flare casts twinkling red light from the open vent door. In addition to this, the stacked corpses and blood leaking from the vent help the player to understand the potential path.

Figure 10: The 1st Floor Restroom

If the player takes the path #1, #3, #4, the twinkling emergency light appears in the player's vision when he turns to the staircase (#7). No matter the player takes the stairs (#7) or the vent (#6) as the path, the player will reach the 3rd floor. When the player comes out from the staircase, the furniture that fell to the ground as the virtual guiding line and the blinking vending machine as the guiding lighting leads the player to the elevator shaft (#8).

Figure 11: The 3rd Floor Corridor

On the other hand, if the player comes out of the vent, with his viewpoint fixed by the corridor, the player sees a bright yellow light shining from a broken window. This guiding lighting guides the player to the scaffolds outside the building (#9).

Figure 12: The 3rd Floor Corridor

If the player chooses the elevator shaft (#8), the player enters it from the right elevator. In the shaft, all the pieces compose the vertical lines leading the player to look up. And lamps that

light up the shaft enforce the guidance. The player climbs up and reaches the 5th floor.

Figure 13: Elevator Shaft

Alternatively, if the player climbs the scaffolds (#9), he will reach the 5th floor from another path.

Once the player clears soldiers on the 3rd floor, 5th floor, and the roof, he will find the Antizin stored on the roof. After obtaining the Antizin, the player could use the zipline to go back to the spawn platform to end the level.

VI. CONCLUSION

I set up the playtest for the artifact "Survival of the Dead Building" with nine players. HUD is turned off to allowing the player to navigate with guiding lines and lighting without relying on quest markers or minimap. The overall result of playtesting suggests that in the artifact, the guiding lines and lighting effectively guide the players.
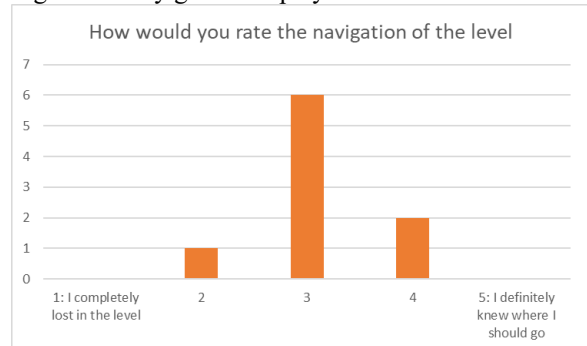

Figure 14: Overall Navigation Effectiveness Result from the Playtest Survey

Take the front entrance (#3) as an example, 100% of testers who went through this scene felt guided by the guiding lines and lighting. On the other hand, the exploration area intended no guidance such as the street, less than 20% of testers felt guided. In most of the guidance scenes, more than 50% of testers felt guided.

Figure 15: Scenes Navigation Effectiveness

With the above research and the artifact created, I learned how to set up effective guiding lines and lighting in a large environment. As the above guidelines mentioned, I learned techniques to steer players' viewpoint which satisfy gameplay and narrative at the same time. I learned that arranging enemies and supply provides feedback to the players and help them better-understanding navigation. Besides, I learned how to self-study a new engine and set up pipelines based on the features of the game itself.

For the time and scope limitation, this artifact is a slice of the open-world map. It focused on the interior space and in-game time was set at evening. The open-world map will have more potential paths and include exterior space and interior space in the daytime as well as night. Each potential path still works with the above guidelines to set up guiding lines and lighting. The exterior open-world space is more challenging to steer the player's viewpoint. With a brighter ambient light, it's also harder to establish the contrast in intensity for the guiding lighting. However, the contrast in movement or color still works, and guiding lines have better visibility in this situation.

For future research, I would like to research how the guidelines for this topic will be for multiplayer games. During the development, I also realize the guidance effectiveness is also affected by the gameplay pacing and other elements, which is worthy for in-depth study.

I believe with the above guidelines that I mastered using guiding lines and lighting to guide the player across a large environment. I look forward to applying my methodology to a bigger open world map.

REFERENCES

[1] GDC Vault - Level Design Workshop: Invisible Intuition: Blockmesh and Lighting Tips to Guide Players and Set the Mood, by David Shaver. [Online]. Available: https://www.gdcvault.com/play/1025179/Level-Design-Workshop-Invisible-Intuition

[2] GDC Vault - Level Design Workshop: Invisible Intuition: Blockmesh and Lighting Tips to Guide Players and Set the Mood, by David Shaver. [Online]. Available: https://www.gdcvault.com/play/1025179/Level-Design-Workshop-Invisible-Intuition

[3] Open World, by Wikipedia. [Online]. Available: https://en.wikipedia.org/wiki/Open_world

[4] Dishonored. Arkane Studios: Bethesda Softworks, 2012. (Image from Dishonored Gameplay Walkthrough Part 1)

[5] Prey. Arkane Studios: Bethesda Softworks, 2017. (Image from PREY Gameplay Walkthrough Part 1 FULL GAME [1080p HD PS4 PRO] - No Commentary)

[6] Game design and Gestalt laws, by Sita Vriend. [Online]. Available: https://www.gamasutra.com/blogs/SitaVriend/20170828/304420/Game_design_and_Gestalt_laws

[7] Game design and Gestalt laws, by Sita Vriend. [Online]. Available: https://www.gamasutra.com/blogs/SitaVriend/20170828/304420/Game_design_and_Gestalt_laws

[8] Why Nathan Drake Doesn't Need a Compass | Game Maker's Toolkit, by Mark Brown. [Online]. Available: https://www.youtube.com/watch?v=k70_jvVOcG0

[9] Composition in Level Design, by Mateusz Piaskiewicz. [Online]. Available: https://www.gamasutra.com/blogs/MateuszPiaskiewicz/20140817/223513/Composition_in_Level_Design

[10] How to Tell Stories and Guide Players Through Level Design, by Brendon Chung. [Online]. Available: https://www.youtube.com/watch?v=9RbXTv7iNbw

[11] Survival of the Dead Block Walkthrough captured from Dying Light and Dying Light Developer Tool by Author