Portal demonstrates how effective use of environment in combination with an innovative core mechanic causes 'play' to be more enticing to a player than playing through the 'game' itself. Within this essay I will cover what constitutes formal and informal play, imposed and user created goals, mechanics and how the world can compliment these elements. Then I will attempt to resolve what this teaches us in terms of games design.

Portal contains all of the typical mechanics present in almost every first person shooter game such as running, jumping, picking up and dropping items (somewhat less common in first person shooters but still not unique) and – in a manner – shooting. The shooting mechanic itself is when Portal becomes unique and presents its core mechanic and what makes the game so interesting and fun.

The only gun present in Portal is the 'Portal Gun' a gun able to fire two coloured portals where one leads through to the other causing anything travelling through one to come directly through the other as if simply walking through a door. There is no loading and the portals work hand in hand with the physics engine meaning there is not even any loss of momentum or change in character in any way, something that becomes very important at certain points.

The only rules present in the game are designed to force the player forward and to generate the difficulty and learning curves. They control the gun itself, first not having it then the first gun can only place the blue portal meaning the orange is still generated outside of user control then finally allowing the placement of both portals. Later, after both portals are under player control areas where portals cannot be placed are introduced and the fields that destroy carried objects and reset portals are placed within the puzzle space rather than simply before the elevators as early in the game (to prevent carrying objects from earlier levels to make later puzzles easier or travelling to previous levels via any placed portals.)

Portal uses the principle of emergent mechanics to familiarise the player with its core mechanic (the portals) gradually so as not to make it too overwhelming too soon, thereby frustrating the player. This also serves as the initial driving force for the player. Keeping them playing in order to get full control over the portals at which point they will be hooked by the game. The mechanics relate to the typical controls present in first person shooters, such as the wasd movement controls and the portal gun using the usual primary and secondary fire to place the two portals. This assists learning in that a player doesn't need to be distracted by learning an entirely new control scheme.

The world in which Portal is based is (especially in the earlier portions of the game) very cold and clinical, the surroundings are plain but well suited to the narrative which is supposed to be set in a laboratory. It consists mostly of plain white walls and very few very consistent assets. This - whilst serving practically in that most of the assets were able to be re-used consistently -

also served so as not to distract the player from the game through the aesthetics, allowing the player to focus on the play without getting caught up in the environment.

Portal has an extremely linear narrative but it is not detrimental to the game as it primarily serves merely to impose goals and to drive the player forward. This is especially true of the earlier section of the game where the only narrative influences come in the form of a computer voice over a loudspeaker explaining what is going on and dropping hints to later story events. The early portion of the game consists simply of elevators at the start and end of a challenge area which requires puzzle solving to traverse. Later the narrative is more important as the goals are caused to shift and the challenge spaces are not clearly defined.

Portal's real beauty is in its mixing of formal and informal play. Salen and Zimmerman (2004, pg 74) says that Parlett, D (1991) defines the differences between formal and informal play as "An informal game is merely undirected play or 'playing around'... A formal game has a twofold structure based on ends and means". From this I have taken that simply playing with the portal gun as 'informal play' and progression through the game itself as the 'formal play'. This element of informal play mixed in with formal play seems to be the main reason for Portal's success.

In a lot of cases the informal play of the game – simply playing with the portal gun – became more engrossing than the game itself. This is something I have witnessed firsthand, not only when I played the game myself a year ago, but more recently when a friend of mine purchased it for the Xbox 360. Seeing as none of my circle of friends with the exception of myself had played it before we all decided to sit around and pass the controller around so we could all have a go. And sure enough after we got control of both portals all everyone did was play around with 'infinite loops' and other forms of 'play', loosing almost all interest in the game itself. This is something that was noticed by other people as well. In his article on Wired.com Thompson, C. (2007) says "Pretty much everyone who plays *Portal*... immediately tries a little physics experiment... You put a portal on the floor in front of you, and then one on the ceiling directly above it. Step into the first portal, and you instantly fall out of the portal on the ceiling -- whereupon you fall back into the portal on the ground... You are now falling endlessly through the portals, over and over again, in a dreamlike, self-created infinite loop."

Experiments like these serve as a form of user created goal. One of my friends for example spent about 20 minutes just trying to place the portals for his infinite loop perfectly so that he didn't have to touch the controller at all once he fell in. Another placed his facing opposite directions (being ovular one was placed at a 90 degree angle to the other) causing a sort of pulsating effect as we watched the player falling continuously. I myself decided to knock a camera off the wall and place two portals – both on the ground next to each other - and drop the camera in such a way that as the camera came out of the first it one, then fell into the other then back out the first again continuously.

Another thing that I observed in playing this game with my friends is that we all tended to devise the most elaborate ways to do the simplest task, simply because the ability was there. For example, at one point there are two drones that are attempting to shoot me. The simplest method would be to simply place a portal anywhere and drop another under the drone – something one of my friends did in a similar situation – but merely because I could I decided to place one portal on the wall behind the first drone and the second below the second drone, the result was that I effectively threw the second drone at the first through the portal. Thompson, C (2007) explains doing similar things himself "I experienced a ton of other delightful "aha" moments, as I deduced clever new ways to use the portals. I'd coax an enemy to fire at me, then use a set of portals to reroute his bullets back at him... In another situation, I was trying unsuccessfully... to get a view of a remote upper level. Then I realized I could open a portal high on the wall, and use it to simply peer through." This also demonstrates that the challenges in portal are not strictly speaking, puzzles. As a puzzle has only one method of completion and a challenge can have many.

Valve even seemed to anticipate this style of play and that players would try to explore areas beyond the intended game space. In response they placed intentional 'Easter Eggs' usually in the form of scribbling on walls seemingly done by other test subjects, mostly referring to the 'companion cube' and that the cake that GLaDOS (an AI that communicates with you throughout the game in the form of voiceovers, giving you your imposed goals.) has been offering you 'is a lie' foreshadowing future events.

Portal's seamless blending of formal and informal play is achieved through its use of a fun and innovative core mechanic helped along by use of controls already established by the genre and an interesting but non distracting world. This ability allows for a wider range of play styles and makes the game enjoyable for a wider range of players. This teaches us as game designers the value of the core mechanic and how everything else when used to compliment it can lead to greater enjoyment from this same blending of formal and informal play.

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