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Pie Menus and Efficiency of Item Selection

Since 1993 when Doom was first released, games have given players the ability to carry an arsenal on their back. For Pc games using keyboards it was no different, all they had to do was map unused keys to weapon/item slots as needed. The problem arose when it came to adapting games for consol. With only 12 analog inputs and 2 joysticks on an average controller, you are working with serious input constraints. Developers needed to find a way to adapt these large item selections into a more simple format. In an article by Bramha Dalvi called *Video game UI that helps immersion — Weapons Wheel*, Davi shows the inefficiency and difficulty of the older systems of item selection that attempted to solve the problem. He uses *Grand Theft Auto III* as a perfect example which used a weapon scroll system using the triggers on a controller. The player would have to click through every weapon in the weapon array between the currently equipped weapon and the desired weapon. This would mean if there is a total of 10 weapons/slots and you currently were on weapon 2 and wanted to equip 7, you would have to rotate through either weapons 3, 4, 5 and 6 or scroll through weapons 1, 10, 9 and 8 before arriving at 7 (see Image 1). This made games slower and item selection more of a burden, especially in games like *Doom* and *GTAI* that were heavily centered around using a varying arsenal of weapons to create chaos and calamity. This led large action games to look for an innovative solution for a selection menu, which was followed by the implementation of the radial menu allowing players to select items 15% faster and with a much lower error rate, making it a more viable solution. The radial menu

provided those games the ability to have large arrays of weapons, just as Lucy Morris exemplifies in an article titled *Putting the 'Rad' Back in 'Radial Menus'* where she exemplifies the depth the radial menu in the game *The Secret of Mana*, and still be quick and efficient.

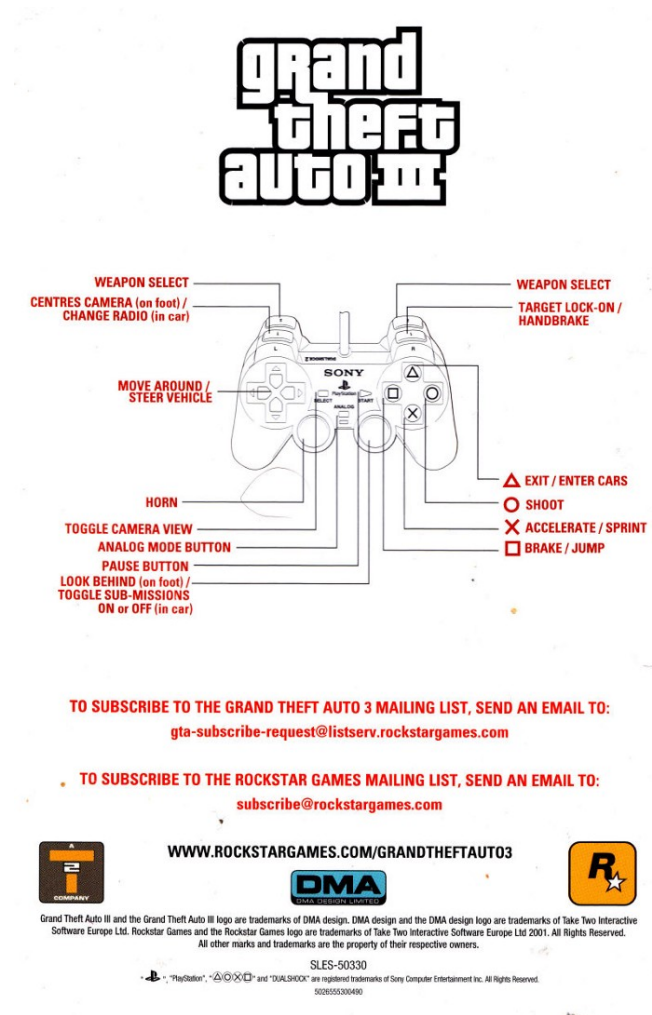


Image 1: Grand Theft Auto III button map for the Playstation

Radial menus have opened up many options for inventories and item selection. In *Lego Harry Potter*, developers utilized a radial menu for spell selection. With a world like the *Harry Potter Universe* where characters can cast a myriad spells it can be difficult to create an immersive experience for the player and can potentially make them feel railroaded into using

only a few spells if a poor selection system is used. To ensure that the player can cast a number of spells and be able to efficiently choose between, developers implemented a static radial menu. The menu also fits perfectly into the game's UI by placing it as a ring around the chartered icon in the top left corner of the screen. Because the game is an action-adventure game you want to aim to create a play experience which flows together and where the player can hold pace with the scene. It is very difficult for a player to feel they are in an action-adventure game if they are having to wait long periods of time to select the proper spell to complete a task.



Image 2: The spell wheel activated



Image 3: The spell wheel (top left) UI

Lego Harry Potter is unlike other action adventure games, instead of a weapon you have an all-in-one utility tool and weapon you carry around. In other games that have incorporated the radial menu, like Doom and GTA, your player is usually more of a pack mule and/or walking arsenal. They allow you all of these weapons because they rely on the player's desire to act as an agent of chaos to drive your motivation for in game activity and progression. Because Lego Harry Potter is not so much a game about inciting chaos it gives the player a totally different feel when they play. The game creates a fun child-like world filled with plastic people and quirkiness all around. Instead of centering focus on the weapons you can use, they

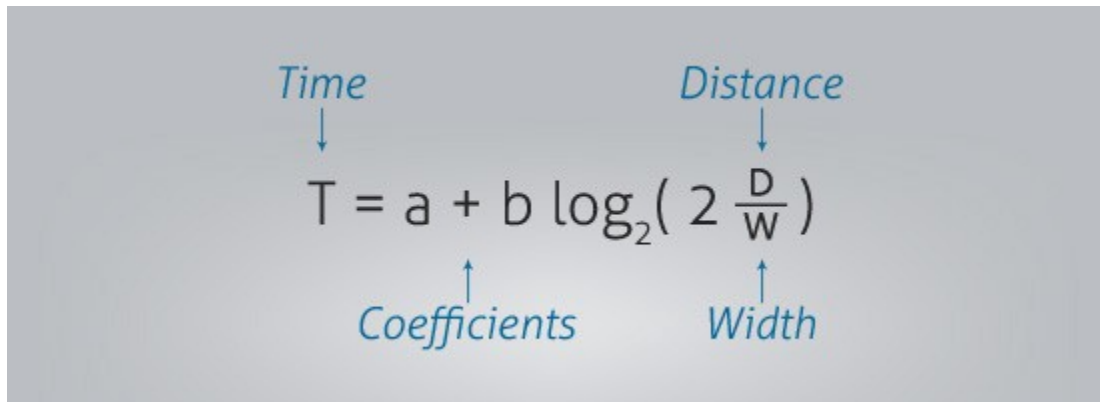
developers instead draw the players attention to objects that can be interacted with by highlighting it with a certain color ring to indicate which spell you can use when your character is looking at them. When your character interacts with objects in the world they collect a ton of studs (the coin equivalency used in lego games) to encourage the player's interaction with the world. The flow and ease of the radial menu help in supporting the game play by allowing quick access to a maximum of 8 spells. The Players can easily interact with varying types of objects and not have to feel burdened with having to choose the proper spell. By using the radial menu for spell selection you are greatly decreasing the distance between each spell by making them all just one apart. Instead of how GTAIII did their weapon selection, when in a circular format all of the slots are touching each other at the center. Based on the distance change, Fitts law tells us this is a mathematically quicker solution than any other shape for an array. Brahma Dalvi explains Fitt's law best as saying:

“the time taken to complete a movement is a function of the *start and end points* of that movement and an inverse function of the *width* of the object to which we are reaching. *a* and *b* are constants that represent the dexterity of the user and the ergonomic ease of the input device.”

By giving the players the fastest and most efficient way to select spells, the developers are providing the player the best opportunity to play Lego Harry Potter. It will allow the player to play the game while operating the main game mechanic without hindering the speed of the game.

In addition to making navigation of the spell wheel simpler, the spells in the wheel are color coordinated where each spell has its own color. Using this color coordination allows the players to better remember what spells they have in their spell wheel. The color coordinated dots can be seen in image 2, where the player can quickly glance up if they forget where the spell is in the wheel, that way the player can use spells in a more paced way if needed. In addition the spell

wheels color coordination allows it to be identifiable within run time. While the player is roaming through the world, they will be prompted on which spell to use by having a highlighted circle surrounding the object. The color of the circle will correspond to the spell color. By prompting which spell to use, the developers take away the need for players to figure out which spell can be used.



The diagram shows the Fitts Law equation $T = a + b \log_2 \left(2 \frac{D}{W} \right)$ on a grey background. Above the equation, the word "Time" has a downward arrow pointing to the variable "T". To the right, "Distance" has a downward arrow pointing to the variable "D". Below the equation, "Coefficients" has an upward arrow pointing to the variables "a" and "b". To the right, "Width" has an upward arrow pointing to the variable "W".

Image 4 : Fitts Law

Radial menus have not yet solved all the issues we have had with inventory and item organization. The way the player must access the radial menu is by pressing a button to display the “spell wheel”, use the thumbstick to select a spell and then cast said spell. When you open the spell wheel you lose the ability to control your character's movement. For the duration it takes for the player to select a spell your character stands frozen. In a game that is supposed to be action-adventure, you should not have to sacrifice the ability to move while operating one of the main game mechanics. From a playing experience, there are times when a player can be in a battle with deathteater, dementors, the Basilisk (Image 5), or even other students and can be easily stopped due to the fact they can not move while selecting a spell. There needs to be the ability to continue moving while selecting spells to fully create that immersive experience that games are looking for, just as Lucy Morris exemplifies in an article titled *Putting the ‘Rad’ Back*

in 'Radial Menus', where she exemplifies the depth the radial menu in the game, *The Secret of Mana*.

. When a person is making a decision in a paced environment they do not stop moving, they continue with their momentum and velocity while making split second decisions. The way the radial menu is currently accessed slows down the pace of the game sporadically and slightly disrupts the flow of the play. UI is supposed to facilitate the fantasy of the player and help to immerse them in the world, while radial menus are ultimately a better option over other methods to carry a large inventory there is still room to grow.



Image 5: Harry battling the Basilisk

Works Cited

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