**Assignment 3**

**Research and Report**

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In a video game, most people will usually notice the visuals of their character or the game's music, or even the gameplay. An important feature that can go unnoticed is the background in games. The background is one of those things that might not get the recognition it deserves, but if it’s missing or lacking in quality, it will be noticed. The four main backgrounds of 2d games are blank/solid backgrounds, fixed images, tiles, and scrolling backgrounds. Each of these backgrounds has been used in games and each comes with its advantages and disadvantages. I believe each of the four backgrounds has its use depending on the game being made. Each background has increasing levels of complexity.

The first and most simple background to look at would be a blank background. This type of background is not so much of a background, but the lack of. Using this background you end up usually with a black screen and then you would draw your sprites onto this black. Many older games use this type of background because of hardware and platform limitations. If a game is using every bit of memory possible to work with its sprites it might be a bad idea to use more to render something behind them and then use more resources each time a sprite is redrawn. The stand-out games that most people will remember using this style of background would be Asteroids and Space Invaders. A downside of using this background is pretty obvious, you don’t have any background art to stylize your game.

The next step up from having no background is to use an image (usually a bitmap) and draw that to the screen. The image will be static and usually won’t change during gameplay. This implementation of a game background will add some more style to your game or maybe boundaries the player can’t cross. The character can essentially interact with things in the background if you add points that interact with the player character that corresponds to something in the image. Good usages of this background would be Undertale and Pac-Man. Each game utilizes boundaries with these backgrounds without being too complex. An image background won’t work if your game world is too large as the space the bitmap would use would take far too many resources.

The next background that solves the problem of space usage would be a tile background. This background is made up of many small tile images that can be arranged in any configuration. The reason this solves the space problem is that you only need to draw tiles as they appear on the playable screen. You don’t need a large image that is always sitting there being wasteful. So if a player moves you can delete old tiles and add new ones. These tiles can be randomly generated or preconfigured. Civilization and Ultima 3 are good examples of this technology. Each of these games would draw tiles as the screen needed and then they could be easily removed as they moved off of the screen. This does add some more complexity to the making of the game compared to the previous background types, but for the right style of game, this would certainly be worth it.

Scrolling backgrounds are closely related to tile backgrounds. The difference is that the scrolling background doesn’t necessarily have to be tile-based, although many are. Scrolling backgrounds move either independently of the player or as the player moves to the edge of the screen. This technology allows for a very large game world that couldn't be used with previous technologies. A scrolling engine is required to handle the generation of background as the screen moves which adds to the complexity of implementation. The standout games using this would be Super Mario Bros. and Galaxian. Both games utilized scrolling backgrounds but each used a different version. The two types are vertical scrolling and horizontal scrolling. Scrolling backgrounds also may be used to create a sense of movement in the player character where there is none using parallax. Parallax tricks your brain into thinking that your character may be traveling through space like in the case of Galaxian when the background is scrolling downwards and the ship is fixed in place.

All of these backgrounds have been used and continue to be used to this day. Although, some may be more common as software and hardware limitations have become less of an issue. Some indie games or small projects may use the more simple backgrounds to limit the burden of their scope. My favorite to learn about and utilize has been the scrolling background as it adds a sense of space that the others lack.

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