Ambedic Actions: Definition and Taxonomy of a New Game Mechanics Category.

Jed Graeme Stanton

A thesis submitted to
Auckland University of Technology
in partial fulfilment of the requirements for the degree of a Master of Design.

2020

School of Art and Design
Digital Design

Abstract

This research identifies components within existing video games that demonstrate similar characteristics in their lack of interaction with other in-game systems. The research proposes to unite these components under the term “ambedic” to promote clarity in future research. The research utilises a practice-led approach in its methodology, combining several methods from different disciplines for each part of the process. A combination of formal analysis and MDA framework lenses is used in the initial investigation of existing media to produce a series of archetypes of ambedicity. Practical considerations are used to choose two early arcade-era games to clone to provide a context within which new ambedic actions are generated. The development of these actions is analysed using autoethnography to produce insight into how future game designers may approach implementing ambedicity within a future game.

This research presents the term “ambedic” alongside an investigation of archetypal forms of ambedicity in video games. Furthermore, this research examines how ambedic components may influence the play experience of a player in a video game. It concludes with a discussion of future research pathways that may emerge from the creation of this new niche of components in game design.

Contents

Attestation of Authorship

“I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.”

Signed: Date: 02/10/2020

List of Figures

Acknowledgements

I would like to thank my supervisor, Jason Kennedy, for all his feedback and guidance, for helping me work through this research, and encouraging me to strive to improve at every turn.

I would like to thank my family and friends for their support, and willingness to listen to me attempt to explain my thesis on many occasions.

Lastly, I would like to thank my parents Alison and Denis, for supporting me throughout this endeavour, always willing to lend an ear or give feedback on my work.

Introduction

This research identifies a series of specific player-controlled actions within existing video games that demonstrate a similar characteristic in their lack of interactivity with other in-game mechanical systems. As there is no previous definition within game design terminology for such actions, it is necessary to create and define a new term to describe this collection of actions for future research within game design.

In order to describe these player-controlled actions, this research proposes the term “ambedic”, which stems from the word “ambedo”. In The Dictionary of Obscure Sorrows, a project undertaken by writer John Koenig that gives names to previously undefined emotions, Koenig defines *ambedo* by its relationship to the word “albedo”, which is a measure of the proportion of light reflected from a substance, and in Latin means “whiteness” (2015, para. 1). This thesis extends the definition of *ambedic* to the context of game design. As such, we find that an apt definition can be created from the Latin prefix “ambi” (meaning “both”), and the word “edo” (which, depending on the Latin etymology used, means either “I eat” or “I produce”). The resulting neologism *ambedo* suggests something that both produces and consumes - that is, something that exists for the sake of its own existence. “Ambedic” describes a subject as being in a state of “ambedo”; in the context of game components, this implies that those components exist for themselves. Such components are inconsequential in the player’s progression towards any intended objectives imposed by the game designer.

An ambedic component can take many forms within a game, most commonly as actions, objects, and systems. Whether undertaken by a player or a system within the game, an action can be ambedic if it does not affect the player’s progression toward any of the specific game objectives created by the game designer. It may be argued that an ambedic action may progress a player’s personal goals within a game, such as by enhancing the player’s sense of play or immersion. One such example would be honking a car’s horn in a racing game to frustrate or encourage another player; however, the resulting effect of this concerns meta-play outside of the controlled game system and is thus discounted from having a perceivable effect on the progression of a game’s predesigned objectives.

It may also be argued that if a component requires a player’s interaction to exist, it cannot be considered ambedic, as the component does not exist for itself but for the player that enabled its existence. For instance, a player may honk a car’s horn to distract an opponent or, alternatively, the player may be under the false impression that honking the horn gives the car a speed boost. However, regardless of the meaning or effect engendered by the horn sound, the resulting effect of the action will remain consistent with the specific intent created by the game designer. The act of creating an ambedic component imparts only intent and not purpose, thus a component’s ambedicity can only be quantifiable after its creation.

If we have defined what characteristics qualify a game component to be ambedic, we must also consider what prevents it from being ambedic. If an ambedic component *exists for the sake of*

its own existence, then a component that exists for the sake of something other than its own existence must not be ambedic. It is from this line of reasoning we find the term “synergistic”. *Synergistic* stems from the term *synergism*, defined in the Merriam Webster dictionary as “interaction of discrete agencies ..., agents ..., or conditions such that the total effect is greater than the sum of the individual effects” (2020). Synergistic components work in conjunction with one another to form the systems that allow progression through the game space. While both components exist in the game space as created by the game designer, the difference between them is that synergistic components can influence each other while ambedic components cannot affect any synergistic components.

A classic example of an ambedic game object is the Easter egg. An Easter egg, as defined by the Merriam Webster dictionary (2020), is “a hidden feature in a commercially released product (such as software or a DVD)”. Easter eggs contain meaning and emotion. Sometimes Easter eggs require a great deal of effort to observe their existence at all. They may be ambedic if they exist within the game space outside of intended play. A player may observe and subjectively enjoy Easter eggs, but the act of doing so should not affect gameplay within the system. However, not all Easter eggs are ambedic as some can be manipulated by players to affect a game’s progression. Thus, such Easter eggs are instead considered to be synergistic components of the game.

This research seeks to explore the proposed definition of *ambedo* further in the context of game design, through the analysis of existing games and the generation of new game artefacts. A taxonomy of archetypal instances of ambedicity in games will be created to assist with an understanding of how to identify and create ambedic components in games. This research then progresses to discuss the aesthetic and mechanical design considerations that are made during the creation of new artefacts and provides documentation of these processes to assist future game designers in the development of ambedic actions.

Defining the Terrain

When discussing the role of ambedic actions in video games, it is imperative to have a basic understanding of *play*. For the context of this research, I invoke an understanding of "*play*" as defined by Jaakko Stenros, a university lecturer in game studies at Tampere University. Stenros suggests that "play is, in essence, doing for the sake of doing" (2015, p. 62). Due to this project's scope, I am unable to engage with an exhaustive survey of the concept of *play* within a video game context. However, Stenros' definition is meaningful in that it draws from a larger array of disciplines. Notably, it builds from the works of philosopher and anthropologist Johan Huizinga, and sociologist and philosopher Roger Caillois. Huizinga's book "Homo ludens - A Study of the Play Element in Culture*"* is influential in the field of game studies for its concept of play as "standing quite consciously outside 'ordinary' life*"* (1938, p. 13). Caillios' work, "Man, Play and Games*"* (1971) builds on Huizinga's work and suggests "play to be an *activity,* which is essentially *free* and voluntary" (2015, p. 55, *original emphasis*). However, the concept of play in many of these earlier works was developed before the creation of video games. As such, using a modern definition of *play* is required for the context of this research. In addition to Strenros' definition of play, this research draws upon the works of Alexander Galloway, a professor in the Department of Media, Culture, and Communication at New York University. In Galloway's book "Gaming: Essays on Algorithmic Culture" (2006), the concept of play in video games concerns both the actions of the 'operator' and the 'machine'. This differs greatly to previous ludic concepts of play where the tools used in play merely facilitate actions instead of participate in them. This coincides with the concepts of meaningful play, described by Eric Zimmerman, a game designer, and Katie Salen, a design professor at the University of California. In their book "Rules of Play: Game Design Fundamentals", they describe meaningful play as "the process by which a player takes action within a designed system of a game and the system responds to the action" (2004, p. 50). I believe that through these contemporary understandings of play within the context of video games, a greater understanding of the relationship between the game and the player can be formed. Delineation of what play is will not be addressed substantially further as the topic of play is prevalent in many academic disciplines, notably psychology, biology, sociology, philosophy, ludology, and more. While each subject may have their own unique perspectives, to attempt to truly define *play* would be an entire subject for a thesis itself, and thus extends beyond the purview of this thesis.

Methodology

This research takes a practice-led approach in its study of ambedic actions. Linda Candy, an adjunct professor of software at the University of Technology Sydney, defines practice-led research as:

> [that which is concerned] with the nature of practice and leads to new knowledge that has operational significance for that practice. The primary focus of this research is to advance knowledge about practice, or to advance knowledge within practice. Such research includes practice as an integral part of its method and often falls within the general area of action research. (2006, p. 1)

Game design is the specific medium of practice engaged with through this research. As the practice is integral to this research, the methodology is constructed with consideration for both the practical and theoretical aspects of this study.

Formal Analysis:

An integral part of this study is the use of formal analysis. Petri Lankoski, an associate professor of game studies at Södertörn University, and Staffan Björk, a professor of gameplay design at Gothenburg University, describe formal analysis as “the name for research where an artefact and its specific elements are examined closely, and the relations of the elements are described in detail.” (2015, p. 23) This method is used at the start of this research to provide the framework of terms that describe and compare ambedic components in the analysed games. Additionally, formal analysis is used at the end of the research to compare and contrast the ambedic components created throughout the project. Björk suggests the use of formal analysis of gameplay to derive design patterns in video games (2015). Following these suggestions, the formal analysis within this research is performed on the gameplay of pre-existing games and on the practice generated through this research. Lankoski and Björk also suggest the importance of a defined vocabulary: “The basis for being able to do a formal analysis of games is to have a vocabulary that enables a clear and distinct description of specific games.” (2015, p. 24). Therefore, this research uses the example vocabulary utilised by Lankoski and Björk in their case study to provide clear and concise descriptions of the game components discussed.

MDA Framework:

As this research focuses on design and interaction with ambedicity in games, an approach from both the perspective of a game designer and player is taken to provide a holistic understanding of the effects of ambedicity. The MDA framework as set out by video game designer and professor Robin Hunicke, game designer and educator Marc LeBlanc, and game designer and developer Robert Zubek, provides a series of lenses through which a game's design can assist in the understanding of how differing perspectives (primarily those of games designers, players, and reviewers) interact with games. The acronym MDA stands for the following three lenses: mechanics, dynamics, and aesthetics.

> **Mechanics** describes the particular components of the game, at the level of data representation and algorithms.
>
> **Dynamics** describes the run-time behavior of the mechanics acting on player inputs and each other's outputs over time.
>
> **Aesthetics** describes the desirable emotional responses evoked in the player, when she interacts with the game system. (2004, p. 2, *original emphasis*).

This research predominantly focuses on the lenses of mechanics and dynamics as a game component's ambedicity is primarily determined by its interactions with other parts of the system during gameplay. While this also likely affects a player's emotions, that is outside the scope of this research.

Autoethnography:

Mariza Méndez, a researcher and teacher of English language at the University of Manchester, suggests that "[o]ne of the main advantages of personal narratives is that they give us access into the learners' private worlds and provide rich data." (2013, p. 282). As this research is practice-led, the act of creating the practical component is of significance to the contribution of this thesis. A method for analysis of my thought process throughout my practice may be beneficial for future researchers to understand my first-person perspective when undertaking design considerations. By engaging with autoethnography, not only will the synthesised narrative provide insights into my workflow for future researchers, but it also benefits creating documentation for the decision making during the design stages of the practice. I record retrospective self-observations of my decisions and thoughts on the process of generating practice during and after a session of work. All of this is recorded online using the Google Docs service.

Practical Considerations:

The practical component of this research is the creation of several games to display different types of ambedic actions (as defined later in this study). Due to the time and personnel constraints of this thesis, several criteria must be met by these games. The games must be simple - overcomplicating their designs would subtract valuable time from testing and designing the accompanying ambedic actions. Simplicity also allows for easier differentiation between ambedic and synergistic actions: if a game is too complex, the player may become overwhelmed by options and miss the ambedic actions entirely. The type of games chosen must be well-documented. Creating several new games from scratch is unnecessary as the games are intended to serve as a context for the ambedic actions and are not the focus of the research in that regard. Finally, the games must be easy to play: if a player or researcher is focused on mastering a difficult game, it will detract from their interactions with any ambedic actions. With these criteria in mind, I choose arcade-era video games into which I incorporate ambedic actions. Due to technological advances and popularity, I propose that such arcade games provide simple game designs with widely available documentation. This assists in the rapid development of each base game before changes are made to incorporate ambedicity. The possible challenge that this research faces is the difference in machine code between the original arcade games and modern game engines. That is, the code that makes up the original arcade games will not work implicitly on a modern computer, and therefore the re-creations will be an approximation of how the systems were designed in the original games.

Methodological Pipeline:

There are three major areas of research as part of this study: analysis of pre-existing media to generate a taxonomy of ambedicity within video games; the generation of practice and implementation of ambedic actions within game artefacts; and, analysis and reflection on the design considerations undertaken during the creation of game artefacts. Due to the scope of the project, the methodologies previously laid out are utilised in varying combinations throughout the study.

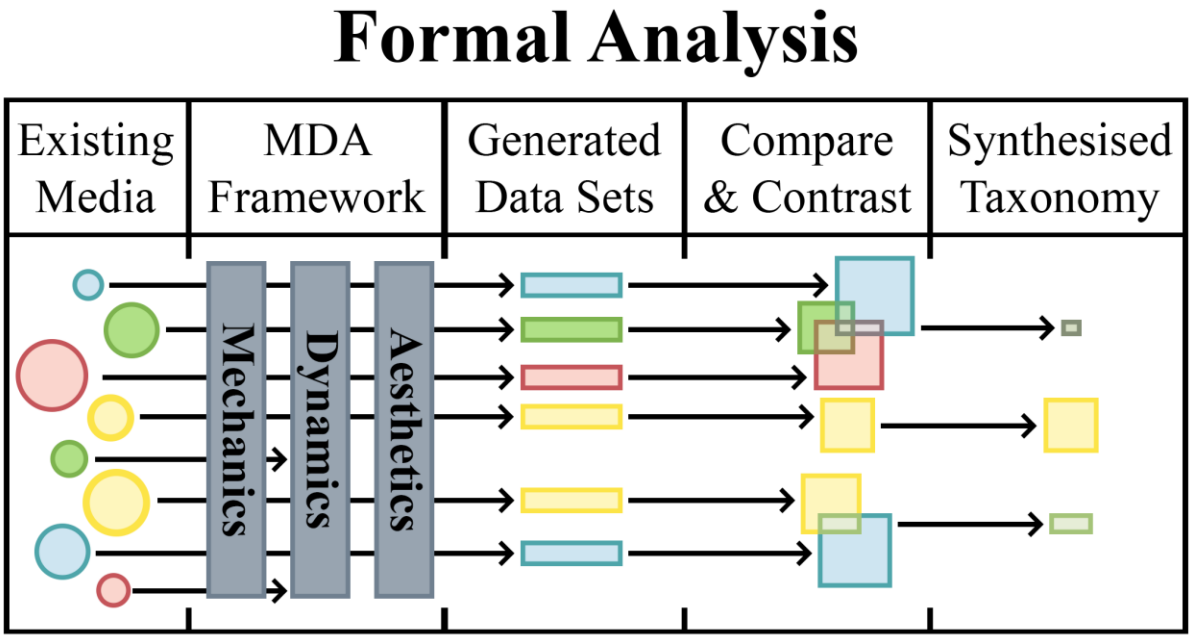

Fig. 1 Formal analysis of existing media

In the analysis of pre-existing media, a formal analysis is conducted upon existing media to create a synthesised taxonomy of archetypal ambedic components (Figure. 1). I gather existing games that I believe have ambedic components and document their observable state within the game through the lenses provided by the MDA framework. Through the lens of mechanics, I analyse and form a description of how the ambedic component is viewed. Through the lens of dynamics, I ascertain whether the component is ambedic by investigating whether it can interact with synergistic components in the game. Finally, through the lens of aesthetics, I discern how the ambedic component has been adapted to the context of the genre and game world of which it is part of. The data sets generated by breaking down the existing games with the lenses of the MDA framework are then compared and contrasted. Through this comparative analysis, it is possible to synthesise a taxonomy of ambedic archetypes. By contrasting how these archetypes are adapted to their respective game genres, I glean insights into possible future design considerations for creating new ambedic components.

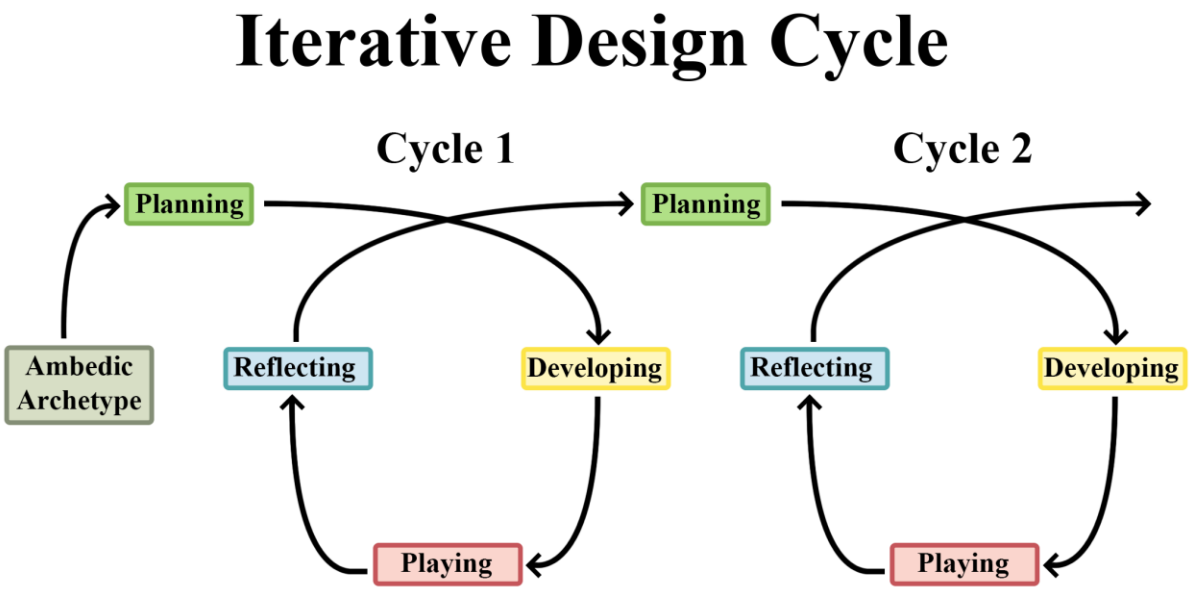

Fig. 2 Iterative design cycle

Within the generation of practice and implementation stage, an iterative design cycle is used to generate practice (Figure. 2). The iterative cycle I am using is made up of four stages that repeat, including: planning, developing, playing, and reflecting. During the planning stage, I choose an ambedic archetype (from the synthesised taxonomies created in the formal analysis) and a game to recreate that follows the practical considerations set out in the methodology. I then draft concepts for how the ambedic archetype may be implemented within the game. The developing stage comprises the creation of the game and the ambedic component. In the playing stage, I play the game and interact with the ambedic component. Finally, the reflecting stage encompasses critical reflection on the ambedic component and how it fits into the selected game. From there, the cycle beings again with planning how to improve the ambedic component of the game. This continues until the ambedic component is judged to be a sufficient example of the archetype it was designed from. This cycle is used for each game and ambedic component generated in this research.

In the analysis and reflection stage, I engage with autoethnography with a focus on my experience of creating the ambedic components in the practical aspect of this research. To assist in this, I employ the lenses from the MDA framework to analyse which mechanical, dynamic, or aesthetic factors affect my design process. Through this reflection, I create a series of design considerations that may be utilised by future game designers who intend to implement ambedic components into their games.

Discussion

Examples of Games with Ambedicity

Ambedicity has existed in video games since at least 1980 with the creation of the first credited Easter egg in the Atari game “Adventure”. The Easter egg present in *Adventure* is located in a hidden room and contains flashing text that credits Warren Robinett as one of the game’s developers. To get to this room, the player must go to a specific point within the game and locate a single invisible pixel. The player then brings this pixel to a specific room, at which point they may leave the boundaries of the game’s maze and enter the hidden room. As in this example, many Easter eggs are ambedic as they exist within the game space outside of the intended play. A player may observe and subjectively enjoy an ambedic Easter egg, but as previously mentioned, if an Easter egg affects other systems within the game, it is instead considered to be a synergistic component of the game. An example of a synergistic Easter egg is a series of skulls in “Halo 2” (Bungie, 2004). These skulls are objects hidden within *Halo 2* that modify gameplay, such as the ‘Assassins Skull’, which renders all enemies permanently invisible. While the skulls are still considered Easter eggs (as they are hidden and are not required to complete the game), they are not strictly ambedic because they influence other components in the game.

A similar situation arises when we look at how emotes may be ambedic. In the context of video games, emotes are a symbolic representation of an emotion. They can range from a simple question mark above a player’s head to a full animation of a character dancing. Analogous to the example of Easter eggs, emotes can be ambedic depending on whether or not they interact with other game systems. In “World of Warcraft” (Blizzard Entertainment, 2004), emotes take both written and animated forms. The in-game chat displays a message when an emote is used, and the player’s avatar plays an animation of the action described in the text. While the player’s avatar moves as part of this emote, the avatar’s position in the game-space remains constant. Although the character’s form changes aesthetically through this movement, there is no change from the perspective of game mechanics. Any effects or actions aimed at the player will interact in the same way as they would if the character were not emoting. From this, we can ascertain that the emote action in *World of Warcraft* is ambedic as there is no mechanical interaction with other game systems. However, this is different to the emotes present in the game “Dark Souls III” (FromSoftware, 2016), where the tight mapping of hitboxes (an invisible shape used to detect collisions) to the player character’s avatar results in all player animations affecting the chance that an attack will collide with the avatar. It is therefore possible for the player to use these emotes (referred to in-game as “gestures”) to avoid attacks from enemies by activating animations that move their avatar. An example of this is the “stretch out” gesture in which the avatar lies flat on the ground while enemies swing horizontally at the player character’s torso but miss due to swinging their weapons through the air above the character. Thus, the emotes in *Dark Souls III* are synergistic because they interact with the game’s combat mechanics.

By contrasting actions in the context of different games, I find that an action's ambedicity may change. Through a comparison of actions that are ambedic, the synthesis of a taxonomy of ambedic actions is possible. This research identifies five archetypal forms that ambedicity takes in video games and defines them below, with examples in Figure. 3.

Game	Ambedic Archetype	In-game example
Counter-Strike: Global Offensive	Cosmetic Addition	Customisable image spray painted onto surfaces
Overwatch	Cosmetic Addition	Image from in-game selection spray painted onto surfaces
Fortnite	Cosmetic Customisation	Player character & weapon model customisation
Grand Theft Auto V	Cosmetic Customisation	Player character model customisation, Outfit selection
League of Legends	Cosmetic Customisation	Player character model customisation
PUBG	Cosmetic Customisation	Player character model customisation, Outfit selection
Hearthstone	Emote (Symbol Form)	Cutstomizable in-game selection of visual responses
League of Legends	Emote (Symbol Form)	Cutstomizable in-game selection of visual responses
League of Legends	Emote (Movement Form)	All characters have dance, joke, taunt, laugh animations and voice lines
World of Warcraft	Emote (Movement Form)	Emotes vary in use of character animation, sound and text displayed
Duck Game	Sound (Controlled)	Player character makes a "Quack" sound
Halo Combat Evolved	Sound (Controlled)	Warthog vehicle's horn may be honked
MySims Racing	Sound (Controlled)	Player's vehicle's horn may be honked
Grand Theft Auto V	Sound (Customised)	Selection of several in-game radio stations interactable while in vehicle
Viscera Cleanup Detail	Sound (Customised)	Selection of several in-game radio stations interactable from Big Banger Radio
Warcraft 2	Easter Egg	Continously clicking a unit may result in secret voice lines
Adventure	Easter Egg	Flashing text crediting developer

Fig. 3 Ambedic Archetype Examples.

Ambedic Archetypes:

Cosmetic Addition: An action where the player may add an image, whether fully customisable or from a selection of in-game images, to an area of the game.

Cosmetic Customisations: A system that allows the player to customise the visual appearance of in-game components.

Emotes: An action that is a symbolic representation of an emotion. This may take the form of visual symbols (such as text or images) or be shown through the character' animation.

Sounds: An action or system in which the player may manipulate the audio of the game. It may take the form of an action where only by the player interacting will the sound be played, or through in-game systems that play a sound that may be customised by the player.

Easter Eggs: A hidden feature within a video game, often taking the form of an object, image, or sound.

Designing Ambedicity

When designing ambedic components in a game, it is imperative to be aware of how mechanical and aesthetic contexts affect the implementation of ambedicity. For instance, an ambedic action that makes a sound effect can only be ambedic if the game does not use sound as a gameplay mechanic elsewhere. In “Alien: Isolation” (Creative Assembly, 2014), sound is used to track the player’s location and guide the alien antagonist towards the player. For this type of game, allowing the player to honk a horn is subjectively a poor choice of ambedic action due to possible mechanical or aesthetic complications. In the case that the sound can be detected by the alien, the action is synergistic. But if the alien cannot detect the sound, the player may be left confused as to the inconsistency apparent when an in-game sound does or does not trigger the alien to find them. This example demonstrates how designers must take into consideration gameplay mechanics when designing ambedicity for a game.

For this research’s practical component, I create two clones of arcade era games: *“Space* Invaders*”* (Taito, 1978) and “Pac-Man” (Namco, 1980). These games are chosen by following the practical considerations as laid out in the methodology. For both games, I attempt to faithfully recreate the original game experience using the 3D game engine application Unity. In this step, the research is somewhat limited as acquiring the original software and hardware is beyond the scope of this project. My implementation of *Space Invaders* and *Pacman* are clones, or recreations of the originals, within a new platform. These clones are designed to create a play experience that is as close to the original game as possible. Once this fidelity is assured, I design ambedicity to fit the context of each game world.

Space Invaders

When designing ambedic actions for the *Space Invaders* clone, it is important to observe the core gameplay mechanics to understand how to create actions that do not interfere with gameplay while also fitting into the game world. In *Space Invaders*, the player’s controls are restricted to horizontal movement and firing a bullet upwards. The player wins by eliminating all alien invaders; the player loses if an invader makes it to the end of the level or is struck by an enemy bullet. Based on this, it is possible to build a list of guidelines the new ambedic action must adhere to:

- The action must not affect the player’s horizontal location.
- The action must not stop bullets from hitting the player or an invader.
- The action must not affect the position of an invader.

With these guidelines, we can begin to consider what type of ambedic actions would best fit the context of the game in question. The limited colour scheme of *Space Invaders* provides a canvas to work from if we are to add a cosmetic action. However, adding new sprites (two-dimensional images or animations that are integrated into a larger scene) may confuse the player: due to the limited amount of entities on screen, any addition could be mistaken as a new

enemy. Instead, it would be better to add a cosmetic attribute to a component already in the game. Such an attribute could be the sound associated with a component or the colour of the component's sprite. In this example, the ambedic action could involve changing the colour of a component as a player-controlled action. However, merely changing the colour of the player's character does not fit the game world of *Space Invaders*, so the action needs to be tailored to the player. In *Space Invaders*, the player takes the form of a green tank that fires bullets from the bottom of the screen. By joining these two ideas, when a player shoots an alien invader it changes colour. This should provide the player with an understanding of the cause and effect of the ambedic action: when a coloured bullet is shot, it changes the colour of what it hits.

Pac-Man

In *Pac-Man,* the player controls a single character represented by an 8-bit sprite. The player is chased by four enemy ghosts, each represented by their own 8-bit sprite of varying colours. The game takes place within a maze, and the player moves up, down, left, and right at intersections therein. Players win by collecting all the pellets scattered around the maze and lose by coming into contact with a ghost. Players may also earn points by consuming ghosts after collecting an energizer, a flashing larger pellet that grants this ability for a limited duration. The ghosts' appearances change when an energizer is eaten. Collisions are detected when Pac-Man and a ghost are both detected on the same maze tile. For this game, I created the following guidelines for ambedicity:

- The action must not change the location of the player.
- The action must not change the appearance of the ghosts.
- The action must not change the rotation of the player.

The same ambedic archetype used in *Space Invaders* cannot be used in *Pac-Man,* as changing the enemy's colour may disrupt the visual clue that the ghosts can be eaten. However, it is possible to change the sound a character makes. To fit the context of *Pac-Man,* I must use a sound that the character Pac-Man would make. Pac-Man already makes a "waka-waka" sound as he moves over the pellets. By analysing the sound, it is actually two tones alternating each time a pellet is consumed. By using only part of this sound, an ambedic action can be created. This action produces and loops a portion of the "wa" sound Pac-Man makes, creating a new "wa-a-a-a-a-a" sound. Pac-Man's animation is changed to that of an open mouth that does not close. Pac-Man is thus able to yell on command as the ambedic action. This falls under both the Sound (Controlled) archetype and the Emote (Movement Form) archetype.

From my experience designing these ambedic actions, I have come to understand some of the possible factors a game designer should account for when creating ambedic actions in a game. From a mechanical perspective, a game designer should keep in mind that the action chosen does not imitate any synergistic actions the player may already take, as doing so may create confusion for a player who expects similar actions to produce similar results. There is also the importance of keeping an action's design simple, as overcomplicating its use or effects may cause the action to become synergistic in nature. From an aesthetics perspective, the action must be easy to understand, as leaving the player to assume the intended effect may lead to

misunderstanding or misuse of the ambedic action. The action must also fit into the context of the game-world or else the player may experience a disruption in the immersion of the game. Finally, there must be opportunities given for the player to use the ambedic action. For example, a bullet hell game (a genre of games that features overwhelming numbers of enemy projectiles) is a poor choice to include an ambedic action as the player will be preoccupied attempting to overcome the challenges of the game that they have no time to interact with an action that does not give them a perceivable advantage.

Encountering Ambedicity

A player's interaction with ambedicity is reliant on observation of the ambedic component. Unlike synergistic components there are no mechanical consequences of using an ambedic action - therefore once it is no-longer observed it loses its meaning shortly after. This leads ambedicity towards certain forms of play such as performative play or co-operative play. Through personal experience I have found myself interacting with ambedic components in games more often when I am playing a cooperative or competitive game, sometimes as a form of non-verbal communication in the case of emotes, or purely as a spectacle as I combine multiple ambedic actions to create a performance. From an observational standpoint, I also find that players who record or stream their gameplay for others to view also engage with ambedic components more often than players who play alone. My belief is that by sharing in these moments created through ambedicity, players form meaning associated with the ambedic actions either with other players or their audience. From then on, whenever the players interact with the ambedic actions, they may revisit the meaning they created and may gain a sense of nostalgia, or that they are part of some in-crowd.

Ambedicity does not just affect the play experience of a player but also their immersion within the game. Much like the visual effects of simulated grass blowing in the breeze, ambedic actions can be employed in the attempt to evoke a sense of realism for a player. In the game-world, ambedic actions do not have a purpose as they solely exist for their own sake; I believe this mimics many aspects of reality as not all things which exist require a reason to do so. By including ambedic components, designers are able to harness that aspect of reality into their games and make the game-space feel closer to a living world. However, these views may vary widely based on one's own philosophical stance on the reason for existence.

Like game designers, players may also utilise ambedic components for their own reasons, namely taking control of their play experience. For synergistic components, the rate of interaction of a player is largely pre-designed, through level design or code. Game designers have a large range of control as to what a player can and cannot do within a game either by limiting the control schemes of a player character or by reinforcing certain types of gameplay. A designer may create tight walls around the player (as in *Pac-Man*) or the designer may prevent movement in a specific direction (as in "Super Mario Bros." [Nintendo EAD, 1985]). Game

designers may give the player character a sword that destroys enemies, thus teaching the player that whenever an enemy appears, they should use the sword. However, ambedic actions do not fit this model of prescribed play. There is no way to encourage a player to use an ambedic action; it is up to the player alone to decide whether they interact with an ambedic component. Ambedic components give players the freedom to decide on their own terms how and when they will interact with the ambedicity present. Ambedic actions allow players to control their own play experience within the game by being unbound to the other synergistic systems controlled by the game designer.

Overview of the Practice

Space Invaders

For the first arcade game clone, *Space Invaders* was chosen to serve as an example of a 'shooter game'. A *shooter game* is a genre of video games which focuses on the player engaging in combat with other players or enemies with a long-range weapon. Other examples of this genre that were considered include: "Galaxian" (Namco, 1979), "Asteroids" (Atari, Inc., 1979), and "Centipede" (Atari, Inc., 1980). *Space Invaders* was selected from this group for its simplicity as, unlike *Centipede* and *Galaxian*, the game limits the player's movement to just the horizontal axis. Each of the ambedic archetypes generated during the formal analysis of existing games, were considered. Emotes were the first archetype considered: the initial idea was that changing the player avatar's sprite would not affect the collision detection of the enemy projectiles. However, upon research into *Space Invaders*' original code, I found that collisions were detected on the level of a single-pixel and so changing the avatar's sprite affects the player's ability to be hit by projectiles, making an emote action synergistic. The Easter egg archetype also proved ill-suited to *Space Invaders* as the player's exploration of the game-space is limited to the lower half of the screen - thus hiding and finding a feature proved challenging. Many games that feature cosmetic customisations utilise a menu to control the selection of visuals for the player, but as *Space Invaders* does not have a formal menu, this archetype was decided against. However, cosmetic addition proved to work well with the limited aesthetics of *Space Invaders*. The limited number of sprites onscreen meant that any additions would be easily recognised by the player, but also any new sprite would require to be understood by the player. It was decided that instead of creating a new sprite, the action would change the colour of an existing sprite, therefore not affecting the pixel-based collision detection or requiring the player to recognise the shape of a new ambedic sprite. As *Space Invaders* does not rely on the perception of sounds, it was also possible to combine the archetype of sounds into the chosen ambedic action. This resulted in the final design of the ambedic action as an alternative projectile shot for the player that changes the colour of the alien invader it collides with. Developing this action assisted greatly in my understanding of how synergistic game systems, such as collision detection, shape the space that ambedicity may be present within games.

Pac-Man

For the second arcade game clone, *Pac-Man* was chosen as an example of the maze game genre. A maze game is a genre of video games where the entire game space is a maze, often focusing on speed to complete the maze or avoid enemies within it. “Dig Dug” (Namco, 1982) was also considered for this role, but as *Pac-Man* has a simpler control scheme, *Dig Dug* was ultimately not chosen. *Pac-Man* was also chosen in order to experiment with a different genre and player control scheme to that of *Space Invaders*. In the creation of the ambedic action for this game, differing guidelines were in place to that of *Space Invaders*, allowing for variation in the archetypes of ambedic actions to form. For *Pac-Man*, Easter eggs were decided against as Easter eggs often include a reference to subjects outside of the game-space and so depend on the player’s understanding of the specific subject reference to be fully enjoyed. This would reduce the number of possible players that interacted with the ambedicity as a player that does not understand the reference does not perceive it as ambedic but instead as an aspect of the level’s design. Cosmetic customisation was also decided against as, similarly to *Space Invaders*, the original *Pac-Man* does not include a formal menu screen for cosmetic selection. The archetype of cosmetic addition also proved unfit for use in *Pac-Man* as all game sprites serve a mechanical purpose and to introduce a sprite that is ambedic may create uncertainty for a player who assumes each sprite has a synergistic purpose. Unlike *Space Invaders*, collision detection in *Pac-Man* is controlled by tracking the location of entities within the game and not on the pixel’s the avatar takes up. It was, therefore, possible for an action to change the shape of the avatar as part of an animation without becoming synergistic. As such, the creation of an ambedic emote was possible in the game of *Pac-Man*. As the game systems within *Pac-Man* do not rely on sound, it was also possible to include the creation of an ambedic sound as part of the action. This resulted in the final design for the ambedic action in *Pac-Man* of an emote in which the player character holds its mouth open and yells. The development of this action served as important data for the understanding of how games of similar aesthetics can produce different opportunities for ambedicity due to the variation of mechanical systems.

The development and analysis of these ambedic actions were limited in this research, due to time frame and scope. In future attempts to generate ambedic actions, it would be beneficial to test a wider range of game genres and with more recent game samples. By restricting the scope of games cloned to only arcade-era games, the possibility for what forms of ambedicity can be generated has been limited. Due to the hardware restrictions of the early arcade games, designers were less likely to implement graphics that did not serve a mechanical purpose. Because of this, the generation of cosmetic additions was limited in the games created. I was unable to create additional sprites without the worry that a player would become confused as to the sprite's lack of interactivity. I believe that by widening the scope of games analysed and created, the possibility of a wider range of ambedic actions would be increased.

Conclusion

Analysing existing games has produced examples of ambedicity in video games as far back as 1980 with the creation of *Adventure* and the first credited Easter egg. However, documentation with a unified definition for these components has not yet been created. This research synthesises a taxonomy of ambedic archetypes from the examples found in existing media, and with this taxonomy creates two new samples of ambedic actions in game clones of *Space Invaders* and *Pac-Man*.

Through reflection on the creative process of generating and developing these actions, insight is gleaned into how the mechanics and aesthetics of a video game affect the opportunity for ambedicity to be implemented in a video game. During this process, several heuristics for the development of ambedic systems are created:

- Ambedic actions should imitate existing synergistic player actions.
- Ambedic actions should be kept simple.
- The result of an ambedic action should be easily discernable by the player.
- An ambedic action should fit the context of the game-world.
- Opportunities for the player to use the ambedic action must be present

This documentation of process and the taxonomy of ambedic archetypes is created with the intent that future game designers may use it to inform the generation of ambedicity in games.

This work also seeks to create new avenues of research into the phenomena of ambedicity in video games. There is an opportunity for debate and delineation of the term *ambedo* in the context of video games alongside a further synthesis of existing ambedicity in games to create new ambedic archetypes. It is the hope of the researcher that this initial exploration in ambedicity provokes further works into this topic by other researchers.

Limitations and Future Research

This research only represents a start into the study of ambedicity in video games. Because of the personal physical restrictions in place during the creation of this thesis, it was not possible to conduct interviews, surveys, or case studies into the interaction of other players and ambedicity in games. It would therefore be beneficial to examine a wider range of experience in both the data collection of existing ambedicity in games and in the interaction with the created ambedic actions. Future research may benefit from the observation of other players and ambedic actions.

Another topic briefly discussed in this thesis is how performative or observational play, informs the possibility of interaction with game objects. This research suggests that in competitive or cooperative games, a player is more likely to interact with an ambedic action due to these

relationships with other players. Similarly, it appears that players who stream or otherwise broadcast their gameplay are also more likely to utilise ambedic actions to interact with their viewers through this connection.

Another limitation to this research is the number of existing games analysed and ambedic actions produced. Due to the scope of this project, practical considerations were introduced that influenced the selection of games to be recreated as a platform for the generation of ambedic archetypes. In future research, removing such guidelines may result in a wider opportunity for the design and development of ambedic components. It is also possible that through further analysis of existing games, ambedic components may be uncovered that demonstrate characteristics outside of the outlined archetypes. This may require investigation in future research to generate new definitions for these archetypes.

Bibliography

Atari, Inc. (1980). *Adventure* [Atari 2600]. New York City, United States: Atari, Inc.

Caillois, R. (1971). *Man, Play and Games.* New York, United States: Free Press of Glencoe.

Candy, L. (2006). Practice Based Research: A Guide, *CCS Report: 2006-v1.0 November, 1*, University of Technology Sydney, 1-19.

Galloway, A.R. (2006). Gaming: Essays on Algorithmic Culture, Minneapolis, United States: University of Minnesota Press.

Huizinga, J. (1938). *Homo Ludens*. New York City, United States: Random House.

Hunicke, R., LeBlanc, M., & Zubek, R. (2004). MDA: A Formal Approach to Game Design and Game. *AAAI Workshop - Technical Report*.

Koenig, J. (2015). "The Dictionary of Obscure Sorrows". *Tumblr*. Retrieved September 30, 2020 from https://www.dictionaryofobscuresorrows.com/post/111275133215/ambedo-n-a-Kind-of-melancholic-trance-in-which

Lankoski, P., & Björk, S. (2015). *Game Research Methods*. Pittsburgh, PA, United States: ETC Press.

Méndez, M. (2013). Autoethnography as a research method: Advantages, limitations and criticisms. *Colombian Applied Linguistics Journal*, *15*(2), 279-287.

Miriam-Webster. (2020). *Definition of "Easter egg"*. Retrieved September 30, 2020, from https://www.merriam-webster.com/dictionary/Easter%20egg

Miriam-Webster. (2020). *Definition of 'synergistic'*. Retrieved September 30, 2020, from https://www.merriam-webster.com/dictionary/synergistic

Salen, K. & Zimmerman, E. (2004). Rules of Play: Game Design Fundamentals. Cambridge, Massachusetts, United States: MIT Press.

Stenros, J. (2015). *Playfulness, Play, And Games: A Constructionist Ludology Approach*. Tampere, Finland: Tampere University Press.

Games Cited

Artificial Mind & Movement. (2009). *MySims Racing* [Wii]. WorldWide: Electronic Arts.

Atari, Inc. (1979). *Asteroids* [Arcade]. United States: Atari, Inc.

Atari, Inc. (1980). *Centipede* [Arcade]. United States: Atari, Inc.

Blizzard Entertainment. (2004). *World of Warcraft* [PC]. United States: Blizzard Entertainment.

Blizzard Entertainment. (2014). *Hearthstone* [PC]. WorldWide: Blizzard Entertainment.

Blizzard Entertainment. (2016). *Overwatch* [PC]. WorldWide: Blizzard Entertainment.

Bungie. (2001). *Halo: Combat Evolved* [Xbox]. United States: Microsoft Game Studios.

Bungie. (2004). *Halo 2* [Xbox]. United States: Microsoft Game Studios.

Creative Assembly. (2014). *Alien: Isolation* [PC]. United States: Sega.

Epic Games. (2016). *Fortnite* [PC]. WorldWide: Epic Games.

FromSoftware. (2016). *Dark Souls III* [Xbox One]. Japan: Bandai Namco Entertainment.

Namco. (1979). *Galaxian*. [Arcade]. Japan. Namco.

Namco. (1980). *Pac-Man* [Arcade]. Japan: Namco.

Namco. (1982). *Dig Dug* [Arcade]. Japan. Namco.

Nintendo EAD. (1985). *Super Mario Bros.* [NES]. Japan: Nintendo.

Podbielski, L. (2014). *Duck Game* [Ouya]. WorldWide: Adult swim Games.

PUBG Corporation. (2017). *PlayerUnkown's Battlegrounds* [PC]. WorldWide: PUBG Corporation.

Riot Games. (2009). *League of Legends* [PC]. WorldWide: Riot Games.

Rockstar North. (2013). *Grand Theft Auto V* [PS3]. WorldWide: Rockstar Games.

RuneStorm. (2015). *Viscera Cleanup Detail* [PC]. WorldWide: RuneStorm.

Taito. (1978). *Space Invaders* [Arcade]. Japan: Taito.

Valve. (2012). *Counter-Strike: Global Offensive* [PC]. WorldWide: Valve.