# How the animation in Monster Hunter World guides player-game interaction

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***Abstract*—Video games are a popular form of entertainment, and their interactivity sets them apart from traditional media. However, video game interactivity still lacks foundational texts in academia. The study of animation, on the other hand, has solid literature in both the academia and the industry. This article uses the 12 principles of animation, activity theory, and other proposed frameworks to analyse the animation of Monster Hunter World and identify when the game's animation influences the player-game interaction. This influence was found in different aspects of interaction, but mainly related to the game's rhythm, its main combat loop, its appeal and its ability to efficiently convey information.**

***Index Terms*—video games, interaction, animation, HCI, activity theory**

## I. Introduction

Video games are a highly popular form of entertainment and their relevance in the public conscience has been growing ever since their inception. The video game industry has continually grown in terms of generated revenue, and is effectively a mainstream form of entertainment [1]. Some of that success may be attributed to video games' inherent aspect that differentiates it from conventional media such as traditional books and movies: video games are highly interactive [2].

Video games are, at their core, a particular form of computer software. They capture their user's input using specialized hardware, process it in a pre-programmed way, and provide audiovisual feedback through screens and speakers [2]. As such, they are inherently dependant on player-game interaction to keep their users engaged and to provide the experience their developers are set to achieve.

The interaction in video games, however, has some fundamental differences compared to regular industrial software, as both have very different goals and values [3]. While regular software is made to be as seamless as possible and to achieve an external task, video games are purposefully redundant and may have no external goal other than engage the player.

While the study of video game interaction has been a topic of research in the last decades [3], there's still no solid definition for interactivity or widely accepted terminology for its analysis in the literature [4]. As such, most of the latest studies either focus on a qualitative, non-specific analysis of interaction, or discuss interaction as a secondary element while exploring other aspects of video games [3]. The field of animation, on the other hand, has robust references in both the academic space and in the industry. One of the foundational texts for modern animation is The Illusion of Life [5], in which the twelve principles of animation are first proposed. While the text refers specifically to 2D animation for movies, its principles have been successfully adapted for both 3D animation and game animation [6] [7].

Specifically in games, animation can be an useful tool to convey information to the player, so they can access their current situation at a glance. That's particularly powerful in the action game genre, since the player controls an avatar in real time and split second decisions can significantly influence the outcome of a game session [8]. How an animation is executed and planned by the developers can provide representational guidance to the player [9], informing those decisions.

The purpose of this article is to analyze the interaction on a specific game, Monster Hunter World, and outline how the developers use animation techniques to guide the player-game interaction. To achieve that, the twelve principles of animation [5] will be used as a framework to analyze the game's animation, and Human-Computer Interaction (HCI) [3], activity theory [3] [9] [10], Pippin Barr's proposed video game values [3] [11] [12], and Pinelle's game heuristics [13] will be used as a reference when discussing how the player interacts with the game. This analysis framework could then be used to either better understand how the animation and interaction of other games intertwine, or be used as a reference for future designers that wish to use animation in a similar fashion for future games.

## II. The 12 Principles of Animation

First proposed on [5], the twelve principles of animation are guidelines for making expressive animation for movies. The book refers to animation as an art form and technique for movies, often citing specific techniques and limitations present at the time. As the art form grew and conquered new mediums, the principles remained as a reference, and were adapted accordingly for video game animation [6] [7]. While there are other frameworks to produce and analyze animation [7], this article will use the twelve principles as a reference due to their ubiquity both in academia and in the industry.

Following is a brief description of each principle and how they're often used in video games [5] [6] [8] [7]: squash and stretch, anticipation, staging, straight ahead action and pose to pose, follow through and overlapping action, slow in and

slow out, arcs, secondary action, timing, exaggeration, solid drawing, and appeal.

*Squash and stretch* means compressing and decompressing the character and deforming their model, to reinforce the impact of an animation. In 3D games with more realistic aesthetics the model itself won't often be distorted, but its pose and silhouette will attempt to emulate this effect.

*Anticipation* is a part of the animation before the main action that implies the character's next action. How long the anticipation is also influences the animation's impact. In video games, generally, the enemies will have long anticipations for their actions, while the player's characters tend to have either faster anticipation, or none at all.

*Staging* is a broad principle, as it stands onto how the animation is presented. The main goal should be to present the animation in the clearest way possible, while also communicating the intended emotional outcome of the scene. As video games are interactive, and their camera is often in control of the player, camera cuts are kept to a minimum. As such, more attention is spent on the character's silhouette, clear motions, and shot composition, usually relying on an automated system to help the player point the camera to wherever is needed.

*Straight ahead action and pose to pose* are two possible approaches for structuring a character animation. Straight ahead is to work on a animation linearly, in the same order as the animation will play out. Pose to pose is to work on individual key frames, planning the animation ahead of time, then going back and filling the missing frames. For 3D animation pose to pose is the preferred method, leaving the straight ahead method only to secondary elements, often simulated, like cloth or hair.

Similar to anticipation, *follow through and overlapping action* are usually a part of the animation that happens after the main action, in which the character's movements either stop or reach their destination. If the character model has looser parts like hair or clothing, their stop is delayed from the main action. In video games this part of the animation can often be cut or shortened to blend with the next animation about to be played.

*Slow in and slow out* means that the character's actions velocity shouldn't be linear, instead it should accelerate or decelerate at certain points. This can be thought on the scope of an entire animation, in which it will be tied to anticipation and follow through, or on a more granular fashion, applying to every movement of the character. This is usually exaggerated in video games, as it helps with the animation's readability and can be used to modulate the animation's impact.

The *arcs* principle proposes that a character's movement should follow an arc-like path. This helps the animation to look more natural and readable. In video games, this can happen either within the animation itself, or emerge from the interaction between the player and the game world (i.e., the player's path while jumping forms an arc motion due to the combination of its velocity and the world's simulated gravity).

*Secondary action* is a second animation that plays during a main animation, often present in smaller details of the character. Used to add complexity to an animation and make it more life-like and interesting. In 3D video games, they can be animated separately and then blended with the main animation.

*Timing* is another broad and abstract principle, and it's related to how long and how often animations last and play out. It helps to communicate the character's action's weight, as longer animations feel heavier, and shorter animations will fell lighter. In video games, the timing of each character's actions can provide a certain rhythm to the experience.

The subtle movements of real-life don't read clearly on the medium of animation, so the principle of *exaggeration* proposes that a character's actions and poses should be exaggerated to clearly convey what they mean. This principle is mostly unchanged when applied to video games.

The principle of *solid drawing* proposes that characters should be represented as if they have volume, and occupy space in the world. This is usually more relevant in 2D animation, as in 3D animation the characters models already have volume on a 3D world, and no effort is needed to convey this volume. Instead, animators should pose their character in a more dynamic fashion, and avoid static or overly symmetric poses. This principle does not apply to interface elements, such as text, icons and menus.

Characters, models, and the animation itself should be distinct, interesting, and well executed. This is described as *appeal*. This principle is more abstract, but in essence, characters overall should have their own charm.

## III. Interactivity in video games

While the research of HCI has been around since the 1980s [14], video games as an object of this research still faced scrutiny until the early 2010s [15]. Recently, however, video-game interactivity has been studied from a variety of different angles, such as studies on virtual reality [16], its impact on learning [17] or its relationship with narrative design [18]. However, an unified framework for interaction analysis and classification has yet to be adopted. Other disciplines have also had video games as focus of discussion, but rarely they delve into the specifics of player-game interaction [3]. As such, the terminology for the analysis of video game interaction is still lacking.

Research for this article favored studies that propose a clear terminology or framework for the analysis of player-game interaction, as the main goal of this article is to correlate animation techniques with their impact on player-game interaction. While some of those frameworks originated from other disciplines, such as *activity theory* [10], their concepts will be used as they pertain specifically to video games.

The main concepts referenced for the analysis of player-game interaction, for the purposes of this article, will then be: *activity theory* [10] [9] [3], *Barr's video game values* [3] and *Pinelle's game design heuristics* [13].

### A. Activity theory

First proposed on psychology studies in the late 1970s [19], activity theory has been since adapted and is a popular

framework of analysis for user conduct in HCI [10]. Therefore, the following concepts will be used in the context of HCI.

*Activity* is defined, fundamentally, as a purposeful interaction between a *subject* and an *object*, in which either or both are transformed in some fashion. This interaction is always mediated by a *tool*, contributes to a specific *outcome*, and is informed by a *motive*. Fig. 1 shows a basic diagram for a generic activity and how those relationships are usually represented graphically.

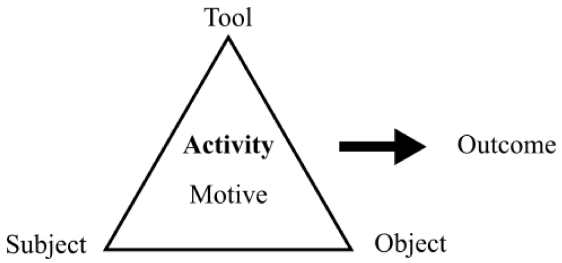


Fig. 1. Activity model for a generic activity

- *Subject* is the entity that is executing the action and making decisions. In video games, the subject is often either the player itself or a player-controlled object.
- *Object* is an entity that is getting acted upon. This varies depending on the scope of the activity, but it can range from a specific object in the game world to the entire game itself.
- *Tool* is the entity or concept that mediates the subject-object interaction. This can also vary in scope ranging from a very literal interpretation of tool, in which case it will be the physical controllers used by the player, to a more abstract interpretation, in which it can be a specific game object or mechanic.
- *Outcome* is the definitive result of the interaction. It's the impact on either the game world or physical world that the interaction provides. Since games introduce uncertainty as a concept, an *outcome* and an *expected outcome* can be two very different things.
- *Motive* is the reason the subject has decided to execute the activity. It informs all the relationships in an it, as an activity can't exist without a motive. It's often derived from a need the subject has, but depending of the scope of the activity it may also have a relationship with the incentives the video game provides for the player.

This *activity model* is an horizontal interpretation of activity, breaking down the interaction to better understand it. A vertical interpretation of activity also exists, and has to do with its scope. It's defined as *activity hierarchy*, and divides activity in three orders of scope: the activity itself, *actions*, and *operations*. Fig. 2 shows a representation of a generic activity hierarchy.

- *Activity* is the broad interaction, informed by a *motive*. It follows the *activity model* described before.
- *Action* is the individual conscious actions the subject takes during an activity. An activity is constituted by a collection or chain of actions. Each action is informed by a *goal*, a short-term objective that contributes to the execution of the broader activity.
- *Operation* is the unconscious response that emerges from a *condition*. This is often an involuntary reaction to a stimuli or situation. A sequence of operations can be the foundation for an action.

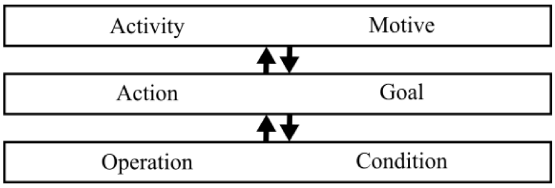


Fig. 2. Activity hierarchy for a generic activity

Those two frameworks form a solid foundation for player-game interaction analysis. Using the two models both the broader and the granular form of interaction can be divided and classified, and the relationship between their elements and the game's animation can be made explicitly clear.

### B. Video game Values

In the context of *value theory*, *value* is defined as "an enduring belief that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence" [20]. While typically associated with ethics and morals, value theory as it pertains to video game values is used in a more abstract manner. Following Barr's interpretation, and for the purposes of this research, values are "beliefs about 'what to do' in a context, based on a comparison of the known options" [3]. Therefore, a video game value can be defined as a belief that influences the decisions a player makes during play. A collection of those values forms a *value system*, which in turn informs which actions should be prioritized over others [3].

While the personal values of the player can often influence their decisions during play, video games values are unique in that they are intrinsic to the play experience. Each game suggests their own values, either by the game's narrative or by their affordances [9]. Based on game studies literature and some qualitative research, Barr [3] [11] [12] suggests two omnipresent values in commercial, mainstream games: the value of *play* and the value of *progress*.

The value of *play* informs activities that involve self-directed play and experimentation. While exercising this value, players are often testing the boundaries of the game world, experimenting with its mechanics, or simply doing an activity they find interesting. This value ties directly with the concept of *exploration* [21] and *paidia* [22].

The value of *progress*, on the other hand, informs activities that involve achieving goals proposed by the game. During those activities, the player's motives are aligned with the game's direction and intended way of play. This value ties directly with the concept of *achievement* [21] and *ludus* [22].

Other values may be proposed depending on the game being analysed. For example, the value of *self-expression* may be proposed for the discussion of a more social game, or the value of *order* for a logistic game.

The concept of values will be useful for the analysis of the motive behind player-game interaction, and describe how the game's mechanics encourages a specific type of play.

### C. Game Design Heuristics

The concept *usability* can be a valuable resource in video game design. While this term is originally used for the analysis of the interface of regular software [23], the unique quality of video games allows usability to be influenced by its gameplay [13]. Therefore, for the purposes of this paper, *usability* will be defined as "the degree to which a player is able to learn, control, and understand a game" [13].

One useful way to evaluate usability in video games is through an heuristic evaluation. This method implies the evaluation of a software though an inspection following a number of broad principles, designated as 'heuristics' [23]. A number of heuristics for this evaluation of game design have been proposed [24] [25], but those heuristics don't consider usability in detail. Therefore, Pinelle's paper [13] will be used as a main reference, since many of their heuristics are relevant to the discussion of player-game interaction. The following heuristics were proposed by Pinelle:

- provide consistent responses to the user's actions;
- allow users to customize video and audio settings, difficulty and game speed;
- provide predictable and reasonable behavior for computer controlled units;
- provide unobstructed views that are appropriate for the user's current actions;
- allow users to skip non-playable and frequently repeated content;
- provide intuitive and customizable input mappings;
- provide controls that are easy to manage, and that have an appropriate level of sensitivity and responsiveness;
- provide users with information on game status;
- provide instructions, training, and help;
- provide visual representations that are easy to interpret and that minimize the need for micromanagement.

This heuristic principles will be used to inspect the design of the game in terms of usability.

## IV. Monster Hunter World

Monster Hunter World is an action RPG game released in january 2018 for the PlayStation 4 and Xbox One video game consoles. Published by Capcom, the game was exceptionally well received, becoming the best selling game of all time for the publisher in march 2018 [26], and totalling over 17 million copies sold in mid 2021 [27]. As a point of reference, one million sales is enough to classify a game of its scope a successful game.

In Monster Hunter World, the player takes control of a hunter, and is tasked to complete a number of different quests, that mostly involve doing battle with giant AI controlled monsters, either alone or with up to 3 other players. Those quests, once completed, provide materials that the player can use to craft and upgrade weapons and armor, and then challenge harder quests with different and stronger monsters.

The game's story is presented either in between or right before quests, and generally directs the player to find and battle a new monster.

The main feature of the game is its distinguished combat that heavily contrasts with the usual fast-paced combat popular in action RPGs. Combat in Monster Hunter World is generally slow, calculated, and every action taken has tangible consequences. Monsters are always controlled by their own AI, that the developers try to make as life-like as possible while still having recognizable patterns, so reading a monster behaviour and predicting its next move is key to success. Monster Hunter World also doesn't show a health bar for its enemies, so the player has to pay attention to subtle cues (such as limping, broken horns or body parts) to judge how close an enemy is to defeat.

While combat is the main activity of the game, other activities complement the game's structure. Quests happen in one of five main large areas, but while not in a quest, the player navigates the town of Astera, a place where there are multiple facilities that the player can interact with. There, the player can craft weapons and armor to make their hunter stronger, buy item supplies, such as potions, order food that will make the hunter stronger for the next quest, cultivate herbs and mushrooms that can be turned into items later, and take on smaller objectives that will grant a reward after the quest.

### A. Gameplay Loops

The gameplay of Monster Hunter World can be divided into two main loops: the core gameplay loop, consisting of the game's combat, and a broader gameplay loop, encompassing all the other activities on a broader scale.

The core loop [28], represented within the flowchart in Fig. 3, is the relationship of the main actions and operations the player takes during combat. In this activity, the player needs to predict the monster's next move, and tries to dodge or avoid it. If successful, this will create an opening that the player can then use to attack safely, use an item, or reposition. If the player gets hit, the character will not only take damage, but will also begin a long recovery animation, wasting a possible opening and opportunity to attack.

The broader gameplay loop refers to all the other actions the player can take that are not related to combat. Some of those actions could be broken down into another specific loops, but since those actions aren't the main focus of the game, those loops will not be used for this analysis.

A brief description of a possible gameplay loop in Monster Hunter World is as follows: the player starts the game, loads its save file, and their character is put on Astera. The player interacts with a non-playable character (NPC) to cultivate herbs and mushrooms, then the player interacts with another NPC to buy supplies. After that, the player picks a quest by

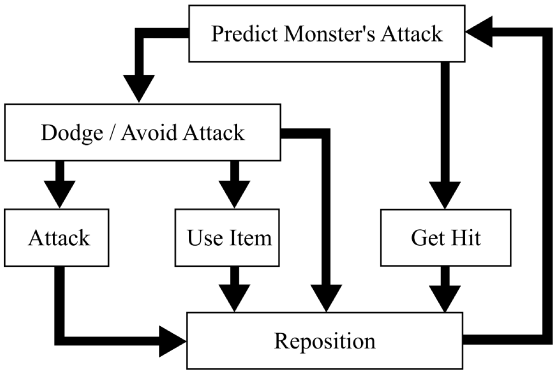


Fig. 3. Combat gameplay loop in Monster Hunter World

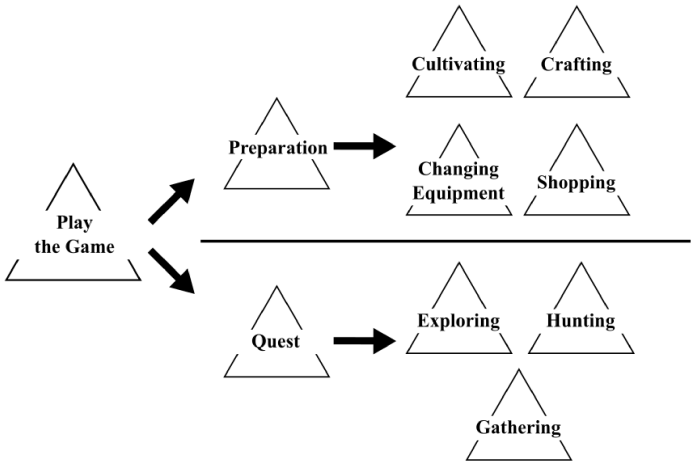


Fig. 4. Simplified representation of the main activities in Monster Hunter World

interacting with a questboard, and while the game is loading the quest area, the player goes up some stairs and interacts with another NPC to order food that will boost the character's performance for the next quest. When the quest has finished loading, the player is transported to a forest area, starting on a camp. The player leaves the camp and travels though some areas of the forest until they find some monster tracks. After a number of those tracks are found, the player discovers the monster location, and moves to another area in order to find it. The battle starts, following the core loop described earlier. After the monster is defeated, the player collects materials from the fallen monster and the quest ends. The player receives additional rewards from the quest completion, and is transported back to Astera. The player then heads to the armory, where they can use the materials earned to create a new weapon. After forging the weapon, the player equips it, increasing the character's strength. From here on the loop restarts. With the new equipment, the player is able to complete harder quests, therefore acquiring more materials, being able to craft even stronger equipment.

### B. Activities and Values

For Monster Hunter World, the video gaming activity can be divided into two less broad, game-specific, activities: *Preparation* activity and *Questing* activity. Both are illustrated in Fig. 4.

*Preparation* refers to the activities that happen in between quests, when the player character is in the hub town, and interacts with its facilities. Most of its sub-activities occur using the user interface as their mediating tool. Therefore, the interaction of activities such as *crafting* and *changing equipment* happens through the use of lists, buttons and menus. For those activities, interaction happens similar to regular software, and principles of conventional interface study and design can be applied.

*Questing*, on the other hand, does not rely on interface elements as its sole mediating tool. It refers to the parts of the game that happen on the field, where players can interact with the environment and enemy monsters. In these activities, the mediating tool is often a specific game mechanic. This activity can be subdivided into three sub-activities: *exploring*, *gathering*, and *hunting*, the latter being the most important. This is where most of the relationship between animation and interaction can be observed. Those three activities can then be broken down into an *activity model* (Fig. 5) and an *activity hierarchy* (Fig. 6) to describe more granular actions.

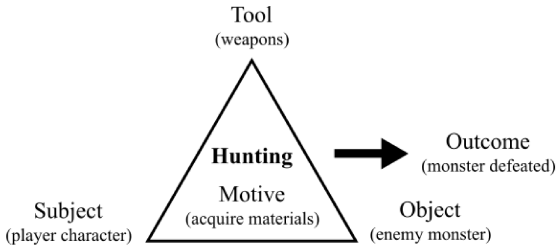


Fig. 5. Activity model for the Hunting Activity

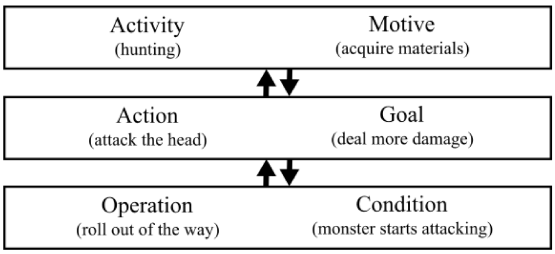


Fig. 6. Activity hierarchy for the Hunting Activity

Those activities' motives, in turn, are dictated by Monster Hunter World's *video game values*. As mentioned before, the values of *play* and *progress* are the most prominent values in video games, and Monster Hunter World is no different. However, the value of *self-expression* may be proposed for this analysis. The game offers 14 different types of weapon to the player, each of them unique in both presentation and mechanics, and over 100 passive skills that can be gained by equipping specific armor. The game is balanced in such a way that all weapons are viable for most challenges, so

the player has to choose what style of play they identify more strongly. Weapons and armor also have mostly unique designs, so this choice can also be made from purely aesthetic reasons. This means that, while the value of *progress* may influence a player to choose a mathematically better piece of equipment, the value of *self-expression* may lead the player to choose differently.

## V. Analysis

Monster Hunter World is classified as an action-RPG, and as such interaction happens in real time. Player input is time sensitive, especially during the Quest activity. Therefore, interaction in the game is inherently tied with animation: it is though character animation that the actions of the player translate into the game world, enabling the real-time combat that is core to Monster Hunter World's gameplay.

While inherent to player-game interaction, not all animation relates to it in the same way. Animation can be simply informational, communicating a game state or other information that the developers wish to communicate. However, some animation can directly influence either the player-game interaction or the player's motives behind such interaction. Those are the cases this paper seeks to analyse, dissecting the interaction using the previously discussed methods, and using the 12 principles of animation as a framework.

For this analysis some principles will be grouped together due to their relationship in the game's animation. One or more animations will be subject of analysis in each subsection, and the relevant principles will be identified. Then, the current player-game interaction will be analysed in the context of activity theory, video game values and game heuristics, noting how the discussed principle relates to the interaction.

### A. Timing, Anticipation and Follow-through

The principles of timing, anticipation and follow-though are essential to Monster Hunter World's combat, and therefore, its main gameplay loop. Timing is overall slow, individual actions may take over a second from start to finish. For example, the player attack in Fig. 8 takes 1s from the player input to the end of the animation, followed by a 2s recovery animation. Likewise, a monster's attack may take even longer between start and finish: Rathian's fireball attack, shown in Fig. 7, has a duration of 2s and is followed by another 1,9s of follow-though.

Most of the game's animations are divided into three parts: anticipation, action, and follow-though. This applies not only to the character's and monsters attacks, but also to dodging, using an item, drawing or sheathing a weapon, and most other actions.

The anticipation is the first part of the animation, and the character is posed in such a way to imply the action. For Rathian's fireball (Fig. 7), the monster raises its head in an arc-like path, contracts its wings, lowers its tail, all the while particles of fire start spewing from its mouth. This anticipation lasts 1.1s, and clearly communicates the next action, its direction, and its consequences: the monster will launch a fireball

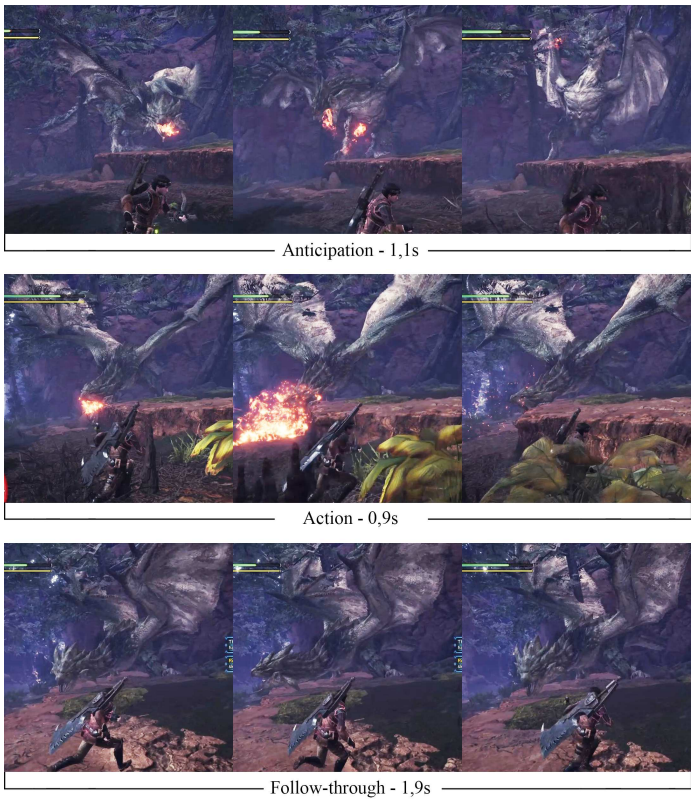


Fig. 7. Anticipation and follow-though for the fireball attack of Rathian

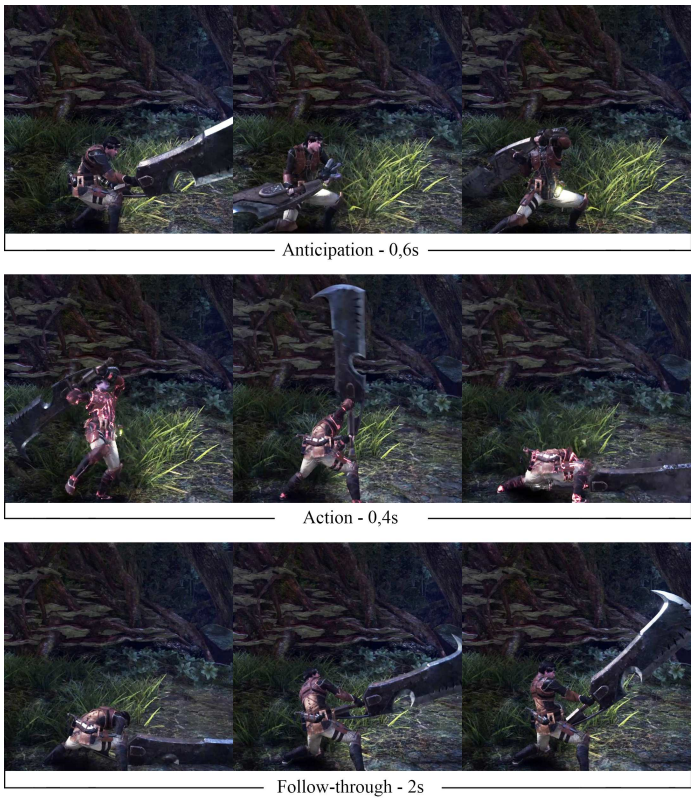


Fig. 8. Anticipation and follow-though for the forward attack using a greatsword

forwards, and if the player doesn't get out of the way they will take damage. The player attacks' anticipation, however, is a bit shorter, but still long compared to most action games. As seen in Fig. 8, when the player starts the greatsword's overhead slash attack, the character lowers its sword, crouches, brings the sword behind him, and raises the handle while the sword's tip is still near the ground. This anticipation takes 0.6s, and much like the monster's anticipation, perfectly implies the next action, its direction, and its probable impact: the character will bring its sword down in a forward slash that will pierce the ground.

The action part of the animation is when the attacks happens properly, and is when damage can be done by hitting another object. This part tends to be shorter than the anticipation, but still longer compared to most action games. The characters are posed in a very contrasting way compared to their final anticipation pose. After its anticipation, Rathian stretches its neck, lowers it close to the ground, raises and spreads its wings, and opens its mouth to shoot a fireball projectile. This lasts 0.9s, almost as much as the 1.1s anticipation. As for the player's attack action, the character raises its sword in the air, and then brings it to the ground, while stepping forward and lowering his body. This action lasts 0,4s.

The follow-though is the last part of the animation, and is often referred to as *recovery*. In Monster Hunter World, both player's and monster's actions have a very long follow-though animation. For its fireball recovery, Rathian contracts its neck, shakes its head, folds its wings and repositions its feet, reverting back to its default idle animation. This animation lasts 2s, and its goal is to return the monster to its idle state as naturally as possible. Similarly, the player's recovery also lasts for 2s, in which the character tries to bring up the sword that is stuck to the ground, raises its body and then the sword, adjusting it in the last frames to return to the idle animation.

To measure the impact of those principles in the player-game interaction, a particular excerpt of gameplay will be analysed (Fig. 9). This gameplay relates to the Hunting activity described earlier, and is part of the combat gameplay loop. In it, the monster starts its fireball attack anticipation. Noticing that, the player repositions themselves so as not to be in the way of the incoming attack. The monster's attack happens, and as the main action is finishing, the player closes in and begins their attack animation. As Rathian's follow-thought is finishing, the player's attack hits the monster and deals damage.

This interaction happens during the Hunting activity, in which the player character is the subject, the monster is the object, and the weapon and its mechanics are the mediating tool. The intended outcome of this activity is to defeat the monster. The actions executed in this activity's hierarchy are: predict, reposition, move, and attack. The video game values relevant in this gameplay are the value of play and the value of progress. This stretch of gameplay also exemplifies some of the video game heuristics described before, mainly: consistent response to actions, predictable and reasonable behaviour,

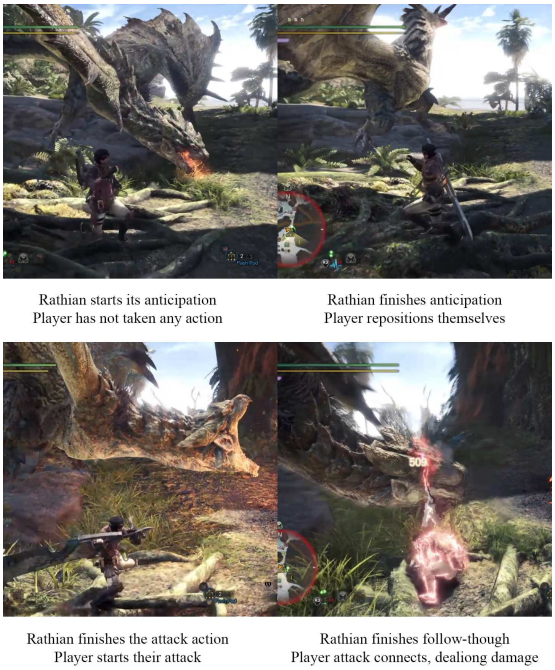


Fig. 9. Player character avoids Rathian's fireball attack, then attacks during the follow-though

information on game status, and visual information easy to interpret.

Timing, anticipation and follow-through's influence happens mainly on the subject-object and subject-tool relationships in the hunting activity. In the former, the animation that an enemy is playing informs the player of the current game state. Since timing is slow in Monster Hunter World, the player has time to process this information and plan ahead its actions before performing them, instead of just instinctively reacting to the enemy. Anticipation is key to facilitate this interaction, as enemies have clear and recognizable poses. Follow-though is also important to create the windows of time the player is encouraged to attack, tying back to the value of progress. All of that helps to maintain the heuristics of predictable behaviour, information on game status, and easy to interpret visual information.

However, those principles influence the player-tool relationship in a different way. While the heuristic of consistent response is still respected, the timing and anticipation make the interaction less immediate. Furthermore, the follow-though adds risk to the player's attacks, as they can easily get hit during their recovery animation.

### *B. Staging*

In Monster Hunter World, the player mostly has full control of the camera, and consequently, the framing of the action. Therefore, simply controlling the camera is a form of player-game interaction. The player can rotate the camera with a joystick, and focus the camera on an enemy by pressing a specific combination of buttons. In both situations the camera favors a central framing. The main goal for the game's staging

at this point is to keep the action in view for as long as possible.

However, there are some moments that the player has limited control of the camera. One example of this is during the mounting action (Fig. 10), when the player loses the control of the camera completely. During this part of the gameplay, the player needs to attack the monster while mounted, reposition itself to grapple another body part, or brace itself to avoid falling off. There are interface cues that inform what action will have to be performed next, but the current staging of the camera also relays this information: the camera zooms into the player to show that the mounting action is starting, then zooms back out to show that the player can now move or attack. If the monster tries to shake the character off, the camera will come closer to the player. If the monster tries to smash the player into an wall or other object, the camera will switch framing to have this object visible. When the monster has taken enough damage, it will stop and the player will have an opportunity to do a special attack. At this moment, the camera zooms back out as an anticipation, then zooms close to the player to signal that the attack can be executed. After that, the mounting action is finished, and the camera returns to its default position.

Fig. 10. Staging of the mounting action

For this part of gameplay, mounting is a sub-activity of the main hunting activity. Its subject is the player, its object is the monster, and its tool is the mounting mechanics. The game's staging influences the subject-tool relationship, as it communicates the moments the player needs to execute a specific action. It relates to the value of progress, as the interaction follows a very strict set of possibilities and outcomes. It also follows the unobstructed views, intuitive inputs and information on game status heuristics.

### C. Arcs and Slow-in Slow-out

The principles of arcs, slow-in and slow-out are present in most of the animations in Monster Hunter World, but it often does not relate to the player-game interaction. The clearest cases in which this relationship does exist are in the attack animations, both for the player and for the enemies. Fig. 11 shows the trajectory of the attack for the charged overhead slash for the greatsword weapon.

The character, already in position for the attack, raises its sword, slowly at first. Once the center of gravity shifts forward, the weapon picks up speed and moves quickly, while the character brings his body closer to the ground. Once the weapon makes contact with the ground, it decelerates quickly, moving very slowly in the couple last frames. This movement follows a clear arc, emphasised by the particle effect triggered by the charged attack. In the last frame the arc itself can be viewed though the lingering smoke of the particle effect. While the animation itself is fairly exaggerated, those principles help it to look natural and fluid.

Fig. 11. Sequence of frames for the charged overhead slash

Both arcs and slow-in slow-out help with predictability. A natural movement is easier to follow, and the arc-like path is simple enough to be accounted on-the fly. In the Hunting activity, arcs and slow-in slow-out influences both the subject-object, subject-tool, and tool-object relationships. It helps to inform both the attack and dodge actions the player can take during the activity. The two principles relate more closely to the progress value, as it is more informational and does not create the possibility of experimentation. They also most closely follow the heuristics of predictable behaviour and easy to interpret visual representation.

### D. Secondary Animation

Monster Hunter World uses secondary animations in a number of different ways. This can be simulated cloth physics, visual effects, or any other smaller behaviour. However, not all secondary animation influences the player-game interaction. Cloth physics, pendants, or the player's facial expression won't change the way the player interacts with the game.

The type of secondary animation that does influence the player-game interaction are the status effects animations. In Monster Hunter World, the player can be afflicted with conditions like poison, burn, paralysis and others. Monsters also are susceptible to some of those effects, and also have a unique status, called enraged.

Those secondary animations play over either the player or monster, and are usually some sort of particle effect that attaches to a part of the character's body, as shown in Fig. 12.

Fig. 12. A poisoned player and an enraged Rathian. Both effects are a secondary particle effect.

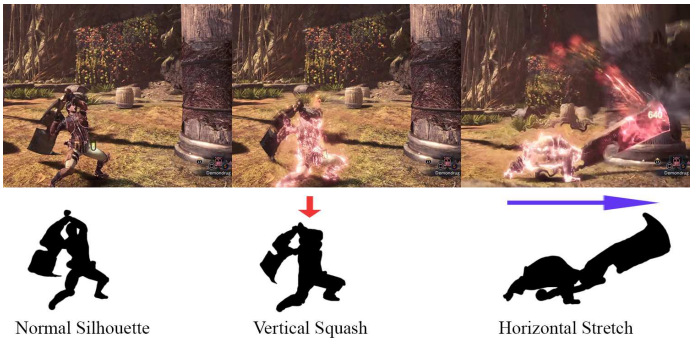


Fig. 13. Squash and stretch on the greatsword's charged overhead attack

The enraged status for the monsters adds a bit more complexity to the player-game interaction. The monster's AI is programmed in such a way that the monster will change the moves it can do while it is enraged. This means that the information about this status influences how the player may predict the monster's next movements.

Much like the previous section, this principle relates closely to awareness and predictability. As such, it relates to the subject-object relationship in the Hunting activity. It also relates the value of progress, and follows the heuristics of information on game status and easy to interpret visual representation.

### *E. Squash and Stretch and Exaggeration*

As most realistic-inclined video games, Monster Hunter World does not use proper squash and stretch. Instead of deforming the character's models, it compresses and stretches its silhouettes to achieve the same effect the regular principle would achieve. However, to do this, the game also relies on the principle of exaggeration. Character's poses are extreme, movements are broad and clear, and the impact of the attacks is magnified.

Fig. 13 shows the silhouette compression and extreme poses of the changed attack for the greatsword. In this case, the player is charging an attack, holding a button. If the player releases the button at a certain time, the attack will start sooner and deal more damage. This moment is exactly when the silhouette is its most compressed.

Squash and stretch and exaggeration, thus, serve the purpose of communicating timing and weight to the player. While they do not fundamentally change the player-game interaction, they nonetheless inform all three relationships in the hunting activity: subject-object, subject-tool and tool-object. They slightly relate to both the value of progress and of play: they serve as a hint for the player's input, but also may help to communicate an action's *appeal*, as will be discussed next. The use of those principles and their relationship with the player-game interaction follows the heuristics of information on game status and easy to interpret visual representation.

### *F. Appeal*

Appeal is one of the broader principles of animation, and in 3D animation it refers to both the 3D models and their movement. Monster Hunter World delivers appeal in both fronts, and it often influences player choice. The game has a sizeable collection of well crafted models for both weapons and armor, and while they each provide a specific bonus for the player character, often players will choose equipment based on how it looks. Players may choose a specific type of weapon not just because of its gameplay advantages, but also because they identify with its specific play style. The same happens when the player can choose what monster to hunt next: while they can choose the easier monster to beat and get its rewards, often players choose a specific monster to fight because they find it appealing in some way.

Those choices usually happen during the Preparation activity, when the player has unlimited time to deliberate their choices. This interaction relates heavily with the value of play, and that in turn informs the motive behind the respective activity. Other value that may inform those choices is the value of self-expression: the player character is a representation of the player, and as such they may prefer to look and feel a certain way according to their tastes.

### *G. Straight ahead and pose to pose and Solid Drawing*

Both the principles of straight ahead and pose to pose and solid drawing have no relationship with the player-game interaction, as they are more related to the process of producing animation than to the animation's use in a video game. As such, there's no observation to be noted from those principles in this analysis. Other games may use one or both of them in such a way that it is meaningful to the player-game interaction, but in Monster Hunter World they are not that relevant.

## VI. Conclusion

The understanding of video game interactivity and how a game's animations influence the player-game interaction is essential to develop a well crafted action game. This article used the principles of animation as a reference to better describe this influence, and through the chosen frameworks for interaction analysis, found that the developers of Monster Hunter World carefully used these principles to control the

rhythm of the game's combat, to craft its main loop, to bolster the game's appeal and to communicate information efficiently.

The principles of timing, anticipation, and follow-though proved to be the most involved with interaction, as they were used to craft the flow of the game's combat and provide its predictability, reliability and fairness. The slow timing is crucial to provide the player with enough time to take meaningful decisions mid-combat. The clear anticipation is the main provider of predictability, and enables the player to access the current situation and take action accordingly. The long follow-though provides safe moments the player can use to act and experiment with their weapons' moveset.

Other principles were less involved, and vary in importance. Controllable staging, clear arcs, slow-in and slow-out help with predictability. Distinct secondary actions help to inform the current game state. The game's use of squash and stretch, exaggeration and appeal help to provide player satisfaction and enjoyment, relating to the values of play and self-expression. Straight ahead and pose to pose and solid drawing were not that relevant.

The use of the 12 animation principles proved useful to this research, as it helped to anchor the analysis into to well known theoretical reference, but it was also somewhat limiting. Since not all principles were well represented in every animation, the analysis of player-game interaction was not as focused as it could be. A future research could analyze the animation in a broader sense, while maintaining the current framework for interaction analysis, allowing the inspection of full sequential moments of gameplay. A qualitative research with multiple subjects playing the game would be ideal, as it would provide more concrete data about the decision-making aspect of player-game interaction.

The analysis of other games would also prove valuable, as the contrast between the use of animation in different games may provide new insight on how it relates to player-game interaction.

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