ADDING PERSONALITY TO FANTASY CREATURES
Using animal motion references

Bachelor Degree Project in Media Arts, Aesthetics and Narration

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Abstract

Fantasy creatures are an essential part of many games, but while there are several studies focusing on body language and how expressive gaming companions may enhance the player’s experience, creatures and animals are rarely the focal points. Personality is closely related to believability, which is what most game developers work towards hence believability may improve the gaming experience. The purpose of this paper was to explore how the personality of a fantasy creature would be perceived by the observer when using different animal motion references. A 3D-model was created and animated in three different styles using motion references from a cat and lizard. A survey with Likert-scales was then formed with the intention to evaluate the animations. The participants in the survey were assigned one of the three animations to rate statements regarding personality and believability. Rather than a certain type of animal being associated with a certain type of personality, the result suggests that it was mainly certain motion cues and postures that affected the participants’ ratings. The study was deemed to be insufficient for a reliable result. In the discussion part, there are ideas on how the study could be improved with the aim of continuing the research to gain a clearer insight into the subject of personality and creatures.

Keywords: Creatures, Animation, Personality, Believability, Human-Animal Studies
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1 Introduction

Fantasy creatures are present in nearly all modern films and games that includes fantasy elements, which makes them common and essential. Dragons are only one example of common mythological beasts that are included in many modern films and video games of today; sometimes even emerging as one of the core features. Dragons are generally displayed as heavy creatures with large wings and fire-breathing mouths. To create creatures of such large magnitude while also making them look and behave realistically to the audience is a challenge. There are several studies that focus on the subject of believability and many game developers strive for believability as one of their main goals to create better gaming experiences. Personality is one of the most important measures in making a character believable (Loyall 1997, pp. 15-16) and personality can be displayed in many different ways; one of them is through animation.

This project focuses on how to make fantasy creatures more believable by animating them with motion references of real-world animals. The motivation behind this project is that fantasy creatures are a vital part of the industry, but yet, they do not have as much representation within the research field as humanoid characters do. Many games, for example, The Elder Scrolls V: Skyrim (2011) features several interactive human companions while there are almost no animals or creatures with extended background stories in the same game. The idea is that giving creatures personality could make them more interesting to the player and may also add more dimension to a game. That is why the study of this project aims to explore how certain animal motions may affect the perception of the personality of a non-humanoid creature.
2 Background

This chapter starts by defining some common terms, techniques, and methods used in animation that are relevant to this project, and will be used to describe the development and design choices of the artefact. The reader will gain insight on how the animation of creatures has advanced, their importance and how they are used in films and games today. The subject of human-animal bonds is also covered to gain an insight into human attitudes towards certain animals. The human-animal studies section provides the reader with the motivation behind the design of the artefact. Lastly, this chapter will further describe the term “believability”, what factors contribute to how the individual identifies a believable agent and how personality is related to believability.

2.1 Animation

2.1.1 Motion capture

Motion capture is a way to digitally record human movement. When adding movement to creatures that have anatomies similar to humans, it is often preferred to use motion capture as it may generate more realistic movements than animating manually in a 3D software. This method of animation is done by having a human actor wear a black suit with reflective markers in a room with several cameras. The cameras positioned around the actor record the reflective markers’ positions. Generally, the more cameras there are placed in several angles, the more accurate the recorded data will be. The recorded data is then transferred to a rigged 3D model.

Motion capture is widely used both in film and for games; what most of them have in common though, is that the characters are human. There are a few exceptions to prove that motion capture, to a certain extent, can be used to animate creatures too. Wooley, Jang and Lockwood (2015) describes the process of how they gave life to the dinosaurs of the new Jurassic World (2015) film. They used motion capture as a basis for most of the dinosaurs in the film. The way they did this, was by specifying and adjusting the mapping of the joints from human to dinosaur to create as smooth motion as possible. An example of this is how they mapped the human’s head to the raptor’s neck to create a fluid motion of the head; hence the raptor has a much larger head and longer neck than humans. There are other studies that have tried and are trying to evolve similar methods. Boehs and Vieira (2016) describe a framework on how to retarget animations from human acting to a non-humanoid character using machine learning techniques and motion retargeting to synthesize new motion. Another study by Yamane, Ariki and Hodgins (2010) assess how non-humanoid characters are perceived with human motion capture data applied to them. One of their claims is that motion capture could spare a lot of time from manual animation and therefore; wanted to try how effective it would be to use motion capture on non-humanoid characters. The experiment used three characters: a lamp, a squirrel and a penguin. Even though the squirrel is closest to human anatomy, it was perceived as the least expressive character. Yamane, Ariki and Hodgins (2010)
proceed to discuss how this could be due to the audience not expecting that much expressiveness from the other two characters. A squirrel on the other hand has its own specific and rapid movements which the human motion data could not portray. This may be where motion capture reaches its limits; because humans cannot move in a way, or as fast as some other creatures can.

2.1.2 Laban Movement Analysis

Laban Movement Analysis (LMA) is a method to analyze movement specifically in humans, but it is possible to use this method to analyze animal motion too. LMA can be a useful tool for animators to observe and understand movement and its properties. Davies (2006, s.42-46) describes the two established terms of LMA: Shape and Effort. Connected to Shape and Effort, is the Body, which is also a major component of LMA. Shape is the movement’s structure and Effort refers to the quality of the movement. Shape is observed in three planes: horizontal, vertical and sagittal. The horizontal plane is either spreading or enclosing; the vertical plane, rising or descending; the sagittal plane, advancing or retiring. Effort involves three qualities: Space, Weight and Time. Space is how the body moves around its environment and is either flexible or direct. Weight describes the heaviness of the movement: light or strong. Time is the pace of the movement, which is sustained or quick. When combining one of each of the three efforts you get one of Laban's eight basic effort movements. The basic effort movements are: Floating (flexible, light, sustained); Punching (direct, strong, quick); Gliding (direct, light, sustained); Slashing (flexible, strong, quick); Dabbing (direct, light, quick); Wringing (flexible, strong, sustained); Flicking (flexible, light, quick); Pressing (direct, strong, sustained). There is also another movement quality that is connected to Shape and Effort, it is called Flow (Davies 2006, s.48-50). Flow of Effort is freeing or binding, describing if the movements are unbound or controlled. Flow of Shape is growing or shrinking, referring to how much space the Body occupies in its surroundings.

2.1.3 The fundamental principles of animation

The twelve principles of animation were initially developed for traditional hand-drawn animation, but also apply to computer-generated characters. These rules were invented by the animators of Walt Disney studios who compiled these techniques and principles in the seminal work “The illusion of Life” (Thomas and Johnston 1981). John Lasseter of Pixar later expanded on these rules and applied them as tools for digital computer animation. The rules Lasseter (1987, pp. 35-44) adapted from Disney are explained as follow: (Thomas and Johnston 1981):

1. **Squash and Stretch:** Defined as the most important rule by Lasseter. This rule emphasizes the flexibility and rigidity of an object. Only the most rigid object, like a chair, remain so during motion, but anything made of living flesh will show considered alteration of its shape while moving.
2. **Timing:** The speed of action, which gives meaning to a motion. It also reflects the weight and size of the object, and may even carry emotional meaning.

3. **Anticipation:** is the preparation of action, and is used to direct the audience to the right part of the screen at the right moment.

4. **Staging:** is the idea of a scene. Lasseter explains that anticipation, staging, and timing are all vital to direct the eyes of the audience. If the staging is not properly done, then the anticipation and timing will not matter. It is important to stage something so that the audience knows where to focus their attention. For example, in a busy scene with a lot of movement, the eye will be attracted to a still object.

5. **Follow-through and Overlapping action:** Follow-through is the termination of action; however, an action rarely comes to a sudden stop. Overlapping action is the continued movement after a stop. For example; the hand continues a motion-path after a ball has been thrown.

6. **Straight ahead action and Pose-to-Pose:** Straight ahead action is described as a very free and improvisational approach of animation where the animator starts from the very first drawing or pose of the scene. The Pose-to-Pose method of traditional animation is fairly equivalent to keyframe computer animation with timing and pose control of extremes and in-betweens. The approaches for computer and traditional animation are slightly different, as computer animation is more layered rather than creating the extreme poses directly. Computer animation starts with one transformation at a time.

7. **Slow in, Slow out:** deals with the spacing between the extreme poses. This is done automatically by interpolation in most computer animation software.

8. **Arcs:** arcs are used extensively to make animations smoother. It is the route in which a form moves from one position to another.

9. **Exaggeration:** Lasseter emphasizes that exaggeration should be in tune with the scene, balanced, and that the animator should understand the reason for the exaggeration so that the audience also understands it.

10. **Secondary Actions:** A secondary action is the result of a main action. An example of this is when someone is being dragged. Not only does the body move, but every part of the body moves; the legs, hands, feet and so on. Secondary action adds realistic complexity to the animation.

11. ** Appeal:** appeal is not a cute kitten. Appeal has many meanings, but in this context, it is something that a person likes to see. A strong design of a character often instigates for a strong appeal.

One of the original principles has been discarded by Lasseter: **Solid drawing**, which only relates to traditional animation. Another matter that Lasseter discusses is personality,
which is not a principle in itself. According to Lasseter (1987, p. 43), Personality occurs when all of the principles of animation are used in an appropriate and clever way.

2.1.4 Simulated characters

Reinforcement learning is a form of machine learning which is mentioned briefly because it touches on the subject of personality and believability. There are studies that are trying to synthesize movement automatically based on the shape of the 3D-model; tested on human as well as non-humanoid models. Peng, Abbeel, Levine and Van De Panne (2018) mentions the modest adoption of physically simulated characters, and how there are few methods of reinforcement learning that can simulate a variety of behaviors seen in the real world. The problem is that the existing systems for automatic motion decrease individuality; however, reinforcement learning and other algorithm-based methods could still be useful to create the foundation of a character. Wampler and Popovic (2016) designed a method based on algorithms to give motion to animals with different morphologies; this without a starting motion. The outcome was very basic gaits. The method could be useful to determine the gait for extinct or non-existing creatures but does not count for the full personality or unique behaviors under different conditions, such as when creatures are being playful or angry. Peng et al. (2018) presented a data-driven deep reinforcement learning framework which uses motion capture data as a reference. The system receives an input character with a task defined by a reward. One task the character received was to run across an irregular terrain by mimicking the motion capture data. This experiment was tested with humanoid and non-humanoid characters with positive results. However, there are currently too many flaws which obstruct deep-reinforcement learning from becoming a viable method of animation. Reinforcement learning is very time-consuming and is not tested for more complex objectives and interactions with the environment.

2.2 Fantasy creatures

A creature may be defined as a zoomorphic entity that is not identifiable as a human, nor very human-like. They are usually inspired by living or fictional beings.

2.2.1 In films

Fantasy creatures are an essential part of the film industry as a large number of modern films features many different varieties of beasts; for example, the dragon Smaug from The Hobbit: The desolation of Smaug (2013) and the human-like ape Caesar from War for the Planet of the Apes (2017). Most of the creatures in modern films are rendered with the use of CGI (computer-generated imagery), which has allowed for a more controllable and effective way of generating fictional elements and visual effects in comparison to physically based methods, such as building costumes and applying make-up by hand. The revolution of CGI started in 1993 with Steven Spielberg’s film Jurassic Park (1993) which featured only minutes of visual effect, but it changed the industry forever (Acuna 2014).
Jurassic Park (1993) proved that CGI could be used to generate very realistic images of the illusive dinosaurs, and as a consequence, CGI is now present in most of today's films.

The great dragon Smaug was a challenge to bring to life for director Peter Jackson's team. The 3D model of Smaug consisted of no less than 300 individual bones and 100 simulated muscles, as well as several other unique simulation elements (Marshall 2014). Animating a creature of that magnitude demanded a lot of hard work; all of the dragon's movements were animated completely by hand. The British actor Benedict Cumberbatch who voiced Smaug did not only provide the dragon's voice; he also acted while he voiced, and this was used as reference footage to give personality and guidelines to Smaug's facial expressions. Smaug's lizard-like face is nowhere close to humane, and therefore motion capture was not an option. The reference footage, however, was used so that the animators could obtain a concept about how Smaug should be portrayed on the screen. The actor's performance may be the reason behind Smaug's appeal.

The apes in War for the Planet of the Apes (2017) came to life through an advanced motion capture system. Failes (2017) states that the film used 80 deviation cameras for outdoor use and 14 wireless motion capture cameras. This advanced equipment system made it possible to capture up to 14 performers with active makers at the same time. The markers on the suits emitted their own light rather than reflecting light from the environment, which further improved the data. Motion capture was also used to capture facial expressions, but the translation is not direct hence apes and humans have somewhat different muscles and shapes. Adjustments were always made afterwards to ensure that what the actor tries to express is also visible on the screen. Because apes and humans have very similar body shapes and faces, motion capture was a viable and effective option to create believable characters. When the apes moved forward on all four legs the actors used crutches to create the correct form of movement. The film proved that motion capture was a very successful way of bringing life to the characters.

2.2.2 In games

There are several ways to how games incorporate creatures or animal-like beings to make it more interesting. Undoubtedly, there are almost no games with fantasy elements
that do not include non-humanoid characters. *Dark Souls III* (2016) is one example that features many eerie creatures as well as bosses; although, most of them have human-like frames. The most difficult bosses in the game have a tendency to be more human-like, while the crystal lizard monster is one of the creatures from the tutorial part of the game; considered less challenging. There are not as many mainstream games in the present day which allow the player to become a non-humanoid creature, but there are some games of this type that are relatively popular. *The isle* (2015) is a fairly new, early access game on steam in which the player's character is a dinosaur. The main goal of this game is to survive and build packs with other players. An old and very well-known game is *Spyro the dragon* (1998), where the player controls the small dragon Spyro. Another example of how creatures are incorporated into games is companions. *Fallout 4* (2015) is a game with a well-known animal companion: Dogmeat, the shepherd who is fighting alongside the player. In many games, one could also earn a companion that may not fight, but travels with the player as an embellishment. Having this sort of companion could mean the player has finished a difficult mission or simply bought it with the in-game currency, or real money. An example of such a game is *Elder Scrolls Online* (2014). Mounts are a common mean of transportation in many games, and fantasy games usually feature beasts of all variations.

![Figure 3: Dogmeat from *Fallout 4* (2015)](image1)
![Figure 4: Mount from the Crown Store, *Elder Scrolls Online* (2014)](image2)

### 2.3 Human-animal studies

As this study concentrates on animal movement and how humans perceive personality through the motion of animals, the reader is here provided with some background information of studies concerning the human-animal bond to endorse the validity of the experiment. This section serves as the basis of the motives behind the design choices of the artefacts.

#### 2.3.1 Human-animal bonds and attitudes: historically and culturally
Human-Animal Studies (HAS) is a vast research field that has grown rapidly during the past decades. Animals have existed in our society for thousands of years; experts first thought the Egyptians was the first population to domesticate the cat around 3600 years ago, judging by apparent evidence such as mummified cats and Egyptian paintings. The Egyptians were so devoted to cats that their goddess Bastet arose, the worshipped, ancient Egyptian goddess depicted as a cat (see figure 5). The Egyptians respected dogs too; the owners could mourn for days when their dogs passed away, and sometimes even had them embalmed and mummified (Walsh 2009). Newer archeological findings imply that the cat was domesticated before this time, during the beginning of the agriculture era around 10 000 years ago (Driscoll, Clutton-Brock, Kitchener & O’Brien 2009). Walsh (2009) writes about the evidence found to back up the historical bond between human and animals; archeological findings reveals that wolves lived with humans for the mutual interest of survival around 14 000 years ago. Humans and wolves became partners to guide, guard and hunt together. Around 9000 years ago, cats and dogs alike were of great importance in the rise of the agricultural communities. Archeologists have also discovered ancient burial sites and cemeteries in different parts of the world that further strengthens these facts. As history changes, so do the human-animal bond. In the middle ages, Christian churches persecuted pagans as witches, which also affected the cats as they were associated with witchcraft. The cats later regained their status among the humans because they eradicated the rats that were responsible for the Black Plague (Walsh 2009).

As of today, cats and dogs are important companion animals with numerous studies to back up their importance and the positive impacts they have on human life; both physically and mentally. Examples worth noting; Banks and Banks (2002) brings Animal-Assisted Therapy (AAT) to light by conducting 30-minute sessions where elderly individuals participated in spending time alone with a dog. The result showed that merely one session of AAT could significantly reduce loneliness in elderly people. Allen, Blascovich, Wendy, and Mendes (2002) conducted an experiment to examine the effects of the presence of friends, spouses and pets on cardiovascular reactivity to psychological and physical stress. The participants were to complete common tasks used to measure cardiovascular activity either alone, with a friend, with a spouse, or with a pet (dog or cat). 120 married couples were tested, half of which did not own a pet while the other half did. This study found that the pet owners generally had a lower heart rate and blood pressure during resting standard compared to the nonowners. The quickest cardiovascular recovery was seen in the pet-present group that was also pet owners.

The HAS scholars began to recognize the lack of academic awareness in the human-animal relationship a few decades ago (Shapiro & DeMello 2010). Humans dependence on animals have changed through time, and simultaneously, the relationship between humans and animals also changes. There are several strong motives that inspire this great expansion of the field, one of the most important reasons today would concern animal conservation, which also unearths how some animals have acquired rather negative positions. There are numerous studies with the interest to investigate how
attitudes towards a certain group of animals affect their conservation status, most of which the research concentrates on reptiles and amphibians (Alves, Vieira, Santana, Vieira, Almeida, Souto, Montenegro & Pezzuti 2012; Ceríaco 2010; Ceríaco 2012; Janovocová, Rádlová, Polák, Sedláčková, Pelésková, Zampachová, Frynta & Landová 2019; Schlegel & Rupf 2010). There are good reasons for this. Ceríaco (2012) explains how it is often larger mammals that are more aesthetically pleasing, such as tigers (Black Jaguar White Tiger Foundation) or pandas (World Wildlife Fund) that become the profile and symbol of famous organizations. These are called “flagship species” as their protection also adds in the protection of less aesthetically pleasing species because they raise awareness of the importance of conservation (Schlgel & Rupf 2009). Amphibians and reptiles are among the least favored animals among humans, but it would not be solely the matter of speciesism that has formed the negative attitudes towards these animals. An important factor highlighted that affects the attitude towards certain animals is the individual’s educational background (Schlgel & Rupf 2009). Alves et al. (2012) explain how the human perception of reptilians and amphibians could be a possible problem for their conservation. Some snakes are killed because of their practical values, but some societies kill snakes purely due to the formed perception that snakes are evil creatures. Ceríaco (2012) further highlights the problematic impact that some folklore has had on the preservation of amphibians and reptiles. The geckos of Portugal are a strong example of how folklore has negatively impacted the lives of these animals. The lore accuses the geckos of having poisonous skin and that direct contact could kill a person, among other falsehoods. These myths and accusations have caused a great number of geckos to be exterminated for no reason. Ceríaco (2010). Ceríaco (2010) stresses the importance of further research into different local folklore to clear out misconceptions that could impact the preservation of these animals negatively.
2.4 Believability

Believability is a subject with no clear or generally agreed definition, but believability is important; both in the game and the film industry. Fogg and Tseng (1999) state that credibility can be defined as believability, as credible information is also believable information. Thus, the two words are equivalent in meaning. Believability in the film and game industry are somewhat different, though; which is pointed out by Togelius, Georgios, Yannakakis and Shaker (2012). Game developers rarely aspire to achieve the same level of realism as big-budget films, mostly because of technical reasons. Believability does not always imply realism as seen in textures, animations, and visual effects, but films, in particular, relies very heavily on visual realism. Games, on the other hand, involves many other factors that affect the believability of the game content other than the visuals. A player interacts with the game, and therefore, behavior and actions of the NPCs are an essential part of the gaming experience and the believability. Loyall (1997) presents a list of qualities that make an agent believable, which he developed from his own studies. Some of the qualities Loyall mentions the agent should possess in order to be believable are personality, emotion, self-motivation, the ability to change, social relationships, and consistency of expression (Loyall 1997, pp. 15-27). Personality is the most important quality according to Loyall (1997, pp. 15-16), which is also the main focus of this project.

2.4.1 Personality

Sadool (2017) from GDC Talk discusses how to bring believability to creatures, and also emphasize the importance of that very aspect. Every animator has their own way of bringing life to a character, but not all of the tactics are successful. The biggest difficulty in giving motion to a fantasy creature is simply that the creature does not exist. Therefore, the animator has to imagine the motion of that creature in some way or another. Sadool (2017) resumes his discussion by giving an example; the dragon Toothless from the film How to Train Your Dragon (2010). In the first movie, Toothless was animated with the behaviors of a cat. This method strived to give Toothless a personality and make him likable; with the constricting and dilating eyes, the obsession of rolling in the grass (cat-nip), and the slightly mischievous nature. In this movie, Toothless and the protagonist human Hiccup are befriending each other, and Toothless is that of a cautious character. In the sequel movie, Toothless is animated to behave more like a dog, because now he is the loyal friend of Hiccup. The association to the cat and the dog is supposedly what makes the audience sympathize with Hiccup's and Toothless's relationship, and the characters themselves; which also makes them believable.
Concerning personality and gaming experience; there are studies that suggest that adding personality to game characters improves the gaming experience. Emmerich, Ring and Masuch (2018) composed a survey to investigate players’ perceptions about game companions. The majority of people had a generally positive attitude towards game companions and favored well-written background stories, unique personalities, and own objectives. Appropriate and believable behavior of the companion was imperative for a positive experience. Also mentioned, was that the participants did not prefer a specific type of companion, as long as it blended in well with the story and the world. Chowanda, Flintham, Blanchfield and Valstar (2016) also conducted a study in which the players had to interact with a companion in *The Elder Scrolls V: Skyrim* (2011) to finish a quest. The results confirmed that emotional and social companions with a perceived personality enhanced the gaming experience. What can be noted is, that most studies on personality, gaming companions and similar issues mainly uses humanoid characters as test subjects. There seem to be a lack of sociable and personal creature-companions in games in general, most of the companions in popular and big-budget games are humanoid.

One of few examples of an animal game character which the player is virtually forced to form a relationship with is the horse Agro from *Shadow of the Colossus* (2006). The player is isolated in the Forbidden Lands, playing as Wander together with his loyal horse Agro. In this game, the player heavily relies on Agro. Despite the lack of conversations, the personality of the horse is still noticeable through cut-scenes, animations, and actions. Agro saves Wander and even appears to sacrifice himself to save his owner. Agro is undoubtedly a brave horse and helps Wander to defeat the colossi of the game. A notable comparison that Fourcade (2014) points out is: the disappearance of a horse in the western themed game *Red Dead Redemption* (2010) does not evoke emotion. The reason for this is that all the horses in *Red Dead Redemption* (2010) are and act the same. The only differences are the textures and slightly different programming codes. Agro in comparison, is unique because his personality is displayed through animation and the narrative.
3 Problem

Despite being a big part of the film and game industry, creatures are overlooked on the subject of research. Motion capture is one popular method employed to give motion to humanoid creatures, and with success, but the method is inadequate for more complex non-humanoid characters (Boehs & Vieira 2016; Failes, 2017; Wooley, Jang & Lockwood 2015; Yamane, Ariki & Hodgins 2010). An experiment conducted by Peng et al. (2018) uses a form of deep reinforcement learning to give motion to humanoid as well as non-humanoid creatures using motion capture references. The results of the experiment are indeed interesting, but it has many flaws and is currently not a viable option to give motion to creatures at the present time. The problem with the use of motion capture or reinforcement learning is not only the flawed movement pattern but also the lack of personality it adds to the characters.

Personality is one of the most important qualities in order to make an agent believable (Loyall 1997), and most film directors and game developers strive for believability. As the example, given by Fourcade (2014), the horses in Red Dead Redemption (2010) are very different from the horse Agro from The Shadow of the Colossus (2006). Agro has personality, which is displayed partly through animation and behavior. The horses of Red Dead Redemption, on the other hand, are simply a tool of transportation; they have the same mechanics with slightly different traits, conditions, and textures. If the player loses one horse, he/she can find another one to tame. Emmerich, Ring and Masuch (2018) conducted a study in which they evaluated the importance of game companions. The study found that a human companion was not a definite preference, and yet, there are more unique human companions in games than there are creatures or animals, The Elder Scrolls V: Skyrim (2011) is only one example of a fantasy game that mainly uses creatures as common enemies.

Based on the motivation written above, the intention of this project was to open a pathway that emphasizes on giving personality to creatures in games through animation. Creatures and animals are generally not able to speak the human language, but there are other ways to display personality; predominantly through body language. Cats and dogs are common pets that humans can relate to and are the inspiration behind the animations of How to Train Your Dragon (2010). The animators of the movie used the motion of these pets as references to create likable characters. The aim of this project was to examine if the movement of a fantasy creature was perceived to have certain personality traits depending on which real-world animal it was inspired by. The purpose of this project was to explore an approach of animating fantasy characters with certain characteristics so that the audience can recognize the characteristics by intention.

3.1 Research question

The hypothesis of this project was that people generally have a closer bond to common pets with a historical relationship to humans that branches back several thousands of
years. Cats and dogs are known for being loyal and beneficial for survival with plenty of research to back up all the positive claims that their presence induces in humans (see 2.3.1). Reptilians and amphibians, on the other hand, are known to be asocial and respond to survival instincts only. They also have a bad reputation due to folklore, misconceptions, and a lack of understanding and education concerning the psychological and biological aspects of these animals. As of our understanding today, reptilians and amphibians are unable to form close relationships to humans (Anthes 2013), which may further add to their negative status among humans. Therefore, creatures that behave like reptiles should be perceived differently by humans than creatures with dog or cat characteristics. This hypothesis formed the research question and the foundation of this project which is:

“How will the perceived personality of a fantasy creature vary depending on what animal’s motion and behavior it is influenced by?”

3.2 Method

This chapter explains how the study of the project was designed and conducted. A quantitative research method was preferred because a large amount of data was considered to bring more valuable and valid results than would, for example, qualitative open-ended questions.

3.2.1 The artefacts

To test the hypothesis, three artefacts were created and displayed to three groups of participants. The artefacts were created from one 3D model built specifically for this project; a fantasy creature designed to emerge as something in-between a cat and a lizard. The design of the 3D model was chosen based on the differences in behavior of reptilians and mammals, as well as the different perceptions of these animals that was explained earlier in chapter 2.3.1. Cats are common pets, and generally likable animals while lizards are less regarded as such. As for animation, lizards and cats have the same number of limbs and similar anatomies; therefore, the movements could be more pronounced and replaced between the two animals. The 3D model was used to animate the three artefacts into the same scene, performing the same actions. The main and important variance is found within the animations, for that reason, the scene and range of motion are corresponding to exclude other factors from affecting the result. The first artefact is animated with references from cat behavior. The second artefact is referenced of lizard movements and the third and last artefact is a combination between the cat’s and lizard's motions. The third animation was used to compare if the believability of the creature was higher if the movement of the creature was more in tune to its appearance.

The animations were at first supposed to be longer sequences, around 20 seconds for each animation, displaying the creature interacting with an object. This decision had to be revised due to the time limit set against the complexity of the animations. Each
animation was then aimed to be around 10 seconds long. The animation displays the creature in its optimal gait, small movement characteristics for the animal, as well as anticipation before a small jump.

### 3.2.2 Research method

A questionnaire with Likert-scales and open-ended questions was considered to be the most beneficial way of collecting data (Marczyk, DeMatteo & Festinger 2005, pp. 151-154). Based on the research question, it was preferred to collect large amounts of data since the research question aims to investigate how the majority of people perceives the artefacts. Therefore, a survey was conducted as a tool to collect the information needed. In regards to the validity of the study, which relied on collecting data that could represent as much of the population as possible; this project opted for a more quantitative research approach. A pilot study was conducted before starting the actual experiment which consisted of three participants. The pilot study aimed to assess if there were any uncertainties and to determine if there were any scales or questions missing that would be of importance to the result.

### 3.2.3 The questionnaire

The Five-Factor Model (FFM) is the most researched taxonomy of personality traits applied to evaluate the human behavioral pattern (Parks-Leduc, Feldman & Bardi 2015). The FFM was used and adjusted to be applicable to this project as a tool to investigate how the participant’s perception of common animal behavior could be translated as personality traits. The five personality traits were used as scales in the questionnaire of this study, along with some of the values presented by Parks-Leduc, Feldman and Bardi (2015) to further assess how the participants perceived the creature. To assess the believability of the artefacts’ animations, inspiration was collected from the paper “Designing a creature believability scale for videogames” (Barreto, Craveirinha, & Roque 2017), which is a questionnaire specifically formed to assess the believability of video game creatures. Only some of the items of the questionnaire were borrowed because specific questions were not applicable to this project. For instance, social interactions with other creatures were not displayed in the artefacts and would therefore not be a question employed as a believability measure. Each participant evaluated only one of the three artefacts to avoid biased answers. The first part of the survey determined which artefact the participant assessed, which depended on the participant’s month of birth. The second part of the survey asked for the participants’ age, origin, sex, gaming experience and experience with games that includes non-humanoid characters. These questions were considered to be of importance because experienced gamers may generally be more familiar with creature animation and movement. The third part of the survey commenced the essential part of the analysis. This is where the participants’ rated the creature animation based on how they perceived the creature. The five personality traits are used as scales ranging from 1-5 where the lower scores represent the negative
of that very trait. As an example, a score of 1 in Extraversion is considered to be a Reserved personality while a score of 5 is a Sociable personality. The five personality trait scales are presented in the survey as: Close-minded – Curious (Openness to experience); Selfish – Sympathetic (Agreeableness); Reserved – Sociable (Extraversion); Lazy – Responsible (Contentiousness); Nervous – Calm (Emotional stability).

More scales were added to complement the first set of scales. The five personality traits were considered to not generate enough data for comparable results. Thus, another set of scales based on common characteristics was added: Cowardly – Daring; Weak – Powerful; Uncaring – Gentle; Rebellious – Obedient; Apathetic – Energetic; Evil – Good.

A third set of scales concerning believability was implemented to determine the quality of the animations and how the results could be affected as a consequence. The scales are based on the article of Barreto, Craveirinha, & Roque (2017) on how to design a creature believability scale. See Appendix A for a full overview of the questionnaire used in this study.

3.2.4 Participants

This study did not have a specific target group. The most important factor was to include as many participants as possible to be able to make a conclusion on the general opinion on personality and specific animal movements and behaviors. This study aimed to find an even number of males and females to answer the questionnaire, as well as reaching out to a broader public, not limited to the local area only. The questionnaire was uploaded on one Discord channel and several Reddit communities. By publishing the questionnaire on these mediums linked to gaming it would most likely also increase the chance that people within the gaming community becomes the sample population of the experiment. This is favorable, as it does not exclude a certain category of individual, hence all the active gamer with access to the community were able to answer the questionnaire if desired, of any age and gender. It was also judged to be favorable to make the questionnaire accessible only to people with some degree of gaming and computer experience. This is because this project aimed to emphasize the importance of giving creatures personality within gaming. Thus, the interest and objective of this study were to learn the perception of personality traits from people who have an interest in video games. Concerning the ethical aspects of the study, prior to collecting the participants’ answers, the questionnaire stated the objectives of the study. A text informed the participants about how the responses would be used and that all answers were kept anonymous before the participants commenced the survey.
4 Implementation

4.1 Pre-production

One of the first steps was to resolve the design of the 3D-model by creating digital concepts and searching for inspirational images. However, not as much time was spent on conceptual work as other stages of the implementation phase because the creature's appearance was considered to be of less importance than the quality of the animations. Thus, more time was put into the effort of animation at a later stage. One of the key objectives of the design was to balance the creature's appearance to make it appear not too much like a cat, and not too much like a lizard. It was supposed to be something in between. The most important focus, however, was to make the model capable of moving like a lizard as well as a cat. The model was ultimately based on the appearance of a common housecat and a Komodo dragon. The reason behind this was that there was plenty of source material for these animals; videos as well as images on several websites. Another issue that was dealt with before the commencement on the artefacts was finding sources and references on how to organize the questionnaire and the fundamental base of the study. Therefore, relevant articles, books, and additional material were collected to draw the outline of the project.

Figure 8 & 9: Sketches of creature model.

4.2 The 3D-model and rig

The creature was modeled and rigged in Blender 2.8 (Blender foundation 1998) at the University of Skövde for a bachelor degree project study. Two features were established early; the creature would have four legs and a tail because cats and lizard have both. Among the more difficult choices were if the creature should have ears, the original stance when skinning, thickness of limbs, and if the head should be long or short. Ears were added because it would add more characteristics to the cat animation since the ears of a cat is an important feature of its motions. When the ears were added, a short face was excluded for the reason of balance. The creature would look too similar to a cat with a short face in addition to the ears, which a lizard does not have; therefore, the face was shaped to resemble a Komodo dragon. The limbs were chosen to be thicker like the Komodo dragon as it would balance its stance, which is higher from the ground as a cat. Thinner limbs would have made the cat appearance come through too much. Cats do not usually use their mouths when moving, however, lizards may open their mouths when pouncing to catch prey. This might have been a flaw in the design, as of later when
contemplating the lizard movement, an animated mouth on the model could have added depth to the movement qualities of the lizard. The model’s feet are more similar to a Komodo dragon, but with only four claws instead of five. This was solely a choice of simplicity, as a fifth claw did not change the appearance of the creature significantly, and fewer claws are easier to handle during animation.

The rigging demanded flexible movements for the cat as cats generally are more flexible and able to squash and stretch their bodies while lizards cannot. The difficult part was the skinning in this case. The rig enabled the model to stretch and move its legs with IK (Inverse Kinematics) controllers. The rig was improved during the animation phase because certain elements were missing or faulty. For example, a new bone received added weights so that the rear part of the model could move up and down as the legs are moved back and forth when walking. When animating the lizard, it was noticed that the bones did not appear natural. Consequently, it was decided that the lizard would be re-skinned so that the legs could become more flexible for the body to be positioned closer to the ground. Some bones were disconnected and reconnected to other bones for a better connection between the front and the rear part of the model. This was especially helpful when animating the cat because of its flexibility.

The video sequences are rendered with the same scene-setup and shading. A yellow/brown background was chosen as it was considered a neutral color that does not draw too much attention from the animation. The model obtained a simple grey color for the same reason as before; with the attention to direct the focus to the animation. Eyes were added as an adornment to make the model feel more complete, as most animals do have a pair of eyes.
4.3 Animations

The three animations that serve as artefacts for the study are roughly the same length of time (8-9 seconds). It was estimated that this length of time for each animation would be sufficient for the participants to comprehend and gain an opinion of the creature, while also being suitable for the time frame of the project. The camera follows the creature and starts by displaying the creature walking forward in front view before rotating around 140° for a side view. This allowed the participants to see the creature from slightly different angles. The model is animated to show some representative movements of the animal it is inspired by in each sequence. The movements displayed are: walking, looking around (responding to stimuli in the environment) and pouncing. Video clips of two cats and one lizard were analyzed with the LMA-method prior to and during the production phase. An analysis of relevant reference videos and the animations of the creature model are elaborated in this chapter.

4.3.1 The Cat

The cat is an agile and flexible animal and a common house pet. There are two videos in particular that have been used as a reference for the cat artefact. The first video clearly displays the cat walking at a normal pace and became an important source for the first part of the cat animation (Care Animal Clinic Brookfield 2011). The first observation was the cat’s gait; when the cat walks forward three legs maintain contact to the ground. When the hind-leg moves forward and just before reaches the ground, the front paw lifts and moves forward. This can also be seen in figure 12. As mentioned in the 3D model and rig chapter, the cat noticeably appears to stretch and squash, especially its middle part (belly). When one of the hind-legs pushes forward the back elevates slightly. The shoulder blades move significantly up and down as the cat reaches forward with one of
its paws and land on the ground. The head nods slightly as either one of the front paws land on the ground. One of its ears rotates backward, most likely trying to discern some noise. The tail points straight upwards and moves up and down along with the movement of the legs. The tail itself moves very subtly. The overall movement of the cat is nimble, it moves quickly and lightly forward and the effort is direct. It seems to observe and walk towards a specific target.

The second video inspired the motion for the pouncing part, an orange cat observing something in the grass followed by a leap towards its target (Chusmacha 2017). In this case, the cat stands on its hind leg to be able to see its prey amidst the grass. In the animation, the creature drops down to the ground and wiggle its back before pouncing. The video of the orange cat was very useful for determining the cat’s behavior when pouncing. The tail is very active and flicks frequently while finding a position to pounce, but stays very still when entering the definite position just before pounce. The cat’s eyes are focused solely on the target and it squashes and stretches the middle part of its body many times before finding the right position to pounce. The cat displays a lot of anticipation before the jump, going back and forth or standing still observing the target while maintaining an extreme focus; its eyes never wandering off. The jump itself is very straightforward; the effort is direct, quick and light, just like the cat generally moves. The pounce comes to a very abrupt end and the tail flicks one time before the front paws reach the ground and stops when the hind paws have hit the ground. The tail stays fairly still after the jump but then starts flickering again. In many parts of the video and after the jump, the cat’s back is more or less arched and appears to be exceedingly bendable.

The cat artefact was an attempt to recreate these very motions explained above onto the creature model. First, by displaying the cat gait with the up and down motion of the shoulders and the back. The cat flicks its ear and tail and proceeds to walk slightly faster, these motions are intended as a reaction to something it heard. The creature then stops to look around while also arching its back. The creature suddenly spots something, lower its body to the ground and wiggle its tail before pouncing, which is the anticipation of the jump. The jump is quick, direct and light. The tail flicks one time while landing and then continues to move subtly.

Figure 12: Photography of Gozo, the Maine Coon cat (provided by author)
4.3.2 The Lizard

A Komodo dragon was used as the reference for the design of the 3D model, but the movement reference for the animation was a video of a Bearded dragon. This is partially due to the range of accessible references found, but also due to the body weight of the Komodo dragon compared to other more common lizards kept in captivity. It is not uncommon to keep Bearded dragons as pets and they move differently to the Komodo dragons considering they have lighter bodies. The Komodo dragon is heavier and slower and might not be considered to have the most lizard-specific movements out of all lizards. That is why the Bearded dragon was used as a reference for the lizard artefact instead.

A video of a Bearded dragon playing with a ball was analyzed (Adair 2015). The first thing to be noticed is that the lizard holds its body very close to the ground. The gait of the lizard is quite simple. Two legs move at a time; the front leg lifts along with the hind leg on the opposite side. When those legs hit the ground the two other legs lift to move the body forward. The movement of the lizard’s body is not so much up and down oriented as the shoulders of the cat, but is rather horizontal; the body and tail sway from side to side. The legs, however have a broad range of up and down motion. The head faces the target and stays rather still but upright when walking forward. There is almost no motion at all in the rest of the body as it stands still and the head moves around to observe the surroundings. There are moments when it appears to be rather frozen and no moving hold can be observed. The body is stiff and does not squash and stretch, this makes the lizard appear rather clumsy. The tail only moves intact to the body, it does not move when the rest of the lizard is motionless. When the lizard leaps forward it sometimes seems to lose its balance for a second as it almost lands on its head instead of the front feet. Another remark is that there generally are very little follow-through and overlapping actions in its movements, there is also very little anticipation. The leap is rather unexpected; there are no signs the lizard would leap before the leap happens, and it happens very abruptly. The effort of weight seems to be rather strong because it appears as if the lizard struggles to move forward because of the lack of flexibility in its body. The space of the movement I judge to be flexible, as it does not appear to walk a straight line, but rather occupies a lot of space in its environment. As it walks forward the effort of time is sustained; it walks slowly. The leap, however, is different. The lizard jumps directly towards its target, the effort is light and quick. To jump, it lifts its front feet and put all the effort into the hind legs to lift from the ground, but it appears as though it lifts all feet at the same time.

The animation of the lizard artefact displays some of the characteristics of the lizard movements observed from the analysis of the video. While the model has ears, lizards do not, and therefore, they remained rigid throughout the whole animation. The animation starts by displaying the lizard gait; a stiff body, flexible legs, body close to the ground, and a tail that sways along with the rest of its body. The creature then stops to move its head around while the body stays still. After the observation part, the lizard leaps abruptly forward and land heavily in a forward leaning position. Lastly, the lizard composes itself to original pose with its head high-set.
4.3.3 The Mix

The mixed animation of the lizard and the cat was the most difficult animation to assemble, considering the task to blend and balance the movements between two diverse animals. The cat animation was used as a base in the end, after a failed attempt in making the lizard animation more cat-like. The stance of the mix is that of a cat, holding straight legs and its body further away from the ground. It seemed that when the creature holds this stance as a basis, it was easier to add or remove certain movements while still keeping the authenticity of the motions. The shoulder and back movements of the cat were removed and replaced with a swaying side to side motion of the belly from the lizard. The tail became less expressive, and the anticipation of the wiggling back before the leap was removed. Overall, the expressiveness of the cat was removed and replaced with the more rigid motions of a lizard.

4.4 Pilot study

A small pilot study was conducted to ensure that the participants would understand the statements of the questionnaire, as well as detecting any desires to adjust any sections that could possibly cause confusion. Also, the pilot test ensured that the questionnaire was functional with no errors. Three participants took part in the pilot test. The first participant was an experienced male gamer and evaluated the Mixed artefact. Plenty of feedback was received during his ratings. Some lines in the questionnaire needed to be changed or rephrased. For example, one of the original statements to be rated by the participant was: “The creature’s actions involve more than one step”. This statement was re-phrased to: “The creature’s animation involve more than one action”. Also, the description of the questionnaire was improved with a clearer description about the participant’s task in the survey. Some of the statements and personality traits were also adjusted to be more understandable with the intention to rate the personality traits of a creature instead of a human. For example, the first statement was: “The creature is open to experience”, which is one of the trait dimensions stated by Parks-Leduc, Feldman & Bardi (2015). How this trait is explained though, might be more accurate for a human being rather than an animal. This statement was therefore replaced with: “The creature is curious”, because curiosity may be more comprehensible for people to link to an
animal. When these corrections were done, the questionnaire was tested on a second participant. The second participant was a female who does not have much experience with games. She evaluated the Lizard artefact. This participant said there were no uncertainties when answering the questionnaire, the only feedback was a wish for a longer animation. The third participant was a male with some gaming experience. He too stated that there were no problems filling out the questionnaire and that he understood all the statements. The current statements on the survey were considered to be substantial enough to generate a desirable result after inspecting the three individual responses from the pilot study.
5 Evaluation

This chapter will present and analyse the end result of the survey. To view the refined chart results of the Google Forms survey, refer to Appendix B.

5.1 Result

When looking for participants for this study, the goal was to include people that have some or extended experience with video games but preferably do not study Game Development. This decision was made to avoid biased answers as much as possible and to include individuals that this study is relevant for (gamers). The survey was published on several Reddit communities and one Discord group. 21 individuals in total participated in the survey. The birth month of the participant determined which animation the individual would rate and this resulted in a fairly even distribution of participants for each animation.

5.1.1 Demographic

The first page of the survey was comprised of questions that would accumulate demographic data about the respondents which were considered to be relevant for the study. These questions requested the participants’ age, gender, origin, video game experience, and if they played games with non-humanoid characters. The participants were informed at the beginning of the survey that all answers would be anonymous and used as a part of a bachelor degree project. The study did not target a specific age group, but there were no participants above 40 years of age. Three respondents were younger than 18 and the majority of respondents were between 18-30 of age. There was an even distribution of males and females, whereof eleven males and ten females.

The respondents were asked two questions related to video games. The first question was stated as: “How often do you play video games?”. The vast majority of the respondents answered that they played video games every day or more than once a week, while only one respondent answered that they never played video games.

The second game-related questions stated: “Do you regularly play games that include animals or non-humanoid character?”. 15 respondents answered yes, and six respondents answered no. There were no distinguishable variances in value ratings between the respondents who answered yes and no.

The participants originated from different locations. Most of the participants were Swedish or originated from an English-speaking country as seen in table 1 below. This question was optional to answer as the origin of the participant was not deemed to be essential data for the extent of this project. However, cultural differences are a possible reason for alterations in the result, which is why this question was included so that it could be analysed if any diversities occurred.
Table 1: Origin of participants.

<table>
<thead>
<tr>
<th>Country</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sweden</td>
<td>8</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>5</td>
</tr>
<tr>
<td>Germany</td>
<td>1</td>
</tr>
<tr>
<td>Australia</td>
<td>3</td>
</tr>
<tr>
<td>Canada</td>
<td>1</td>
</tr>
<tr>
<td>United States</td>
<td>3</td>
</tr>
</tbody>
</table>

5.1.2 Artefact 1 – Cat

The result is presented in tables for comprehensibility. Each statement is listed, and the mean value and the median value has been calculated from each statement to gain a rough overview of tendencies towards either side of the scales.

Table 2 displays the result of the cat animation; seven participants rated the cat animation. The personality traits that were ranked the highest by the respondents were: curiosity, bravery, and energy; these traits scored the highest mean value. The traits that were ranked the lowest were: sympathy, kindness, virtuosity, trustworthiness, and compliance. Compliance had the lowest mean and median value of all traits. Overall, the mean and median value of most statements is very close to the middle, a neutral value of three. The trait the respondents had the most dissent about was emotional stability as the rating was evenly distributed between the lowest and highest scores. Whereas the statement that had the most consistent value was sympathy since five out of seven participants scored the trait a value of three.

The five last statements measured the quality of the animation to exclude that poor quality could have affected the result. The fluidity of the motions scored the lowest, but the respondents rated the creature’s control of its body higher, as well as the quantity of the animation (the creature’s actions involves more than one step). To conclude the result of the statements that measured believability; the animation should have given enough information for the respondents to be able to judge the creature by the brief impression of the creature animation.

Table 2: Displaying the cat artefact mean and median value ratings.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean value</th>
<th>Median value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The creature is curious</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>The creature is sympathetic</td>
<td>2.7</td>
<td>3</td>
</tr>
<tr>
<td>The creature is sociable</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>The creature is trustworthy</td>
<td>2.7</td>
<td>3</td>
</tr>
</tbody>
</table>
5.1.3 Artefact 2 – Lizard

There were six participants rating the lizard animation, results are shown in table 3. The traits that were ranked among the highest were: energy, curiosity, and bravery. The traits that were ranked the lowest were: sympathy, kindness, trustworthiness, virtuosity, and compliance. The very same traits mentioned were also ranked the highest and lowest for the cat animation. The lizard animation may be the animation that had the least consistent personality rankings. For example, sympathy had scored at least one point for each value, meaning that there were no tendencies to either side of the scale. When the participant ranked sociability for the lizard, none ranked the lizard as neutral, but they found the lizard to be either very sociable or not sociable at all. This incidence occurred to virtuosity as well; the respondents found the lizard to be on the good or the bad side, not in the middle.

As for believability, the values are above average with the lowest mean score in motion fluidity. Body control and quantity of actions scored high which may indicate that the quality of the animation was sufficient enough to be evaluated by the participants.

Table 3: Displaying the lizard artefact mean and median value ratings.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean value</th>
<th>Median value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The creature is curious</td>
<td>4.2</td>
<td>3</td>
</tr>
<tr>
<td>The creature is sympathetic</td>
<td>3.1</td>
<td>3.5</td>
</tr>
<tr>
<td>The creature is sociable</td>
<td>2.8</td>
<td>3</td>
</tr>
</tbody>
</table>
The creature is trustworthy

The creature is emotionally stable

The creature is brave

The creature is powerful

The creature is kind

The creature is compliant

The creature is energetic

The creature is virtuous

The motions of the creature are fluid

The motions of the creature reflect its size and weight

The creature expresses temperament

The creature’s animation involves more than one action

The creature controls its body

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean value</th>
<th>Median value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The creature is trustworthy</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>The creature is emotionally stable</td>
<td>3.5</td>
<td>3</td>
</tr>
<tr>
<td>The creature is brave</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>The creature is powerful</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>The creature is kind</td>
<td>2.8</td>
<td>3.5</td>
</tr>
<tr>
<td>The creature is compliant</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>The creature is energetic</td>
<td>4.2</td>
<td>4</td>
</tr>
<tr>
<td>The creature is virtuous</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>The motions of the creature are fluid</td>
<td>3.5</td>
<td>4</td>
</tr>
<tr>
<td>The motions of the creature reflect its size and weight</td>
<td>3.7</td>
<td>3.5</td>
</tr>
<tr>
<td>The creature expresses temperament</td>
<td>3.7</td>
<td>4</td>
</tr>
<tr>
<td>The creature’s animation involves more than one action</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>The creature controls its body</td>
<td>4.7</td>
<td>5</td>
</tr>
</tbody>
</table>

5.1.4 Artefact 3 – Mix

There were eight participants rating the mix animation, results are shown in table 4. The personality traits that scored the highest values were curiosity and energy. The lowest scoring personality traits were compliance, sympathy, and trustworthiness. There is one distinction between the mix animation and the two other animations; the rating of the statements for the mix animation was not as scattered between different values as the lizard and cat animations. The respondents seemed to agree more when ranking the mix animation, which may be why the median value is closer to the mean value compared to the result of the cat and lizard. The personality statement that had the most consistent rating was energy, while the statement with the least consistent rating was curiosity.

The believability scales suggest that the quality of the animation is above average, which indicates that the animation is sufficient enough to be evaluated by participants. The fluidity of the motions was scored the lowest and quantity of animation scored the highest.

Table 4: Displaying the mix artefact mean and median value ratings.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Mean value</th>
<th>Median value</th>
</tr>
</thead>
<tbody>
<tr>
<td>The creature is curious</td>
<td>3.8</td>
<td>4</td>
</tr>
<tr>
<td>The creature is sympathetic</td>
<td>2.5</td>
<td>3</td>
</tr>
<tr>
<td>The creature is sociable</td>
<td>3.5</td>
<td>4</td>
</tr>
</tbody>
</table>
The creature is trustworthy | 2.8 | 2.5  
The creature is emotionally stable | 3.3 | 3.5  
The creature is brave | 4 | 4  
The creature is powerful | 3.6 | 4  
The creature is kind | 3 | 3  
The creature is compliant | 2.3 | 2  
The creature is energetic | 4.1 | 4  
The creature is virtuous | 3.1 | 3  
The motions of the creature are fluid | 3.1 | 3.5  
The motions of the creature reflect its size and weight | 3.6 | 4  
The creature expresses temperament | 3.8 | 4  
The creature’s animation involves more than one action | 4.5 | 5  
The creature controls its body | 4 | 4

### 5.2 Analysis

When writing this analysis, it is assumed that the animations were of decent enough quality and that the main movement of the reference animals comes through. This is based on the believability result for each animation, and all animations scored above the average value in all believability scales.

If we go back to the hypothesis explained in chapter 3.1 the cat was believed to be more likable, thus why it probably should have scored higher in traits such as sympathy, sociability, trustworthiness, kindness, and virtuosity. However, the cat scored a below average mean value in many of the mentioned traits. The reasons for this could be simple. When looking at the cat’s personality, they may not be related to trustworthiness or sociability as they are independent animals. Cats could also be somewhat associated with being disobedient and independent, whereas dogs are known to be man’s best friend who obeys and protects its owners. There are many individuals who adore cats despite (or because) of their personality, even if they may not be sociable. Some may consider cats to be untrustworthy because they may not be as protective as dogs, and then there are some that may see cats as trustworthy because they are familiar with how a cat responds to different situations. Then there are some individuals that may regard cats as evil, which is why this study could have used a dog as a reference instead of a cat and the result might have turned out somewhat different. The problem does, however, occur with dogs as well. Some people love dogs, but there are also many people that do not. Some people may even describe themselves as a “dog person” or a “cat person”, which is why it would have been beneficial to include both a dog and a cat for this study to compare the results. The
cat scored lowest out of all animations in compliance, which is expected because cats are known for not obeying. The cat also scored the lowest in emotional stability, which might be due to generally more active, *flicking* movement and *flicking* of the ears. Overall, the result of the cat animation is not too unexpected when looking closely on how cats behave and how different humans may interpret cats. The scoring should hypothetically be somewhere in the middle on most of the statements depending on if one likes and have experience with cats or not, and it was.

What was not expected was that the lizard scored fairly high on some of the statements which in theory would not be accurate for a lizard due to their bad reputation (Alves et al. 2012; Ceríaco 2010). Sympathy, trustworthiness, and virtuosity scored higher points than was expected. Although not too dissimilar from the cat animation, the respondents did not seem to agree much on almost any of the statements. There was no tendency to either side of the scales on several of the statements. Two respondents rated the lizard to not be virtuous, while four respondents found the lizard to be more virtuous than not virtuous at all. The lizard scored highest in virtuousness out of all animations, which was not expected, but could be due to its appearance, the low set body stance and generally *pressing* movement forward. Three participants thought the lizard was less sociable or not social at all, while three participants found the lizard to be sociable or very sociable. There could be several reasons for this conflicting outcome. The first reason is that there were not enough participants for this study. One of the goals was to include unbiased participants, but the result could have been rather different if more participants were included. The lizard also had the fewest respondents out of all three animations. Another reason, which is a very significant factor, is the design of the model. The model may not look intimidating or lizard-like enough even though the animation is supposed to be lizard-like. Yet another reason is that the animation is not lizard-like enough either. None of the respondents rated the lizard the lowest score in kindness, so the lizard obviously does not appear to be intimidating, whether it is due to its appearance or animation or maybe both. The rating for sympathy was widely divergent, which may also be due to the reasons already mentioned. There seem to exist many factors that determine how each participant view the animation and the creature itself. As of this experiment, the lizard did not receive significantly lower scores than the other two animations. In fact, the lizard and the cat had rather similar scores.

The mix animation had the most distinct ratings, but still not too far off from the cat or the lizard. The mix was viewed as the most powerful out of all three animations, it also had the lowest score in sympathy. This could be due to the animation’s high stance and rigid body language. It might be that firmer, *gliding* movements may indicate a sense of confidence, thereof why the mix is viewed as the most powerful creature. This could also be connected to sympathy, the more confidence (ego) a character may have, the lesser sympathy it inhibits. Body language could also have been a contributing factor for why the mix and the cat had higher scores in bravery than the lizard; hence the mix and the cat have a higher stance than the lizard, which moves with its body closer to the ground with *punching* steps. All of the animations scored high in energy despite the mix being
more rigid. That might be because the mix used the cat's animation as a foundation, which included the same walk and jump, except it would have the same floating sway like a lizard. All of the creatures in the animations perform the same movements but within their own style and gait. That might have been why the scored values are not too dissimilar from one other, especially true for the energy ratings, and perhaps also for curiosity. There might be a connection to moving the head to look around (which is a movement all creature performed in the sequence) and curiosity. Which would be why all animations scored fairly high in curiosity.

5.3 Conclusions

The motivation behind this study was to find out how different animal references would invoke different interpretations of personality for the observer if applied to a fantasy creature. As seen from the result; the scores for the cat and lizard are similar, but not identical, and there were some specific movement and basic efforts that could be linked to the ratings. The mix animation was the one that stood out to have rather distinct ratings compared to the cat and the lizard. There are many factors that need to be identified when executing a study about movement and personality applied to any humanoid or non-humanoid creature. The first factors are how well the animator can animate the creature, the design of the creature, and movement similarity to the animal in question. Another significant factor is the preferences and experiences of the participant, as well as cultural and educational differences, as described by Ceriaaco (2012). One individual might interpret something as one specific animal movement or appearance completely different than one other individual. Therefore, what should have been included in a study like this, are open-ended questions in order to identify how each individual reason when scoring the creature animation. This could also have revealed if the participant focused on the movement of the creature, or something else. An answer to why the participants rated the way they did was clearly missing from the result. Qualitative features in the survey may have confirmed what factors the participant's focused on. In this case, it was the movement of the creature that was important, but there was no way to discern other factors that could have affected the outcome; for example, appearance, environment or textures.

To conclude the body language in relation to personality from this study; a higher set body stance may be more associated with bravery. A more rigid movement pattern could be read as a lack of sympathy and being more powerful. Combining this, the mix was also rated highest in sociability of all animations, which could add to the connection between rigid, gliding movements and lack of sympathy, and power. There also seem to be a relation between a vigorous, flicking body language and emotional stability; the more sudden movements would result in lower scores for emotional stability. In combination with appearance, a low body stance, a binding Flow of Effort could be associated with being more virtuous.
It could definitely be beneficial to use animals as references when animating creatures to invoke certain feelings. As analysed by the cat reference, the result seemed to be in line with how cats are interpreted in reality, which will also fluctuate from individual to individual. Personality wise, when using an animal as a reference, one may also bear in mind that there are skittish cats and there are calm and confident cats, there are also calm and slow lizards and fast and aggressive lizards. The lizard animation in this study might have been interpreted to be a calm and slow lizard, which is what seems to be reflected on the result. Personality could not be exclusively related to an animal's general movements, there is at least no strong proof of that from this experiment. Specific movements and postures, however, seem to be the strongest indicator of personality traits and distinctions. There are definitely many reasons to further study animals, body language, and human interpretation. By continuing the research on how to animate creatures, game developers may be able to create more meaningful non-humanoid characters in the future. Furthermore, there are also many reasons to raise the awareness of speciesism and attitudes towards certain animals which could reflect into real life.
6 Concluding remarks

6.1 Summary

The idea of this study was to examine if using different animal references for one fantasy creature could cause the observer to perceive the personality of the creature differently. The motivation behind the study was that creatures and animals do not have as many underlying studies about movement and animation as humans and human characters do. Animals and creature are also somewhat forgotten in games because they often lack unique personalities, and personality is closely related to believability, which many game developers strive for. In this study, one 3D model was created and then animated in three different styles. Two animal motion references were used for two separate animations; one cat and one lizard. The third animation was animated to move as something in between a cat and a lizard, this animation was called the mix. The study was conducted by creating a survey with Likert-scales on personality statements. 21 individuals participated in the study; three individuals were below 18 of age and the remaining participants were between 18-40 years of age. Each participant rated only one of the three animations to avoid biased answers. The result shows that participants scored the three creature animations differently, but when calculating the mean and median value for each animation, the lizard and the cat scored similar values on each personality statement. Analysing the result, there were several potential factors found that could have had a major influence on the result; for example, the appearance of the creature and the behaviour and mood of the animal motion reference. There may be vague evidence that certain motions and postures affect how the observer perceives the creature rather than the theoretical animal association.

6.2 Discussion

The purpose was first and foremost to highlight the importance of creatures in games and that creatures can invoke feelings in the player too. Using animal motion as references for fantasy creatures is already a method currently being used in the industry (Sadool 2017), hence is why the interest to investigate exactly how an animal is perceived by the observer arose.

6.2.1 About the method and credibility

The first real problem that befell in the pre-production was time management, because animating is a time-consuming task, and being the only person on this project made it difficult to estimate time in the proper way when 3D-modelling and rigging was also an undertaking which needed to be completed before (and during) animation. The animations were at first supposed to be played as a scene which included the creature to interact with objects, however; because of being alone and the length of this project, the scene was cropped to one shorter sequence focusing solely on the creature motion.
without any object interactions. The movements that were chosen for the animations (walking, stop and look around, jump) were chosen because of the versatility for a short clip. A basic walking gait seemed like an appropriate choice that could be interpreted by the participants, as well as not making the animations too dissimilar. Now when contemplating this choice afterward, it might have been better to include more animal specific movement and make them all behave differently depending on which animal is used as a reference. The conclusion of this is, that the animations were probably too similar for being inspired by two different animals with very different movement patterns.

There are many ways in which this study could have been executed with many animals and creature designs to choose from. That is why a project like this needs an extended exploration. Certain traits may be connected to specific animals, which is why more animals should be analysed in terms of behaviour and the human’s perception of that specific animal. This study however, were focused on companion animals (cats and dogs) contrasted to reptiles. The chosen motion references from a cat and a lizard were probably not completely wrong, nor was it the root to why the result from the analysis turned out uncertain, but rather, there were several missing factors that should have been thought of. I believe there were at least three factors that could have been executed in a different way which could have changed the result greatly. The first factor was the lack of motion references. What could have been included was at least three or four different artefacts with different animal motion references instead of a mix. More references could have led to a better contrast between the artefacts and perhaps a more deep-rooted analysis. The mix could have been replaced with a dog for a better comparison between specific animals. The mix was an idea that occurred for extra measures of believability, but measuring believability should instead have been conducted through qualitative measures as the scales could not fully determine the quality of the animations. The participants rated the believability scales fairly high, but there was nothing for them to compare it to, and no means of communicating probable problems or misunderstandings in the questionnaire. There were no qualitative questions at all in the survey, which hindered the participants from expressing their opinions which could have been of much value for analyzation in answering the research question of how the personality is perceived. The validity of the scales dropped with the exclusion of open-ended questions because there was no way of certainty to know that the participants understood any of the personality scales. A comment that was brought up to discussion after the closure of the questionnaire was: “What does temperament mean?” referring to the believability scale: The creature expresses temperament. This question alone proves that the questionnaire should have had follow-up questions to make sure the participants understood all the scales and rated the animations the way it was intended. Temperament in this study could be referred to as the creature’s appeal according to the twelve principles of animation (Lasseter 1987, pp. 42). The believability scales probably fell shortest of understanding, as believability is too complex of a subject to be evaluated by merely five scales. Loyall’s list of qualities for a believable agent should
have been examined closer to determine a better method for evaluating the believability of the animations (1997, pp. 15-27). As for the artefact animations; ability to change, social interaction as well as emotion, was poorly or not portrayed at all in the animations. These qualities are part of what makes an agent believable according to Loyall (ibid, pp. 15-27), which would conclude that the believability of the creature animations is weak, despite the ratings of the participants.

This brings us to the second factor that could be responsible for the vague results, which was the animations themselves. If given more time to focus on the animation with a finished 3D-model, it could have resulted in improved artefacts and the twelve principles of animation would have been cleverer applied (Thomas & Johnston 1981). The animations should also have been longer and included interactions with at least one object. This would have caused a greater difference in behaviour for the creature model, which could also have caused very different ratings. For example, the lizard could have crawled on the wall instead of remaining on the floor, it could also have expressed different temperaments (anger, fear, happiness, etc.), and different movement speeds, which would have strengthened the believability (Loyall 1997, pp. 15-27). If the participants would have seen more of the animal’s specific characteristics, then the ratings might have been analysed with more certainty, as further information about how the creature moves and interacts had been exposed. Going back to the hypothesis, the lizard was thought to receive the most negative ratings, especially in sociability, sympathy, and kindness. To replace the mix with a dog could, in this case, have been more beneficial for comparison than the cat. As explained earlier, sympathy might not be well associated with cats, but with dogs, the interpretation may be different. If the motion of a dog was to receive higher ratings than the lizard in sociability, sympathy, and kindness, there would have been more substance to the presented hypothesis.

The last factor that indeed caused a vague result is the number of participants. Instead of focusing on finding participants that are not game developments students, this project should have included more participants in general. To judge by the result from the artefacts, it seems as though eight respondents for each animation should have been the minimum.

The questionnaire with five-point Likert-scales was based on the five-factor personality model (Parks-Leduc, Feldman & Bardi 2015), and revised to suit this project. There were also extra statements added which were based on basic game character traits, for example; good or evil. The statements were found suitable for the assignment, a problem, however, was that many respondents preferred to rate the animations neutrally; a value in the middle. This could have been due to already mentions reasons, as well as the respondents actually found the creature to be neutral. That is why, the neutral value should still stand, but it might have been more suitable to use a seven-point Likert-scale instead of a five-point Likert-scale. This would give the respondents a wider range of evaluation options, which could have been useful in an extended project.
Open-ended questions were discarded before the study was completed because no reason for open-ended questions was realized. However; after the study was completed and the result had been analyzed, it was recognized that open-ended questions were necessary to know all the factors that caused the participants’ ratings. This would have strengthened the validity of the study. One idea of an open-ended question that could have revealed how the creature’s appearance affected the result is: **What is your first impression of this creature?**” Another question that might have been too uncovering but could have been included at the end of the questionnaire: “**What animal does this creature remind you of?**” Which would have revealed if the motions are similar to the animal it is inspired by. Another option would have been to include one new question below each statement: “**Explain shortly why you rated this value?**” Which would have given a thorough explanation from each participant as to why they reasoned the way they did. All this would have helped in answering the research question about how animal motion references affect the perception of personality. If the participants did not see the cat animation as a cat, or the lizard as a lizard, then that would be a flaw in itself. Open-ended question could have uncovered whether or not the animations were similar to the animal it was supposed to represent, and added to stronger validity. The method was not sufficient enough to evaluate whether or not the participants saw which animal the creature was inspired by, or what other associations might have occurred.

This project was too vast for such small timeframe. The credibility of the project is not too strong considering the lack of participants, the inconclusive result due to missing open-ended questions, and the length of the animations. Lasseter (1987, pp. 43) wrote that personality occurs when all the principles of animation are used in a clever way. This project tried to include all the principles of animation within the finalized length of the artefact animations. Appeal is one of the principles which makes for a strong character, as explained in the case of Smaug from chapter 2.2.1. The animations may have needed to be longer to expose more temperament from the character in order to emit a certain appeal. The decided length of the animations made it difficult to apply all of Disney’s twelve principles of animation (Thomas & Johnstone 1981), specifically appeal which would have accounted for a stronger personality. There are some indicators that would suggest there is a pattern to follow from the analysis, but the study would need to be revisited in order to distinguish certain trends or tendencies. The research question could not be fully disclosed from this study alone because of the identified inadequacies of the method. This study may, however, serve as a guide to instigate a new and improved study that could answer the research question more reliably.

**6.2.2 About the demographics**

No relation between age, gender, or origin and the participant’s ratings could be found in this study. This would suggest that the first page of questions in the questionnaire was unnecessary. However, if the project was more extensive and included more people from several different countries, there is a possibility there could have been a possible distinction between two groups or more. Also, depending on which animals are
referenced, hence the outlook and value of animals differ from one country and culture to another. Gaming experience did not seem to matter for the study or come in use for analysis, but it was still a question of use to make certain that there were mostly experienced gamers participating in the study, since that was one of the stated objectives. As already mentioned previously, this study should have included more participants, and the origin of the participants should have the least priority for the scope of this very project. If certain patterns or distinguishable features would occur, it is a reason to be more focused on demographics, but that would be a few steps further ahead. I believe there could also be a difference in how an older population would perceive the animals and animation because of their general gaming and computer experience. Animals and fantasy creatures are commonly met by experienced gamers, but an older generation of individuals might not be as familiar with video games and therefore may not have been exposed to fantasy creatures in the same way during their lives. This could have caused a great difference in the result. This study only included one unexperienced gamer, which was a girl, 25-30 years old.

6.2.3 About creatures, personality, and motion

The most significant find from the analysis was that the mix animation had a somewhat different score from the cat and the lizard, which could be due to the gait, stance, and rigidity of the mix in motion. It was also mentioned in the analysis that when animating from an animal reference it matters how the creature is animated. A cat can be angry, happy or emit a whole range of emotion which would affect the result significantly depending on which emotion is being exposed, this is also explained by Lasseter (1987, pp. 42) as appeal. Therefore, it could have been suitable to also include a wide range of emotion for the creature in the animation. That is when it becomes difficult, as a longer and more thorough animation would have been time-consuming as stated previously. The question still stands, if an animal could be connected to a certain type of personality. What was found through this study is that posture, gait and other movement patterns may be of the most importance, and not the referenced animal itself. It is also yet to be explored how great of an impact the appearance has on a creature weighed against its motions.

6.3 Future Work

There are several different ways in how this study could be modified to generate stronger results and most importantly, more substance that can be analysed and compared between the animations. Ways on how to improve the artefacts and the method have already been discussed in chapter 6.2.1, but the improvements explained would require additional planning and workforces to complete. As explained, this study single-handedly could not answer the research question with certainty, as missing information from the study was identified and the result was vague. What this study has contributed to, however; is an established foundation in how to proceed within the same research topic.
The research question is still very relevant to the game industry and could definitely benefit from being explored further as it would contribute to more information on how to create believable and expressive non-humanoid characters. The research question also opens up the concern about attitudes and feelings towards certain animals, which would be interesting to explore further why that is, and how much of an impact some cultures has on animal perception. This information would be especially beneficial for animators and game developers in general, because they would be able to create character based on the common perceptions of a target group. Also, this study could be valuable for directors, narrators, authors, and other people working within the game and film industry. At the same time, this study has lifted some important aspects of speciesism and negative attitudes towards certain animals, which is a topic that would have been interesting to discuss in future studies that could generate additional information; focusing on the reflections of the participants. Knowing how people’s feelings and attitudes impact certain animals, may also put the responsibility on game developers, etc. to change certain standards if it is harmful to the animal in real life; raising the concern about conservation for less favoured animals (Schlegel & Rupf 2010; Ceríaco 2010; Ceríaco 2012).

The lizard in this study did not receive the negative ratings that were expected and could be due to all the flaws of the method that were discovered (see 6.2.1). As Ceríaco (2012) discusses, folklore, culture and educational background is an important reason behind the attitude towards certain animals. This experiment would probably benefit from testing a specific population, or even two different populations (for example, Sweden and Portugal, as geckos are not respected in Portugal (Ceríaco 2010), but the attitude towards these reptiles might be different in Sweden) to compare results and be able to analyse cultural differences.

The design of the model was not evaluated in this project, which is why an interesting approach would be to focus more on the model in conjunction with the animation. A possibility within the magnitude of this project could be to create two different models and animate them in the same style with the same animal reference. This approach could generate some interesting results about how much appearance matter in the interpretation of the animal. Another similar approach would be to use the same 3D model, but to render it in two different styles and using two animal references, creating four artefacts. One of the styles of the model could be texturized, while the other model is a plain grey colour. This approach would reveal how much of an impact colour has on the creature, while analysis of the animation is also possible. These approaches could produce an in-depth analysis of movement as well as appearance.

It would not be meaningless to repeat this study once more, but with the qualitative improvements which have been explained in the previous chapter. A dog would probably have been a better option to include instead of the mix to accompany the cat. This would allow for a deeper evaluation of both dog lovers and cat lovers which could be compared to the ratings of the lizard. It would also be of interest to know the participants’ feelings
towards each animal that is portrayed, so that it can be linked to the ratings, and analysed. A strong recommendation would definitely be to restructure the questionnaire to generate more thorough information. Another idea would also be to conduct a different qualitative method when collecting the results. Interviewing a few participants for example, especially in a pilot study, could reveal some vital and missing information that was not collected from the quantitative method chosen for this project. Another modification that could be done is to not animate the creatures performing the same actions, but rather giving them different actions depending on that unique animal’s more common and daily reactions. For example, a cat could pounce on prey while the lizard runs away quickly as a response to danger. These are two common behaviours of the animals that might be commonly recognized by the observer.
References


Care Animal Clinic Brookfield (2011) Cat from walk to pace [video]. URL: https://www.youtube.com/watch?v=wQsmsr0oR6c. [2019-03-26]


Chusmacha (2017). Watch A Cat Pounce [video]. URL: https://www.youtube.com/watch?v=pfz6DR0gUNE [2019-03-26]


Appendix A
The questionnaire

Creature Animation

Hi!
Your participation in this survey is greatly appreciated.
This survey and artefacts were designed for a study in a Bachelor Degree Project in Game Development at the University of Stavanger. The chosen subject is creature animations.

In this survey, you will first answer a few questions about yourself and your gaming habits. In the next section, you will observe and evaluate a video of a creature through Likert-scales.

Your participation is anonymous. The results and the complete study can at a later point be found at: [http://his.diva-portal.org](http://his.diva-portal.org) (a direct link will be added when the study has been published, late summer 2019).

* Required

What is your biological sex? *

- Female
- Male
- Prefer not to say

What is your age? *

- Younger than 16
- 18-25
- 25-30
- 30-40
- 40-50
- 50-60
- 60+

What country are you from?
Your answer

How often do you play video games? *

- Every day
- More than once a week
- Less than once a week
- More than once a month
- Never
Do you regularly play games that include animals or non-humanoid characters? *

- Yes
- No
- Other:

What is your birth month? *

- January-April
- May-Aug
- Sep-Dec

Artefact

In this section you will observe a short animation of a creature. Your task is to evaluate the creature through likert-scales, and your answers are based solely on the animation and how you perceive the creature.

You are presented with 16 statements below, and you will rate these statements with a value of 1-5. A value of 3 is neutral.
1. The creature is curious
   
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<th>4</th>
<th>5</th>
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</table>
   | ☐ | ☐ | ☐ | ☐ | ☐ | Very curious (interested)
   | ☐ | ☐ | ☐ | ☐ | ☐ | Not curious at all (close-minded)

2. The creature is sympathetic
   
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   | ☐ | ☐ | ☐ | ☐ | ☐ | Very sympathetic (considerate)
   | ☐ | ☐ | ☐ | ☐ | ☐ | Not sympathetic at all (selfish)

3. The creature is sociable
   
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</table>
   | ☐ | ☐ | ☐ | ☐ | ☐ | Very sociable (outgoing)
   | ☐ | ☐ | ☐ | ☐ | ☐ | Not sociable at all (reserved)

4. The creature is trustworthy
   
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</table>
   | ☐ | ☐ | ☐ | ☐ | ☐ | Very trustworthy (reliable)
   | ☐ | ☐ | ☐ | ☐ | ☐ | Not trustworthy at all (unpredictable)

5. The creature is emotionally stable
   
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   | ☐ | ☐ | ☐ | ☐ | ☐ | Very emotionally stable (calm)
   | ☐ | ☐ | ☐ | ☐ | ☐ | Not emotionally stable at all (nervous)

6. The creature is brave
   
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</table>
   | ☐ | ☐ | ☐ | ☐ | ☐ | Very brave (daring)
   | ☐ | ☐ | ☐ | ☐ | ☐ | Not brave at all (cowardly)

7. The creature is powerful
   
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</table>
   | ☐ | ☐ | ☐ | ☐ | ☐ | Very powerful (strong)
   | ☐ | ☐ | ☐ | ☐ | ☐ | Not powerful at all (weak)

8. The creature is kind
   
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</table>
   | ☐ | ☐ | ☐ | ☐ | ☐ | Very kind (gentle)
   | ☐ | ☐ | ☐ | ☐ | ☐ | Not kind at all (cruel)
9. The creature is compliant

<table>
<thead>
<tr>
<th>Not compliant at all (rebellious)</th>
<th>Very compliant (obedient)</th>
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10. The creature is energetic

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<tr>
<th>Not energetic at all (apathetic)</th>
<th>Very energetic (spirited)</th>
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11. The creature is virtuous

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<tr>
<th>Not virtuous at all (evil)</th>
<th>Very virtuous (good)</th>
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12. The motions of the creature are fluid

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<tr>
<th>Strongly disagree</th>
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13. The motions of the creature reflects its size and weight

<table>
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<tr>
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14. The creature expresses temperament

<table>
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15. The creature's animation involves more than one action

<table>
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16. The creature controls its body

<table>
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<tr>
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Appendix B
Results

What is your biological sex?

What is your age?

What country are you from?
How often do you play video games?

- Every day: 9; 43%
- More than once a week: 7; 33%
- Less than once a week: 3; 14%
- More than once a month: 1; 5%
- Never: 1; 5%

Do you regularly play games that include animals or non-humanoid characters?

- Yes: 14
- No: 4

What is your birth month?

- January-April: 7; 32%
- May-August: 8; 36%
- September-December: 7; 32%
Artefact 1 – Cat (horizontal view – value rated; vertical view – respondents)

1. The creature is curious

2. The creature is sympathetic

3. The creature is sociable

4. The creature is trustworthy

5. The creature is emotionally stable
6. The creature is brave

7. The creature is powerful

8. The creature is kind

9. The creature is compliant

10. The creature is energetic
11. The creature is virtuous

12. The motions of the creature are fluid

13. The motions of the creature reflects its size and weight

14. The creature expresses temperament

15. The creature’s animation involves more than one action
16. The creature controls its body

Artefact 2 – Mix (horizontal view – value rated; vertical view – respondents)

1. The creature is curious

2. The creature is sympathetic

3. The creature is sociable

4. The creature is trustworthy
5. The creature is emotionally stable

6. The creature is brave

7. The creature is powerful

8. The creature is kind

9. The creature is compliant
10. The creature is energetic

11. The creature is virtuous

12. The motions of the creature are fluid

13. The motions of the creature reflects its size and weight

14. The creature expresses temperament
Artefact 3 – Lizard (horizontal view – value rated; vertical view – respondents)
4. The creature is trustworthy

5. The creature is emotionally stable

6. The creature is brave

7. The creature is powerful

8. The creature is kind
9. The creature is compliant

10. The creature is energetic

11. The creature is virtuous

12. The motions of the creature are fluid

13. The motions of the creature reflects its size and weight
14. The creature expresses temperament

15. The creature's animation involves more than one action

16. The creature controls its body