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By Katherine Dawn Cissell

Entitled

A Study of the Effects of Computer Animated Character Body Style on Perception of Facial Expression

For the degree of Master of Science

Is approved by the final examining committee:

Nicoletta Adamo-Villani

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Melissa Dark

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Head of the Graduate Program

07/19/2013

Date

A STUDY OF THE EFFECTS OF COMPUTER ANIMATED CHARACTER BODY
STYLE ON PERCEPTION OF FACIAL EXPRESSION

A Thesis

Submitted to the Faculty

of

Purdue University

by

Katie Cissell

In Partial Fulfillment of the

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of

Master of Science

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Purdue University

West Lafayette, Indiana

To my husband, Aaron Humphreys.

And to the people who made me mad enough to prove them wrong.

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ABSTRACT

Cissell, Katherine D.M.S., Purdue University, August 2013. A Study of The Effects of Computer Animated Character Body Style on Perception of Facial Expression. Major Professor: Nicoletta Adamo-Villani.

This study examined if there is a difference in viewer perception of computer animated character facial expressions based on character body style, specifically, realistic and stylized character body styles. Participants viewed twenty clips of computer animated characters expressing one of five emotions: sadness, happiness, anger, surprise and fear. They then named the emotion and rated the sincerity, intensity, and typicality of each clip. The results indicated that for recognition, participants were more slightly more likely to recognize a stylized character although it was not a significant difference. Stylized characters were on average rated higher for sincerity and intensity and realistic characters were on average rated higher for typicality. A significant difference in ratings was shown with fear (within sincerity and typicality) having realistic characters rated higher, happiness (within sincerity and intensity) having stylized characters rated higher and stylized being rated higher once for anger (stylized) and realistic (typicality) being rated once for anger. Other differences were also noted within the dependent variables. Based on the data collected in this study, overall there was not a significant difference in participant ratings between the two character styles.

CHAPTER 1. INTRODUCTION

This chapter will begin with a statement of purpose followed by this study's research question. It will then provide information regarding the scope and significance of the research as well as stating definitions associated with this study. This chapter will also include a list of the assumptions, limitations, and delimitations of this study.

1.1 Statement of Purpose

A stylized character is a character with exaggerated features. They are often based on realistic humans but have overly large and expressive features. Realistic characters are created to mimic reality as much as technologically possible. Currently there is no study asking how the character style affects the human perception of emotion in computer animated humanoid characters. This study can aid the animation field by suggesting if there is a true difference in perception based off a character's visual style. The results of this study could be further utilized by more in-depth looks at why participants are specifically noticing what this study indicates they are noticing. What is being noticed must first be answered before the question of why this is being noticed can be considered. By studying how the two character styles compare, animators will be able to know what is being noticed or not respective of character style and how the viewer

perceives the different emotions based off character style. Above all, this study attempts to add to the knowledge base of animators and character designers. This is still a new field and any new or more definite information can spur more intricate questions about how this industry can improve when it comes to computer animated character emotions. The basic questions must be asked before more intricate questions can be answered.

1.2 Research Question

What are the effects (if any) of a computer animated human like character's visual style (realistic versus stylized) on participants' perception of facial expression?

This question is broken down into four specific variables:

Is there an effect of a computer animated human like character's visual style (realistic versus stylized) on participants' ability to recognize facial expression?

Is there an effect of a computer animated human like character's visual style (realistic versus stylized) on participants' perception of intensity of facial expression?

-If there is an effect, what did the participants report as affecting their perception of that character?

Is there an effect of a computer animated human like character's visual style (realistic versus stylized) on participants' perception of typicality of facial expression?

-If there is an effect, what did the participants report as affecting their perception of that character?

Is there an effect of a computer animated human like character's visual style (realistic versus stylized) on participants' perception of sincerity of facial expression?

-If there is an effect, what did the participants report as affecting their perception of that character?

1.3 Scope

This research centers on the perception of emotion of computer-generated characters in commercial feature films. While the knowledge can be applied to any use of computer animated characters, it is much easier to define a narrower field to study and compare than trying to compare computer-animated characters that were utilized differently. This is not to say the many different uses of computer-animated characters (education, film, video games, etc) cannot be compared, but simply for ease of study only computer-animated characters from commercial feature length films were studied.

This research focuses on the perception of emotion in computer-generated characters as affected by their character style, specifically, realistically styled characters and caricaturized or exaggerated characters. The character styles are different enough to be compared but not so different as to present a difficulty trying to find commonalities between the two styles.

1.4 Significance

This research will allow character designers to make better decisions about their character designs. By studying how the two character styles compare, animators will be able to know what is being noticed (or not) based on the character style and how the viewer perceives the different emotions based off character style. The designers will know what people notice in the respective styles of characters and can focus more of their time on studying why the participants are focusing on that portion of the face.

These character designs can be used in everything from commercial films, to video games, or to educational computer programs. Anything that utilizes a computer-animated character can reference the knowledge gathered in this study to improve the perception of the characters emotions. It is also possible this study can be utilized in non-computer animated character designs such a traditional hand painted animation or other art forms.

This study can also be used as a base for other studies regarding character styles. It would be a useful tool in generating data regarding how different groups view the two different styles. For example, do the inhabitants of Japan perceive emotion differently than the inhabitants of the United States when comparing the two styles? This could also be applied to various other groups as well, thus making this study highly adaptable as a guide for future studies like it.

Overall, this study will improve the knowledge base researchers, animators and character designers have to work with. It will aid them in overall understanding of character animation.

1.5 Definitions

CG – Computer-generated (Claydon, 2005.).

Facial emotion - “When we speak of emotions, we are referring to the transitory feelings, such as fear, anger, surprise, etc. When these feelings occur, the facial muscles contract and there are visible changes in the appearance of the face” (Ekman, 1975, p.11).

intensity - “having or showing a characteristic in extreme degree” (Intense, n.d.).

realistic – “Characters that closely mimic reality” (Maestri, 2006)

realism - “...the term ‘realism’ is often interpreted in a comparable or partial sense. The notion of realism is used here to relate to a reference point... if we speak of realistic graphics the point of reference will be the sense-impressions we receive with our eyes from the real world and the graphics on the screen will be compared with those” (Wages, Gruenvogel, & Gruetzmacher, 2004, p.217).

recognizability – “able to be recognized or identified from previous encounters or knowledge...”(recognizable, n.d.).

sincerity – “free from pretence or deceit; proceeding from genuine feelings” (Sincere, n.d.).

stylized- A character design with some level of exaggeration, caricature, simplification, and/or unusual proportions. The design can range from icons and simple characters to just below photorealism (Bancroft, 2006).

typicality - “how often different variants of a facial expression are encountered in the real world” (Wallraven, Breidt, Cunningham, & Bulthoff, 2007).

1.6 Assumptions

The following assumptions were identified as a part of this research:

- There was a need for the information generated by this research study.
- The use of a mixed methods study utilizing surveys was appropriate for this research question.
- The participants answered as truthfully and completely as their knowledge and abilities allowed, and were not overly biased by personal preferences.
- The participants were familiar enough with computer-generated graphics as a medium that they are not distracted by the medium itself and can focus on the character's animation.
- The number of participants chosen was sufficient to generate enough viable data to be analyzed.
- Participants had a sufficient amount of personal time to fill out the survey.
- The clips chosen were seen as an accurate representation of that emotion.

1.7 Limitations

The following limitations were identified as a part of this research:

- This study used a participant pool drawn from Purdue University College of Technology students, age 18-26.
- This study used clips from the following movies: Tangled, The Polar Express, Brave, The Incredibles, Up, Final Fantasy VII: Advent Children, The Adventures of Tin-Tin, Dragons: Gift of the Night Fury, Beowulf, A Christmas Carol, Mars Needs Moms.

- Clips were chosen from pre-existing films and participants may have seen the clips before and may recall the situation and emotion.
- Qualitative researchers are a part of the analyzing process and view the data through their analysis.
- These clips do not take into account context which can aid recognition and understanding of an emotion. No context was played in an attempt to view the clip's emotion on its own.
- Clips for corresponding character styles for one emotion were chosen by the researcher in an attempt to match similar body styles and are not perfect matches in all instances.

1.8 Delimitations

The following delimitations were identified as part of this thesis:

- This study did not use computer-generated characters from video games or anything other than a commercial feature film.
- The data generated from this study were only viewed as a representation of this group of participants, at that specific time.

1.9 Chapter Summary

The previous chapter identified components critical to this study including the statement of purpose, the research question, the scope, the significance, and several definitions. This chapter concluded with the assumptions, delimitations, and limitations of this study. The next chapter will outline the literature relevant to this study.

CHAPTER 2. LITERATURE REVIEW

Why would it be useful to study the difference in perception of emotions between stylized exaggerated characters and realistic characters? There are a multitude of reasons that show that the information would be very valuable to animators in their pursuit of believable characters, both realistic and stylized. To begin this literature review, there is no study similar to the one proposed that has been conducted at this time that compares the two styles. This research would be entirely new, although certainly it is aided by previous related research.

This literature review will present several definitions of concepts pertinent to this study as well as providing reasons why this study will be useful to the industry. There are a multitude of published articles that relate to this topic and it would be impossible to present every piece ever published in this literature review. This literature review presents a selection of articles that best describe the problems and present various solutions found for this topic. This literature review begins by first discussing stylized and realistic characters.

2.1 Stylized versus realistic computer animated films

This literature review focuses on two types of character styles: stylized and realistic. A realistic character is one that closely mimics reality and often photorealistic techniques are attempted. Motion capture techniques are frequently used to create realistic characters animation. This characters body design should be proportional to what a real human's body proportion would be. A stylized character is adding a specific art style to a character where the goal is not to create a realistic character but to create a caricature of a character (Maestri, 2006). Exaggeration is prevalent for stylized characters and a character designer when designing a stylized character is essentially creating their own reality, which may or may not take several liberties with true reality. Stylized characters allow a character designer much more freedom in how the character is designed and how it moves as proportions and movements can be changed from what would be realistic for a human. For example, stylized characters often have larger heads in relation to their bodies since the face communicates a great deal about a character's personality or mood so the larger the head and face, the larger the space to convey information (Maestri, 2006). The following two figures present young male characters in either a realistic or stylized character body style. One should note how large the stylized characters head is in proportion to his body; it contrasts dramatically with his raised hand. The stylized character's ears are also large and lacking the indication of an actual ear canal, which takes liberties with the reality of human anatomy. These two styles are prevalent in the computer animated film industry and a look at how they fare in the box office should first be considered.



Figure 1.1 Stylized character body style example
(Untitled screenshot of *The Incredibles* character Dash.

http://www.cracked.com/article_15070_the-10-best-animated-movies-traumatizing-kids.html



Figure 1.2 Realistic character body style example
(Untitled screenshot of *The Adventures of Tintin* character Tintin.

www.film.com/movies/the-definitive-differences-between-tintin-and-rin-tin-tin)

To this date, there have been 95 computer animated films released in the past eighteen years (Box Office Mojo, 2013). In this time only seven realistic character computer animated movies were created. One of them, Final Fantasy VII: Advent Children, was not shown in theatres and thus has no box office data to compare to the others. Main characters that are not human-like are not considered as realistic, even if the film attempted to make them realistic creatures. The highest ranking realistic character computer animated film for domestic gross lifetime earnings is *The Polar Express* which is ranked at 28th with \$183,373,735. The following chart is a list of the computer animated films that consisted of human-like characters within the main cast or as a majority of supporting cast roles. It lists their ranking out of the 95 total computer animated films according to domestic gross lifetime earnings, their name, their domestic life-time gross earnings, and an indication if it is a stylized or realistic film. If the film did not fit the criteria of containing human-like characters, it does not appear on this list. This chart is only indicative of life-time gross earnings as of this time as it is possible for the newer releases to continue to earn more and increase in rank.

Table 1.1 Box office data for computer animated films

Ranking	Film name	Domestic Life-time gross earnings	Stylized	Realistic
1	Shrek 2	\$441,226,247	X	
4	Shrek the Third	\$322,719,944	X	
5	UP	\$293,004,164	X	

Table 1.1 Continued.

7	Shrek	\$267,665,011	X	
8	The Incredibles	\$261,441,092	X	
9	Despicable Me	\$251,513,985	X	
12	Shrek Forever After	\$238,736,787	X	
13	Brave	\$237,283,207	X	
15	How to Train Your Dragon	\$217,581,231	X	
18	Dr. Seuss' The Lorax	\$214,030,500	X	
19	Ratatouille	\$206,445,654	X	
20	Tangled	\$200,821,936	X	
21	Monsters Vs. Aliens	\$198,351,526	X	
28	The Polar Express	\$183,373,735		X
29	Wreck-It Ralph	\$181,700,136	X	
37	Dr. Seuss' Horton Hears a Who!	\$154,529,439	X	
38	Puss in Boots	\$149,260,504	X	
39	Megamind	\$148,415,853	X	
40	Hotel Transylvania	\$147,211,394	X	
41	Rio	\$143,619,809	X	
42	A Christmas Carol	\$137,855,863		X

Table 1.1 Continued.

47	Cloudy with a chance of Meatballs	\$124,870,275	X	
49	Bolt	\$114,053,579	X	
51	Rise of the Guardians	\$99,819,379	X	
52	Meet the Robinsons	\$97,822, 171	X	
55	Beowulf	\$82,280,579		X
56	Jimmy Neutron: Boy Genius	\$80,936,232	X	
57	The Adventures of Tintin	\$77,591,831		X
58	Monster House	\$73,661,010	X	
64	TMNT	\$54,149,098	X	
65	Hoodwinked	\$51,386,611	X	
66	The Tale of Despereaux	\$50,877,145	X	
67	Arthur Christmas	\$46,462,469	X	
70	Star Wars: The clone Wars	\$35,161,554	X	
71	Final Fantasy: The Spirits Within	\$32,131,830		X

Table 1.1 Continued.

74	Space Chimps	\$30,105,968	X	
75	The Ant Bully	\$28,142,535	X	
78	Mars Needs Moms	\$21,392,758		X
79	Astro Boy	\$19,551,067	X	
80	Igor	\$19,478,106	X	
82	Happily N'Ever After	\$15,589,393	X	
84	Everyone's Hero	\$14,523,101	X	
87	Hoodwinked Too! Hood Vs. Evil	\$10,143,779	X	
89	Battle for Terra	\$1,647,083	X	
90	The Ten Commandments	\$952,820	X	

(Box Office Mojo, 2013)

The box office data shows a dramatic skewing towards film studios preference to produce stylized computer animated films. This shows that film studios recognize a stylized movie is more likely to generate monetary success which would enable the studio to continue to produce films. The highest ranking realistic character computer animated film for domestic gross lifetime earnings is *The Polar Express* which does not appear in the rankings until 28th with \$183,373,735. Another realistic character film, *Mars Needs Moms*, is ranked 78th with \$21,392,758 and is considered one of the worst box office bombs ever as its budget was about \$150 million and even the addition of earnings worldwide to domestic only puts its earnings at \$38,992,758.

This research will show if there are any differences in perception of facial emotion based on the computer animated characters style which would enable film studios to either consider why that is the case or accept that it is some other difference that is separating the two character type's success in the box office. Essentially, this study is needed to allow film studios to understand their creative choices better to gain more money and continue existing as a film studio.

The next two sub sections will focus on the definitions and pertaining literature to both styles. The realistic character has already been shown to have a disadvantage in box office data and the next section will provide further literature on a major disadvantage of realistic characters, the uncanny valley.

2.1.1 Realistic characters

One disadvantage faced by realistic computer animated characters is Mori's "The Uncanny Valley" theory. This theory states that there is a point at which realism will drop when confronted with a human character, this drop being termed, The Uncanny Valley. Mori was originally designing his theory in reference to robot aesthetics but the theory easily applies to computer-animated characters. In the theory, Mori mentions a metal clad robot as bearing, "...little resemblance to a human being, and in general people do not find them to be familiar. But if the designer of a toy robot puts importance on a robot's appearance rather than its function, the robot will have a somewhat humanlike appearance with a face, two arms, two legs, and a torso. This design lets children enjoy a sense of familiarity with the humanoid toy" (Mori, 1970, p.33). This statement can easily be applied to computer-animated figures. A character designed

entirely for function will not present a sense of familiarity to the viewer. In fact, it would be quite boring to view if all characters were designed solely to provide the message of the film and were not designed to provoke familiarity and emotion from the viewer. Characters are designed so that the viewer will have a sense of familiarity with the characters, and thus it is not often that the design will deviate from the standard humanoid figure. If the character does, it is often still given many human aspects or a humanlike range of motion.

Mori continued by suggesting:

For creatures, including robots, movement is generally a sign of life... adding movement changes the shape of the uncanny valley by exaggerating the peaks and valley. For the industrial robot, the impact of movement is relatively slight because we see it as just a machine. If it stops moving, it just stops working. But if programmed properly to generate humanlike movements, we can enjoy some sense of familiarity. Humanlike movement requires similarity of velocity and acceleration. Conversely, if we add movement to a prosthetic hand, which is at the bottom of the uncanny valley, our sensation of strangeness grows quite large.

(Mori, 1970, p.34)

This is due to the life like appearance of the prosthetic arm (Mori, 1970). When there is a lifelike character, if it does not move, it is considered odd but not uncanny. However, when movement is added to a realistic character it seems to provoke a response in the viewer of eeriness or wrongness. Movement is extremely crucial to the perception of emotions in animation and it seems as if this is where the realistic characters often fall flat.

Others have confirmed the uncanny valley effect with their own experiments. For example one study found, "... the perceptual sensitivity to facial features was higher for real faces than for artificial faces, and the higher sensitivity for real faces produced unpleasant impressions of abnormality while the lower sensitivity for artificial faces did not" (Seyama & Nagayama, 2007, p. 349). Another tested perceptions of uncanniness in different emotions when portions of the face were frozen in realistic characters. Both these studies help confirm the existence of the uncanny theory as well as suggesting there is a difference in perceptions of uncanniness when an artificial face is compared with a realistic face and differences in perceptions of uncanniness based on the emotion. This would lend itself to the concept that a stylized character would be perceived differently than a realistic one based upon the increased sensitivity to real faces and the emotion itself could affect any differences the participant notices.

The Uncanny Valley is not the only potential problem for realistic characters. Research (Jorg, Hodgins, & O'Sullivan, 2010) also suggests that viewers can perceive modifications to a motion captured movement. The authors took a motion-captured motion and delayed the motion. The participants then responded if the clip was modified or not. This research suggests that if an animation of a motion is not animated correctly in its speed, the viewer will notice. There is no data to say whether or not the animated delay in motion would be noticed in a stylized character. Other research suggests that the viewer is much more forgiving of stylized characters (Nunez, 2004) but it is impossible to say definitely if stylized characters suffer from the same fate as realistic characters when studying motion delay in finger motions.

The rush towards realism in computer animation is based on the assumption that the resulting animations will be more believable and immersive for a viewer (Wages, Grunvogel, & Grutzmacher, 2004). If this were true there would not be the dramatic discrepancy between realistic and stylized computer animated character's number of films. There are expectations when a realistic character is chosen that character designers and animators can ignore or change when creating a non-realistic or stylized character. When one's goal is not realism, one is not limited by the restrictions of reality (Nunez, 2004). This concept is one of the key differences when comparing the two styles of characters. A stylized character can do just about anything it wants and a viewer won't be concerned so long as the animation is done in a believable manner. Realism should be considered in terms of what the viewer expects for that world (Nunez, 2004). Essentially, a viewer has a set of expectations for each character relating to the world in which they are presented. When the world or character is exaggerated or a caricature, the expectations become far less strict.

2.1.2 Stylized characters

Stylized characters are often exaggerated, caricatures of humans. Caricatures, or faces that are unusual, are easier to remember and recognize than ordinary faces (Mauro & Kubovy, 1992). It is much easier for a human viewer to recall an unusual or exaggerated face, which would also lend itself to the theory of why it is much easier to perceive the emotion of a caricature of a character. It is exaggerated and therefore easier to read. It is possible that a viewer, when comparing a stylized exaggerated character to a realistic character, would note the ease of recognizing the emotion. At this time, there is

not research suggesting if this is the case or not. This ease of remembering and recognizing caricatures or unusual faces is an advantage for stylized characters over realistic characters.

When one considers animation as a whole, Disney is a name that is often mentioned. It should be noted that Disney has a predetermined set of 12 rules, which animators are to follow if they want a successful animation. Of those 12 rules, number ten is exaggeration. The book *Disney animation: The illusion of life* provides Walt Disney and his company's outlook on animation and realism. The book states:

There was some confusion among the animators when Walt first asked for more realism and then criticized the result because it was not exaggerated enough. In Walt's mind, there was probably no difference....When Walt asked for realism, he wanted a caricature of realism. (Thomas & Johnston, 1984, p. 33-34)

In the Disney world, realism is created through the art of caricature. Woolie Reither states, "The art of animation lends itself least to real people, and most to caricatures and illusions of a person" (Thomas, & Johnston, 1984, p.177). The authors of that book also suggest, "Generally speaking, if there is a human character in a story, it is wise to draw the person with as much caricature as the role will permit" (Thomas, & Johnston, 1984, p. 177). Disney suggests that a character should be as stylized as possible, this eliminates the possibility of using realistic characters.

Pixar, another leader in the computer animated film industry, also believes that overall, "Only intelligent (and sometimes nonrealistic) creative choices ensure that the story makes sense, the characters are appealing, and the images are stunning" (Porter & Susman, 2000, p. 29). Two of the most popular and influential computer animated film

studios favor using exaggeration and caricatures to create a successful film. These techniques cannot be used in realistic characters as it would make them no longer realistic so this is an advantage for stylized characters. Stylized characters currently have the backing of Disney and Pixar and until something changes and the problems these studios find with realistic characters are identified and solutions provided, they are not likely to change their successful strategy of using stylized characters in favor of using realistic characters.

Another concept that is tied to stylized characters in particular is that previous studies in perception of computer-animated characters have found modifications to finger motion can alter the meaning of an animated vignette (Jorg, Hodgins, & O'Sullivan, 2010). While this something to be considered while creating a realistic character, the important question is that if a finger movement alteration can change the meaning of a vignette, what happens with exaggerated smiles or overly large eyes as found in non-realistic humanoid characters? This research on finger motions could be compared to eyebrow motion in stylized characters. A droop in the eyebrows could change the meaning of the video clip because the exaggerated motion of drooping eyebrows is something a realistic character cannot do. Thus, one could suggest that the addition of expressive body parts in stylized characters could aid or hinder the viewer's perception of that emotion. Without comparing the two styles of characters, there can be no conclusion on whether or not the exaggerated or additional body parts are even noticed, let alone if they aid in the expressivity of the emotion.

There is a study that has compared different styles of characters and tested how viewers perceived the emotions. They used six different animated characters; a motion

captured video of the actor acting out the emotion, a high and a low-resolution version of that same actor's footage, a wooden mannequin, a zombie, and a toon character. This is a mix of realistic and stylized characters. There were six emotions recorded and the videos were shown to the participants in random order. The participants then responded by rating the intensity of the emotion and choosing from a list what emotion was being displayed. The results concluded that captured body motion is effective at depicting emotion and perception of emotional motion is unaffected by a character's physical appearance (McDonnell, Jorg, McHugh, Newell, & O'Sullivan, 2008).

According to these results, there should be no difference in how the two different character styles' body emotions are perceived. The uncanny valley however, suggests that there is an impression of uncanniness the more realistic a character gets and thus there is a conflict in the literature. The problem with this study was that it only studied body motion; hands and facial features were blurred out. The authors found that even when a zombie character model was used, despite the descriptions from the participants noting it as unappealing, so long as a realistic motion was applied, a reaction of uncanny eeriness did not occur. The authors suggest that perhaps it could be the face and hand motions that cause the reactions of eeriness and not the body motions of the model (McDonnell, Jorg, McHugh, Newell, & O'Sullivan, 2008, p.70). A study comparing the realistic and non-realistic character's facial emotions could provide the answer to whether there is a difference in emotion perception and perhaps what that difference is.

Emotion is difficult to describe and complex undertaking to define. The next section will provide a definition of emotion and break down how viewers perceive emotion. The study with the different character styles found no difference in perception

of body motion however, they blurred out faces and hands. Faces carry the most emotion information. Thus, facial emotion is likely where a difference can be noticed and should be studied to see if there is a difference in perception of facial emotion based off character style. A description of facial emotion will be presented in the next section.

2.2 Perception of facial emotion

The standard of emotions usually consists of happiness, sadness, surprise, fear, anger, and disgust (Ekman & Friesen, 1975). Emotions can be broken down into different portions of the face in order to study them. The regions consist of the mouth, eyes and eyebrow regions. It should be noted that humans are excellent at perceiving small differences in facial motion and the slightest impression of that motion being incorrect will result in that emotion being viewed as incorrect or creepy. Humans also will create a comprehensive list of what all those facial motions are and what they mean. However, “... even if a physically accurate virtual human face imitates all spatial and temporal aspects of facial motion perfectly, it is still not guaranteed that this facial expression will be identified correctly” (Griesser, Cunningham, Wallraven, & Bulthoff, 2007, p. 12). There is something more to an emotion than just getting the motion right as well and that something is still not identified in the industry.

Ekman and Friesen (1975) suggest that there are three types of signals produced by the face. The first is Static, which includes many more or less permanent aspects of the face such as skin pigmentation, shape, bone structure, etc. The second signal is Slow, which includes facial changes that occur gradually over time, such as wrinkles. The third signal is called Rapid, which includes the temporary changes in facial appearance by the

movement of facial muscles (Ekman & Friesen, 1975). The rapid signal is what a majority of people thinks of when thinking of emotion, the physical movement of the face to a smile or frown. All three of these signals play a role in how a viewer perceives emotion of another being or character.

When it comes to computer animation, it seems to be that the rapid signals are the ones that are more likely to be animated incorrectly. The model itself comprises of the first two signals, static and slow, which only leaves a single signal to be created and then perceived. This is where differences in character style need to be studied in order for the character to be believable. The question of whether the static and slow facial signals have an effect on the perception of emotion is particularly pertinent while studying stylized characters. The benefits of studying the possibility that the physical character design (the slow and static signals) shows an impact on how the character's emotions are compared to other characters will allow designers to create better informed choices.

The facial action coding system (FACS) is a system that measures and describes facial behavior. The most recent version was created by Paul Ekman, Wallace Friesen, and Joseph Hager. This system is valuable for computer character animators since it allows a trained observer to break down an expression into the specific facial movements that comprise it and give it a specific score that can be used to examine its components (Ekman, Friesen, & Hager, 2002). While it by itself cannot ascribe any meaning to the movements, a database called FACS AID (Facial Action Coding System Affect Interpretation Dictionary) translates scores into emotional categories (Hager, 2003). An animator can use this information when creating the rapid signals of a character's expression. These signals can be translated to both realistic and stylized characters, so

the expression itself should always be the correct ones for a specific emotion when using this system. This supports the idea that the appearance of a character could be where any differences in perception of emotion are happening as the rapid signals for a specific emotion should be the same regardless of character appearance.

It is important to understand how to evaluate perception of emotion as well as understand the results when evaluating emotion. One study which is very important to this study in terms of variables defined and how to evaluate perception of emotion used seven emotions across six different animation techniques. (Wallraven, Breidt, Cunningham, & Bulthoff, 2007) Along with the standard six emotions, thinking was added to the set for this study. The first experiment found that rigid head motion in computer-animated character's facial motions is important to the recognizability of the emotion if there is motion. If motion is removed, shape blurring will negatively affect recognizability of the emotion. Both shape and motion blurring will affect intensity as well. Blurring the shape and texture of the animated character will not affect recognition. The also concluded that the addition of eyes and teeth to the characters significantly increased recognition accuracy, as well as intensity and sincerity ratings (Wallraven, Breidt, Cunningham, & Bulthoff, 2007). This study presents an idea of what viewers could be noticing in different characters and when comparing the two styles it is possible that there may be a difference in what they notice depending on the character. It indicates that the visual style could affect how a viewer perceives the character's emotion but it is unknown in the literature if there truly is an effect based on character's visual style. The research proposed here seeks to determine if there are any effects from a

computer animated human like character's visual style (realistic versus stylized) on participants' perception of facial expression.

2.3 Conclusion

This literature review has provided several definitions, concepts, and ideas crucial to understanding the value in this study. There is no study that identifies any differences in perception of emotion between stylized and realistic characters and yet there is a definite trend towards using stylized characters. This study would be a start into exploring what the differences are and from there can provide a stepping stone towards determining why the differences are there. There is a difference in the usage of stylized and realistic characters by film studios. There are advantages and disadvantages for each style but the literature does not show if perception of facial emotion is affected by the character style. A study comparing body motion between a variety of realistic and stylized characters found no difference, but the majority of emotion information comes from the face and that study did not consider facial emotion. Of the three signals that compose facial emotions, slow and static are significantly different for the two characters so, a study comparing the perception of facial emotion expression should be done. This study asks the question: What are the effects (if any) of a computer animated human like character's visual style (realistic versus stylized) on participants' perception of facial expression? If film studios know if there is a difference and what the participants are noticing differently for each style, they can then further study the problems and differences and ultimately make more money and successful films.

CHAPTER 3. METHODOLOGY AND FRAMEWORK

3.1 Methodology

This research is a mixed methods study combining quantitative questions with qualitative questions. This study utilizes descriptive research. The intent is to describe characteristics of what is being studied through data, not to generate a solution to a problem. Descriptive research allows the researcher a better understanding of the topic being studied. Maxwell notes qualitative design allows for identifying unanticipated phenomena and influences and generating new “...grounded theories about the latter. Qualitative research has an inherent openness and flexibility that allows you to modify your design and focus during the research to understand new discoveries and relationships” (Maxwell, 2005, p.22). A qualitative research design allows the researcher the flexibility to ask, “What do you see?” rather than, “Do you see.... (insert word here)”. In order to perform a quantitative study, there must be the definition of what the themes and variables are being investigated. This research uses variables described in a method for evaluating animated facial expressions in previous research (Wallraven, Breidt, Cunningham, & Bulthoff 2007).

3.2 Framework

The goal of the research is to identify the effects (if any) of a computer animated character's visual style (realistic versus stylized) on participants' perception of facial expression. This research utilizes a framework called Website Experience Analysis.

This framework was designed to help a user explain what specifically about a website was affecting their experience of it. Website experience analysis allows the data to create a map of the participant's experience by having the participant answer a quantitative question and then explain what specifically, in the object being studied, made them rate that way and why in a qualitative manner (Vorvoreanu, 2006). The framework was initially used to evaluate the experience of a participant at a public relations website. This framework breaks down experience of a website into two components, spatial and temporal. What this study is using from website experience analysis is both the concept and the method of describing the experience of the spatial dimension of a character rather than a website, as well as a second question being used to describe the temporal aspects of a character rather website. Website experience analysis describes a website being built as a modular structure. This concept of a modular structure is not being applied to this study as the intent is identify where the participant is noting as affecting their perception, not to categorize an area for change or modification. Website experience analysis has five identified steps in its process but this study will use the framework beginning at step 4, the use of a set pattern of questions via a questionnaire. The other steps in the series have been replaced by a different manner not specific to Website experience analysis's order of events. Also, instead of focusing on the relationship between the participant and the character or website, variables defined by previous research (Wallraven, Breidt,

Cunningham, & Bulthoff, 2007) will be used for evaluation of perception of the character emotion. This framework allows for a more guided method of qualitative research than simply asking the participant what they notice. No two viewers are alike and so explaining what specifically about the object they are viewing made them answer the question the way they answered allows the researcher to get a broad look at what is affecting the viewers' perception of that object.

This methodology was chosen for two reasons. Firstly, it allows for the participant to explain their reasoning for the rating rather than only collecting quantitative data which does not tell the reasoning behind the rating. It also utilizes quantitative data for a more controlled description of the characters, meaning this method allows for the best of both branches of research. Secondly, although an animated character is different from a website, they still have a relationship with the viewer where the viewer experiences them and makes judgments about them. This research asks the participant to rate a broad category about the website or character and then narrow into what the participant defines as the area that made them rate in that way, thus the researcher is not forced to define areas of notice and the participant can show what areas contributed to their answer and why. Also, there is no previous mixed method research describing how to identify what differences are noticed when a caricatured computer animated character is compared with a realistically rendered computer animated character.

3.3 Variables

The two independent variables are realistic and stylized character body styles. The dependent variables are recognition, sincerity, typicality, and intensity. The first

question asks the participant to identify the emotion. The other three quantitative questions of this study ask the participant to rate the sincerity, typicality, and intensity of that emotion when viewing the animated character. Each of the quantitative questions are followed by a qualitative question. The typicality of the character refers to, “how often different variants of a facial expression are encountered in the real world” (Wallraven, Breidt, Cunningham, & Bulthoff, 2007). Essentially, is the facial expression something you would see every day or is it in some way unusual? Typicality is also defined as, "having the distinctive qualities of a particular type of person or thing" (Typical, n.d.). So, to what extent does this expression of emotion have the distinctive qualities of a human's expression of this emotion? The second quantitative question asks the participant to rate the intensity of the expression compared to a human's corresponding expression. Intensity refers to, “Having or showing strong feelings...” (Intensity, n.d.). The question essentially asks, how well does this character expression's emotion strength match that of a normal human expression's emotion strength? The third asks the participants to rate the sincerity of the expression. (Wallraven, Breidt, Cunningham, & Bulthoff, 2007). Sincerity means, “free from pretense or deceit; proceeding from genuine feelings” (Sincere, n.d.). Does the participant feel the emotion being displayed is genuine or do they perceive it as not genuine, or insincere? Each of these questions are followed by a question asking the participant to identify what about the character made them rate the previous question in the manner that they did. The qualitative data allows the researcher to note themes that occur in the data collected from the participants in order to provide a more descriptive answer without needing to state specifically what each individual should draw their attention to.

The participants watched brief clips of twenty different movie scenes. A clip was comprised of a computer-animated character expressing one of five emotions: happiness, sadness, surprise, fear, and anger (Ekman & Friesen, 1975). There were four clips for one emotion, two clips represented a realistic human's expression of that emotion and the other two clips were a caricatured humanoid expressing the same emotion. The clips viewing order was randomized. All clips were able to be replayed as many times as the participant wished. The participant viewed the clip and then answered questions.

3.4 Data Collection

The participants used an online survey tool called Qualtrics. This method allowed the participant to choose, on their own time, when it was best to take the survey and did not restrict the researcher to setting particular times and locations to collect data. All that is required to use Qualtrics is access to the link of the survey and an Internet connection. Qualtrics allows for video clips to be embedded into it and allows for a multitude of different answering types. This study used both free form answer boxes and a rating scale.

The rating scale was from 1 to 7. Using Intensity as an example, the rating scale referenced 1 being not intense and 7 being very intense, with the anchor being at 4. This rating scale was chosen to emulate previous research (Wallraven, Breidt, Cunningham, & Bulthoff, 2007). The survey randomized the order the clips were played for each participant to eliminate a testing effect on the data.

3.5 Participants

The age range of the participants was from 18 to 26. Eighteen was chosen as the base since they were of legal age to participate without the researcher requiring separate approval. Twenty-six was chosen as the upper bound because the participant would have been 10 years of age in 1995 when Toy Story, the first commercial length computer animated movie, appeared in theaters. This means they have essentially ‘grown up’ with the medium and are less likely to be distracted by the concept of it being computer generated.

The sample was intended to consist of at least 50 participants. They were undergraduate or graduate students from Purdue University. Participants for the survey were found by the researcher requesting several of Purdue’s College of Technology professors, who teach introduction classes, to send the link to their students. This sample can best be described as a convenience sample as Purdue University College of Technology introductory class students are the easiest for the interviewer to access.

3.6 Compensation

The participants were compensated by either extra credit from their professor for taking the survey or completing an equal assignment or by a random drawing for a \$10 Amazon gift card. If fifty participants were reached, there was to be a minimum of three \$10 Amazon gift cards. If more data than fifty participants was collected, for every ten participants another \$10 gift card was to be added, up to \$60. If the professor chose to give extra credit to the students in their class who completed the survey or another small assignment, the researcher would have offered to grade the other assignments offered so

as to not place an extra burden on the professor. No professors offered extra credit. Since the researcher had intended on purchasing at least three \$10 Amazon cards, and they came in packs of three, the researcher purchased three cards despite there only being 13 completed surveys. Six participants responded to the query for compensation, three were chosen randomly from the six participants, and the card was mailed to them.

3.7 Stimuli

The twenty clips were chosen from a variety of computer animation studios. These studios included: Weta Digital, Pixar Animation Studios, Square Enix, Sony Pictures Imageworks, Dreamworks Animation, and Walt Disney Animation Studios. At least three different studios were chosen for each character style to try and negate bias by presenting their different methods of animation that may be particular to those studios. Realistic clips were chosen based off their use of motion capture as the main tool for movement and the artistic style of the movie attempting to emulate human life as much as possible. Stylized clips were chosen based off their representation of a stylized human and their main method of animation not being motion capture. The clips were chosen based off their representation of a human and brevity of the emotion expression.

3.8 Analysis

For the analysis, the clips were designated by numbers. The numbering of the clips was randomized so no order could be determined by participant. A master list of all the clips and their names was created and used as a reference.

For the quantitative analysis, the independent variables are the stylized and the realistic body styles. The dependent variables are the participant responses for

recognition, intensity, typicality, and sincerity. The statistical methods were a mix of T-tests and analysis of variance (ANOVA). In instances where only two samples were compared, a paired T-test was used but in instances where many samples must be compared an analysis of variance was performed. The first item to be analyzed was the responses to recognition. For each clip, a tally of those who accurately identified the emotion will be taken. The number of correct identifications across all the emotions will be tallied for each character body style. This average percentage was compared to the opposite character body styles average percentage. This provided data on differences in recognition between character body style clips for all five emotions.

Next, the ratings for sincerity, typicality, and intensity were analyzed. These responses were in a range from 1-7. All three variables were analyzed in the same manner, one variable at a time. Using intensity as an example, a two way Anova was first be performed to see if there was an effect of character body style, emotion or an interaction between the two, affecting participant ratings of intensity. Next, if the Anova did not show an effect of the interaction between character and emotion, a paired t-test looking to see if there is a difference in ratings for realistic and stylized character was performed. If an interaction is shown in the Anova, a paired t-test was not performed as this can present unreliable results. Paired T-tests were next performed for each emotion's intensity ratings to see if character body style affected participant's ratings of intensity for a particular emotion. This was done for each emotion. The variables of intensity, sincerity, and typicality were all done this way. For each comparison, the null hypothesis that is being tested is that there is no difference between the two dependent variables.

The qualitative answers were analyzed by a categorizing coding strategy. This strategy was chosen due to its ability to present themes in the participant's responses, which aids the reader in understanding the larger picture of the data by breaking the data down into simpler and smaller concepts. Unlike the coding used in quantitative data, where the object is to note the frequency of the codes based on predetermined conditions, qualitative data coding attempts to fracture the data into themes that aid comparison with other things in the same category and provide support for the researcher's theories about the data (Maxwell, 2005). After several readings of the answers, general topics were identified. Each topic was given a code to allow the researcher to easily identify those topics. Each answer was then categorized with the number and the corresponding themes. More than one code could be applied to an answer. The researcher then studied the coded answers and made decisions whether or not that particular code legitimately expressed a common theme noted by the participants. The researcher then studied each theme individually to see how it fractured the data farther. Several small topics at this time were dismissed as unsubstantiated by the data while others were combined into more descriptive themes. In qualitative coding, the codes emerge from the data and initial codes may be later dismissed.

3.9 Perspective

This research was analyzed using an interpretive paradigm. An interpretive approach to data means the researcher is, "...interested in the meaning, for participants in the study, of the events, situations, experiences, and actions they are involved with or engage in" (Maxwell, 2005, p.22). Essentially, the researcher is interested in how the

participant makes sense of the world around them and how that changes the participant's behavior (Maxwell, 2005). In the case of this research, the focus was on what differences, if any, the participant perceived, thus, this research was interested in how the participants made sense of the computer animated video clips presented to them and what they noticed.

3.10 Credibility

The researcher has an undergraduate background in graphic design and has been trained to notice differences in design and the effects these differences can make. The researcher has also run a smaller version of this research under the guidance of a faculty member as an unofficial test study in a qualitative methods class. The stimuli were confirmed as representing either stylized or realistic by expert testimony.

3.11 Approvals

Approval was first sought from the researcher's committee chair and members. Upon their approval, the researcher sought IRB approval utilizing the expedited review application and it was granted.

CHAPTER 4. RESULTS

The results section will first introduce the demographics of the responses and then present four main sections. Each of the sections will present the results of a variable, beginning with recognition, and continuing to sincerity, intensity, and typicality.

In order to classify the participant ratings into two groups using a seven point Likert scale, the rating of four needed to be classified into either the high or low rating group. It was classified as low since the most common answer was a rating of 5 or 6. The number of high responses ranged from 142 to 169, whereas the number of low responses ranged from 91 to 118, even with four included. If four had been classified with the high group, it would have made the disparity between low and high ratings stronger, but as the most common answer was five or six, it should be considered beneath the average participant's rating and therefore is considered below average, or low. Ratings of five and six were overall most common and ranged from 47 to 73 times versus the ratings of four, which ranged from 41 to 47 times. Also, four was more similar in the number of occurrences to a rating of three rather than to a rating of five.

4.1 Demographics

A total of 13 completed surveys were collected. One participant indicated his age was 34. His survey was included as his answers were in line with many of the other participants and no noticeable difference during the quantitative analysis was noted about his responses. While he did respond to several qualitative responses with non-relevant answers, another participant within the age range did the same and so his qualitative answers, while not answering the question, are not significantly different from the other participant. Besides the 34 year old, all the participants who completed the survey were within the age range of 18-26.

Three females and ten males completed the survey and ten participants indicated they were a student in one of the undergraduate college of technology classes.

4.2 Recognition

Emotion recognition was coded with different names of the same emotion being counted as correct. For example, shocked would also be counted as correct for surprised. Answers were counted the number of times they appeared as some participants answered with multiple emotions and these were counted on their own, not as the complete answer.

For multiple answers, if the participant responded with the correct answer in the list, the response was considered correct. Not relevant answers such as non-emotions or participant expressions of their uncertainty were put into their own category.

Table 4.2.1. Emotion Recognition

	Correct	Incorrect	Not Relevant/ Uncertain	Correct specifications	Incorrect specifications s
Surprise					
Clip 5- Realistic- Surprise	7	6		Shock, astonishment counted correct	disgust, fear x3, helpless, awe, scared
Clip 8- Realistic- Surprise	10	2	1	Shock, amazement x7 counted correct	awe, wonder
Clip 1- Stylized- Surprise	9	3	1	Shocked/Stun ned, amazement, considered correct	Angry, realization, found something, , frightened

Table 4.2.1. Continued.

Clip 12- Stylized- Surprise	7	6		Stunned counted correct	Curiosity x2, epiphany, fear, wonder, discovery, awe
Anger					
Clip 11- Realistic- Anger	9	4			Excitement, commanding yell, determination, denial
Clip 15- Realistic- Anger	6	6	1		Annoyance, disgust, upset, displeasure, irritation, dissatisfaction

Table 4.2.1. Continued.

Clip 9- Stylized- Anger	4	9			Doubt, disappointment, bitter, upset x 3, frustration x 2, unhappy, annoyed
Clip 19- Stylized- Anger	10	3		Shouting/yell ing ready to fight	Crazy, determination, challenge
Sadness					
Clip 2- Realistic- Sadness	9	4	0	Verge of tears counted correct	Worry, realization, anxious, fear, hurt, guilt

Table 4.2.1. Continued.

Clip 17- Realistic- Sadness	2	10	1		Sorry, remembrance, confusion, sincere, concern, calmness, apathy, reluctance, farewell, helpless
Clip 7- Stylized- Sadness	10	3		Defeat, Depressed, Despair counted correct	Thinking, moment before insight, worry, frustration
Clip 13- Stylized- Sadness	11	2			Release, loss, ashamed
Happiness					

Table 4.2.1. Continued.

Clip 3- Realistic- Happiness	5	7	1	Amusement counted correct	Cocky, pride, authority, confidence x 2 calm, hopeful
Clip 14- Realistic- Happiness	3	10			5 listed Curiosity, Interest, satisfaction, awe, fascination, nostalgia, discovery
Clip 6- Stylized- Happiness	10	3		Joy counted as correct	Excitement, awe, surprise

Table 4.2.1. Continued.

Clip 18- Stylized- Happiness	2	11			Love x2, longing x2, hopeful, wonder, satisfaction, contentment x2, endearment, helpless, anticipating/imag ining/thinking
Fear					
Clip 10- Realistic- Fear	2	10	1		Shock x2, awe, worry, anger, waking from nightmare x2, relief, startled, exhaustion
Clip 20- Realistic- Fear	11	2			3 participants mentioned disgust, worry

Table 4.2.1. Continued.

Clip 4- Stylized- Fear	10	3			Apprehension, regret, resigned
Clip 16- Stylized- Fear	3	10			Surprise x6, shock x2, disbelief x2, astonishment
Total	140	114	6		
Total- Realistic	64	61	5		
Total- Stylistic	76	53	1		

Out of 260 responses to identifying an emotion, 140 were correct and 114 were incorrect. There were 130 responses for each character body style. Participants were correct 58.46% of the time with stylized characters (or 76 times out of 130) and were correct 49.23% with realistic characters (or 64 times out of 130). The participants were incorrect 40.77 of the time with stylized characters (or 53 times out of 130) and were incorrect 46.92% of the time with realistic characters (or 61 times out of 130). The difference in recognition rates between the two character body styles was determined to not be statistically significant using a paired t-test and a measure of .05 significance level.

Participants were also more likely to be uncertain or not relevant when identifying a realistic character (5 out of 6 times) than a stylized character (1 out of 6 times).

Table 4.2.2. Paired Samples Test - Recognition

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Paired Samples 1: Realistic - Stylized	-.08871	.63773	.05727	-.20207	.02465	1.549	123	.124

4.3 Sincerity

Table 4.3.1. Descriptive means for Sincerity

	Realistic mean	Stylized mean
Overall	4.6538	5.0077
Surprise	5.0385	5.0000
Anger*	4.1538	5.0000
Sadness	5.0000	5.2308
Happiness*	4.0385	5.4231
Fear	5.0385	4.3846
*Indicates statistically significant difference		

The results from a two-way ANOVA indicated the interaction between character and emotion affected participant's ratings of sincerity. An overall paired t-test may give

an unreliable conclusion since interaction effects exist between character and emotion, thus an overall paired t-test was not performed. The mean for participant ratings of sincerity for realistic characters was 4.6538 and the mean for participant ratings of sincerity for stylized characters was 5.0077. Paired t-tests for each of the five emotions indicated that for the emotions of surprise and sadness, at a .05 significance level, there was no significant effect of character on ratings of sincerity for that emotion. For the emotions of anger and happiness, the data indicates there is an effect of character body style on sincerity ratings. For the emotion of fear, a p-value of .054 was found; indicating no significant effect from character on ratings of sincerity although it was very close to the significance level of .05.

Table 4.3.2. Sample Statistics

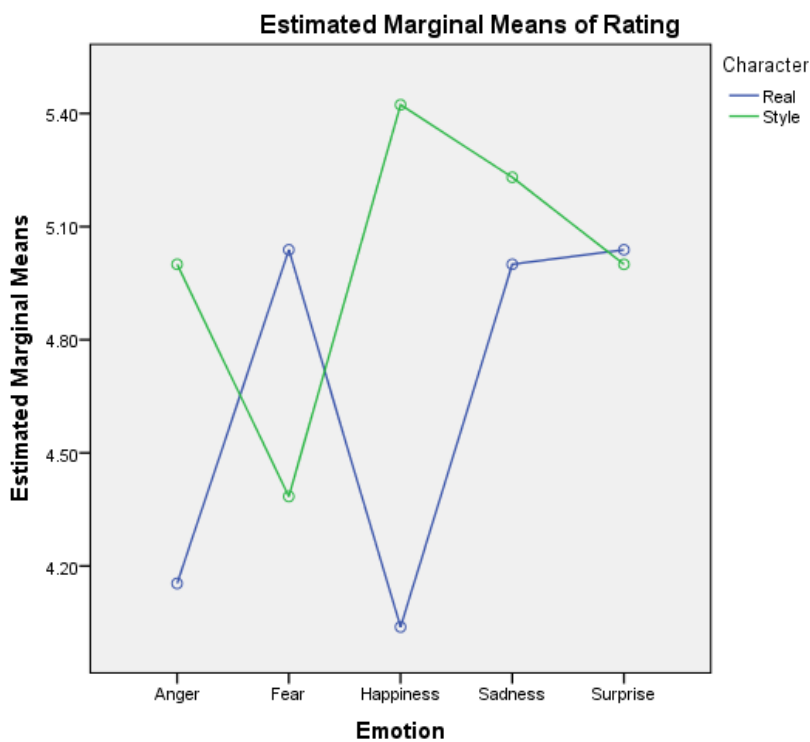
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	4.6538	130	1.52860	.13407
	Stylized	5.0077	130	1.48635	.13036

Table 4.3.3. Tests of Between-Subjects Effects-Sincerity

Dependent Variable: Rating

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	51.169 ^a	9	5.685	2.616	.007
Intercept	6067.446	1	6067.446	2791.506	.000
Character	8.138	1	8.138	3.744	.054
Emotion	10.669	4	2.667	1.227	.300
Character * Emotion	32.362	4	8.090	3.722	.006
Error	543.385	250	2.174		
Total	6662.000	260			
Corrected Total	594.554	259			

a. Squared = .086 (Adjusted R Squared = .053)



b.

Figure 4.3. Estimated Marginal Means of Rating

Table 4.3.4. Paired Samples Statistics - Surprise

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	5.0385	26	1.37057	.26879
	Stylized	5.0000	26	1.29615	.25420

Table 4.3.5. Paired Samples Test - Surprise

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylized	.03846	1.37057	.26879	-.51512	.59205	.143	25	.887

Table 4.3.6. Paired Samples Statistics - Anger

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	4.1538	26	1.80427	.35385
	Stylize	5.0000	26	1.69706	.33282

Table 4.3.7. Paired Samples Test – Anger

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylize	-.84615	1.48842	.29190	-1.44734	-.24497	-2.899	25	.008

Table 4.3.8. Paired Samples Statistics – Sadness

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	5.0000	26	1.62481	.31865
	Stylized	5.2308	26	1.36551	.26780

Table 4.3.9. Paired Samples Test – Sadness

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylized	-.23077	1.65669	.32490	-.89992	.43838	-.710	25	.484

Table 4.3.10. Paired Samples Statistics - Happiness

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	4.0385	26	1.21592	.23846
	Stylized	5.4231	26	1.20576	.23647

Table 4.3.11. Paired Samples Test - Happiness

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylized	-1.38462	1.49872	.29392	-1.98996	-.77927	4.711	25	.000

Table 4.3.12. Paired Samples Statistics - Fear

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	5.0385	26	1.31090	.25709
	Stylized	4.3846	26	1.69887	.33318

Table 4.3.13. Paired Samples Test - Fear

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylized	.65385	1.67194	.32789	-.02147	1.32916	1.994	25	.057

For the qualitative responses, the participant's ratings were categorized into a high category or low category. The high category ranged from ratings of 5 to 7 and low was from 1 to 4. The qualitative responses were coded and the number of times a code appeared was counted.

4.3.1 Realistic

For the high category for sincerity for realistic characters, participants mentioned body movement 11 times, mouth or mouth movement 31 times, eyes or eye movement 35 times, facial movement or the face in general 20 times, eyebrows or eyebrow movement 9 times, and a description of if the clip felt natural or not was mentioned 1 time..

For the low category for sincerity for realistic characters, participants mentioned body movement 4 times, mouth or mouth movement 18 times, eyes or eye movement 13 times, facial movement or the face in general 7 times, eyebrows or eyebrow movement 2 times, and a description of if the clip felt natural or not was not mentioned at all.

More participants mentioned body movement when describing a high sincerity rating. Many more participants described mouth or mouth movement, eyes or eye movement, facial movement or the face in general, and eyebrows or eyebrow movement when describing their reasoning for a high sincerity rating. Finally, about the same number of participants described their impression of whether a clip was natural to them when giving a high or low rating, with the high rating having 1 and the low rating having 0.

For the high ratings, participants described eyes or eye movement the most. For the low ratings, participants described mouth or mouth movement the most.

4.3.2 Stylized

For the high ratings for stylized characters, participants mentioned body movement 16 times, mouth or mouth movement 35 times, eyes or eye movement 44 times, facial movement or the face in general 13 times, eyebrows or eyebrow movement 22 times, and participants described if it felt natural or not 2 times.

For the low rating for stylized characters, participants mentioned body movement 4 times, mouth or mouth movement 16 times, eyes or eye movement 18 times, facial movement or the face in general 7 times, eyebrows or eyebrow movement 4 times, and participants described if it felt natural or not 1 time.

More participants mentioned body movement when describing a high sincerity rating. Many more participants described mouth or mouth movement, eyes or eye movement, and eyebrows or eyebrow movement when describing their reasoning for a high sincerity rating. More participants described facial movement or the face in general

when describing a high sincerity rating. Finally, about the same number of participants described their impression of whether a clip was natural to them when giving a high or low rating, with the high rating having 2 and the low rating having 1.

For the high ratings for stylized characters, participants described eyes or eye movement the most. For the low ratings for stylized characters, participants also described eyes or eye movement the most with mouth or mouth movement closely behind.

For the entire variable of sincerity, participants described the eyes or eye movements as well as the mouth or mouth movements as the most common reasoning for their ratings.

4.4 Intensity

4.4.1. Descriptive means for Intensity

	Realistic mean	Stylized mean
Overall	4.5154	4.8846
Surprise	4.6923	5.1154
Anger	5.0385	5.5385
Sadness	4.2692	4.7692
Happiness*	3.7308	4.5769
Fear	4.8462	4.4231
*Indicates statistically significant difference		

The results from a two-way ANOVA indicated there is a main effect of emotion and a main effect of character on intensity ratings overall but the data indicated no interaction effect between emotion and character. Since no interaction effect between character and emotion was shown in the data, a paired t-test comparing the ratings between realistic and stylized characters was performed to see if there was a significant difference across all five emotions. The mean for participant ratings of intensity for realistic characters was 4.5154 and the mean for participant ratings of intensity for stylized characters was 4.8846. The results from a paired t-test of realistic characters and stylized characters indicated a significant effect on intensity ratings. For the emotions of surprise, anger, sadness and fear, no significant indication of a character's effect on emotion was found. For the emotion of happiness however, the data indicated a significant effect of character body style on ratings of intensity for happiness.

Table 4.4.2. Tests of Between-Subjects Effects
Tests of Between-Subjects Effects

Dependent Variable: Rating

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	58.062 ^a	9	6.451	2.919	.003
Intercept	5743.400	1	5743.400	2598.643	.000
Character	8.862	1	8.862	4.009	.046
Emotion	37.600	4	9.400	4.253	.002
Character * Emotion	11.600	4	2.900	1.312	.266
Error	552.538	250	2.210		
Total	6354.000	260			
Corrected Total	610.600	259			

a. R Squared = .095 (Adjusted R Squared = .063)

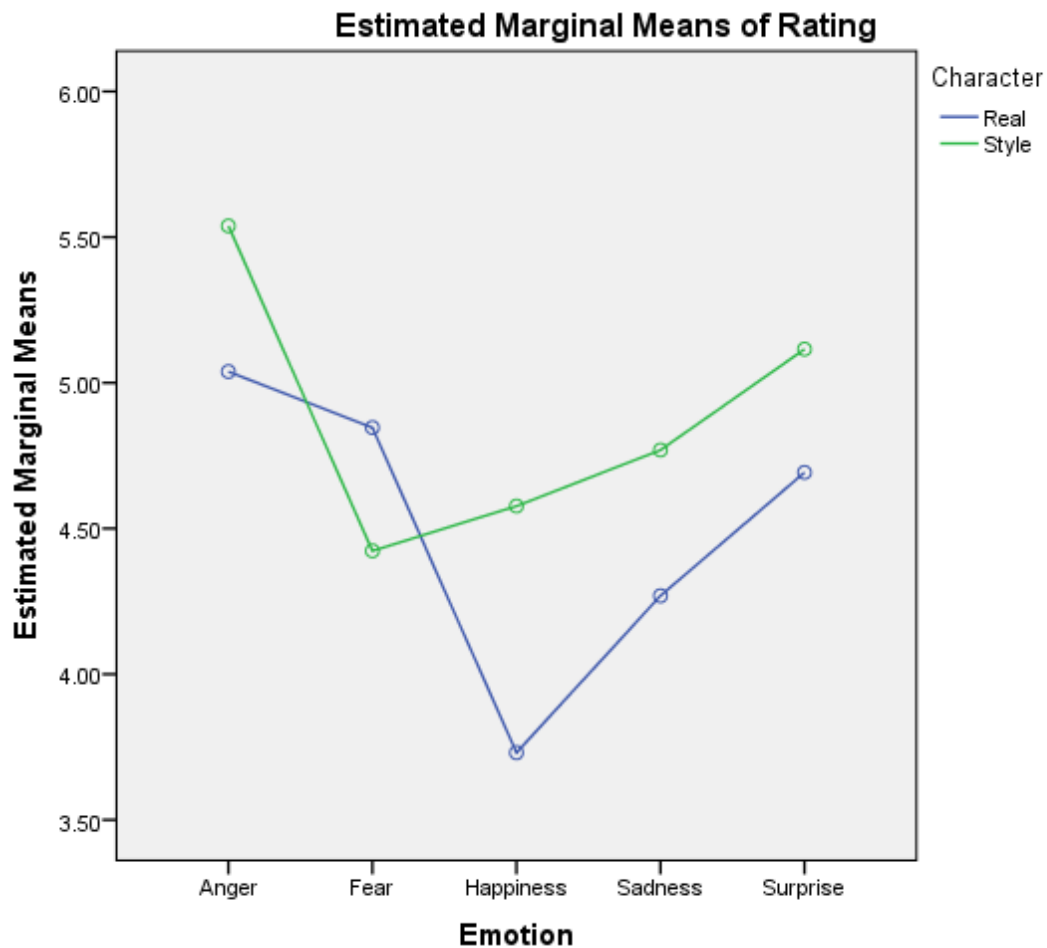


Figure 4.4.1. Estimated Marginal Means of Rating

Table 4.4.3. Paired Samples Statistics - Intensity

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1	realistic	130	1.53125	.13430
	Stylized	130	1.52313	.13359

Table 4.4.4. Paired Samples Test - Intensity

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 realistic - Stylized	-.36923	1.81782	.15943	-.68467	-.05379	2.316	129	.022

Table 4.4.5. Paired Samples Statistics - Surprise

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Realistic	4.6923	26	1.54322	.30265
Stylized	5.1154	26	1.21085	.23747

Table 4.4.6. Paired Samples Tests - Surprise

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylized	-.42308	1.87985	.36867	-1.18237	.33621	1.148	25	.262

Table 4.4.7. Paired Samples Statistics - Anger

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Realistic	5.0385	26	1.68477	.33041
Stylized	5.5385	26	1.42073	.27863

Table 4.4.8 Paired Samples Tests –Anger

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylized	-.50000	1.90263	.37314	-1.26849	.26849	1.340	25	.192

Table 4.4.9. Paired Samples Statistics – Sadness

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Realistic	4.2692	26	1.48479	.29119
Stylized	4.7692	26	1.70429	.33424

Table 4.4.10. Paired Samples Test - Sadness

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylized	-.50000	1.72627	.33855	-1.19725	.19725	1.477	25	.152

Table 4.4.11. Paired Samples Statistics - Happiness

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Realistic	3.7308	26	1.42990	.28043
Stylized	4.5769	26	1.52769	.29961

Table 4.4.12. Paired Samples Test - Happiness

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 Realistic - Stylized	-.84615	1.84808	.36244	-1.59261	-.09970	2.335	25	.028

Table 4.4.13. Paired Samples Statistics - Fear

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 realistic	4.8462	26	1.22286	.23982
Stylized	4.4231	26	1.55366	.30470

Table 4.4.14. Paired Samples Test - Fear

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 realistic - Stylized	.42308	1.60432	.31463	-.22492	1.07108	1.345	25	.191

4.4.1 Realistic

For the qualitative responses for the realistic character, in the high ratings category, participants mentioned body movement 9 times, mouth or mouth movement 29 times, eyes or eye movement 27 times, facial movement or the face in general 15 times, eyebrows or eyebrow movement 2 times, and participants described if it felt natural or not 2 times.

For the low ratings category, participants mentioned body movement 3 times, mouth or mouth movement 16 times, eyes or eye movement 10 times, facial movement or the face in general 7 times, eyebrows or eyebrow movement 3 times, and participants described if it felt natural or not 0 times.

More participants mentioned body movement when describing a high sincerity rating. Many more participants described mouth or mouth movement or eyes or eye movement when describing their reasoning for a high intensity rating. More participants described facial movement or the face in general when describing a high intensity rating. Finally, about the same number of participants described eyebrows or eyebrow movement and their impression of whether a clip was natural to them when giving a high or low rating.

4.4.2 Stylized

For the stylized characters in the high ratings category, participants mentioned body movement 11 times, mouth or mouth movement 34 times, eyes or eye movement 30 times, facial movement or the face in general 10 times, eyebrows or eyebrow movement 14 times, and participants described if it felt natural or not 1 time.

For the stylized characters in the low rating category, participants mentioned body movement 4 times, mouth or mouth movement 15 times, eyes or eye movement 9 times, facial movement or the face in general 6 times, eyebrows or eyebrow movement 3 times, and participants described if it felt natural or not 1 time.

More participants mentioned body movement when describing a high sincerity rating. Many more participants described mouth or mouth movement or eyes or eye movement when describing their reasoning for a high intensity rating. More participants

described facial movement or the face in general or eyebrows or eyebrow movement when describing a high intensity rating. Finally, about the same number of participants described their impression of whether a clip was natural to them when giving a high or low rating.

For the high ratings for the stylized characters, participants described the mouth or mouth movement most commonly with describing eyes or eye movement following second in times mentioned. For the low ratings for stylized characters, participants described mouth or mouth movements the most.

For the entire variable of intensity, participants described the mouth or mouth movements as the most common reasoning for their ratings. Eyes or eye movement was described by the participants second most commonly.

4.5 Typicality

Table 4.5.1. Descriptive means for Typicality

	Realistic mean	Stylized mean
Overall	4.6231	4.3923
Surprise	4.5385	4.3077
Anger*	4.8462	3.9615
Sadness	4.7308	5.1154
Happiness	4.3077	4.8462
Fear*	4.6923	3.7308
*Indicates statistically significant difference		

The results of a two-way ANOVA indicated a significant effect of the interaction between character and emotion on typicality ratings. An overall paired t-test may give an unreliable conclusion since there exists an interaction effect between character and emotion, thus an overall paired t-test was not performed. The mean for participant ratings of typicality for realistic characters was 4.6231 and the mean for participant ratings of typicality for stylized characters was 4.3923. Paired t-tests comparing realistic to stylized body styles for each of the five emotions indicated that for the emotions of surprise, sadness and happiness there was no significant effect of the character body style on that emotion's typicality ratings. For the emotions of anger and fear however, a significant effect was indicated by the data.

4.5.2. Sample Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 realistic	4.6231	130	1.53646	.13476
stylized	4.3923	130	1.62584	.14260

Table 4.5.3. Tests of Between-Subjects Effects

Dependent Variable: Rating

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	43.292 ^a	9	4.810	1.985	.041
Intercept	5283.015	1	5283.015	2180.569	.000
Emotion	14.715	4	3.679	1.518	.197
Character	3.462	1	3.462	1.429	.233
Emotion * Character	25.115	4	6.279	2.592	.037
Error	605.692	250	2.423		
Total	5932.000	260			
Corrected Total	648.985	259			

a. R Squared = .067 (Adjusted R Squared = .033)

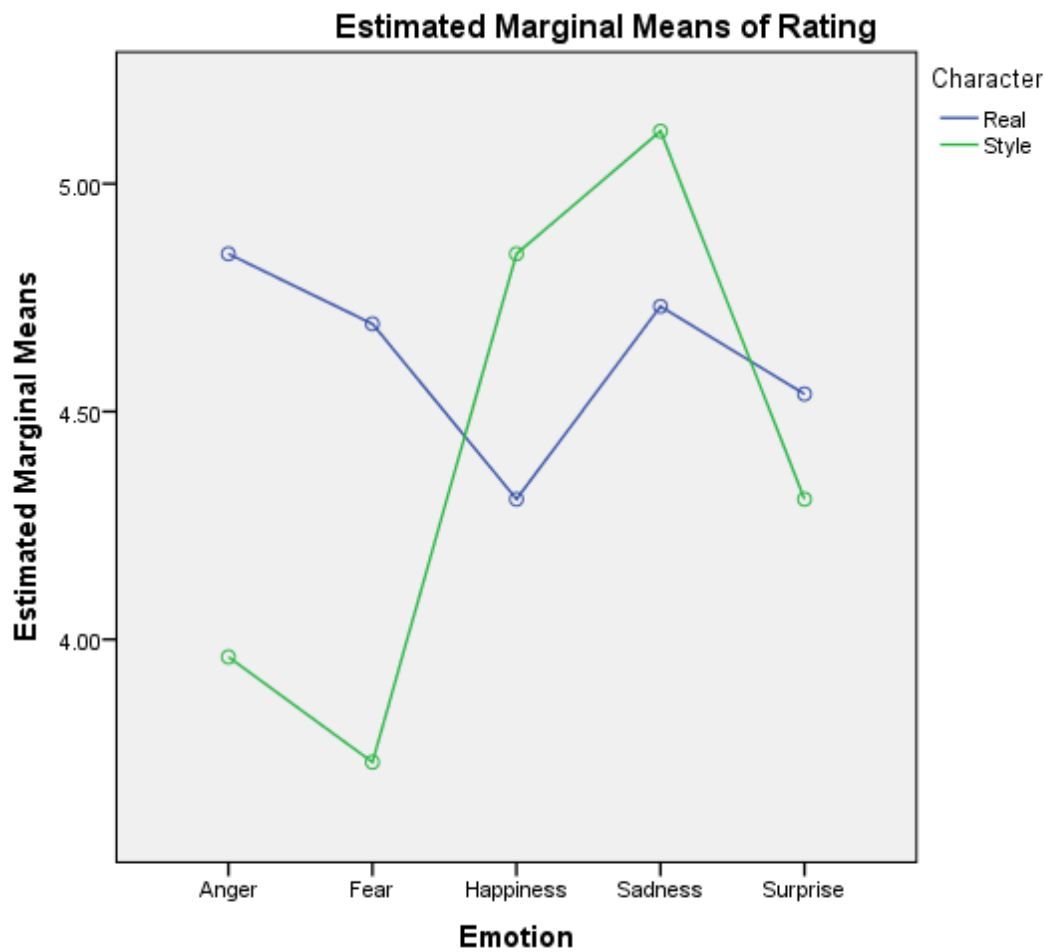


Figure 4.5.1. Estimated Marginal Means of Rating

Table 4.5.4. Paired Samples Statistics - Surprise

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	4.5385	26	1.74885	.34298
	Stylized	4.3077	26	1.66779	.32708

Table 4.5.5. Paired Samples Tests - Surprise

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Realistic - Stylized	.23077	2.14117	.41992	-.63407	1.09561	.550	25	.587

Table 4.5.6. Paired Samples Statistics - Anger

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	4.8462	26	1.54123	.30226
	Stylized	3.9615	26	1.75455	.34410

Table 4.5.7. Paired Samples Test - Anger

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Realistic - Stylized	.88462	1.84015	.36088	.14136	1.62787	2.451	25	.022

Table 4.5.8. Paired Samples Statistics - Sadness

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	4.7308	26	1.37281	.26923
	Stylized	5.1154	26	1.45126	.28462

Table 4.5.9. Paired Samples Test - Sadness

	Paired Differences					t	df	Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	Realistic - Stylized	-.38462	2.06062	.40412	-1.21692	.44769	-.952	25	.350

Table 4.5.10. Paired Samples Statistics - Happiness

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	4.3077	26	1.31967	.25881
	Stylized	4.8462	26	1.43366	.28116

Table 4.5.11. Paired Samples Test - Happiness

	Paired Differences					t	df	Sig. (2-tailed)	
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference					
				Lower	Upper				
Pair 1	Realistic - Stylized	-.53846	1.42073	.27863	-1.11231	.03538	1.933	25	.065

Table 4.5.12. Paired Samples Statistics - Fear

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Realistic	4.6923	26	1.71509	.33636
	Stylized	3.7308	26	1.48479	.29119

Table 4.5.13. Paired Samples Test - Fear

		Paired Differences				t	df	Sig. (2-tailed)	
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower				Upper
Pair 1	Realistic - Stylized	.96154	2.08769	.40943	.11830	1.80478	2.348	25	.027

4.5.1 Realistic

For the qualitative responses for the high category, participants mentioned body movement 7 times, mouth or mouth movement 16 times, eyes or eye movement 13 times, facial movement or the face in general 5 times, eyebrows or eyebrow 2 times movement, and participants described if it felt natural or not 21 times.

For the qualitative responses in the low category, participants mentioned body movement 1 time, mouth or mouth movement 15 times, eyes or eye movement 7 times, facial movements or the face in general 5 times, eyebrows or eyebrow movement 4 times, and participants described if it felt natural or not natural 15 times.

More participants mentioned body movement when describing a high typicality rating where as it was about equal for mouth or mouth movement ratings. More participants mentioned eyes or eye movement when describing their high rating with it

being about the same for facial movement or the face in general. More participants mentioned eyebrows or eyebrow movement when describing their low rating and finally more participants described their impression of whether a clip was natural to them when giving a high rating.

For the high ratings, participants described it feeling or not feeling natural to them the most with describing mouth or mouth movement following second in times mentioned. For the low ratings, participants were tied in describing if it felt natural or to them and the mouth or mouth movements the most.

4.5.2 Stylized

For the high rating category, participants mentioned body movement 5 times, mouth or mouth movement 15 times, eyes or eye movement 14 times, facial movement or the face in general 5 times, eyebrows or eyebrow movement 0 times, and participants described if it felt natural or not 29 times.

For the low rating category, participants mentioned body movement 4 times, mouth or mouth movement 12 times, eyes or eye movement 13 times, facial movement or the face in general 5 times, eyebrows or eyebrow movement 2 times, and participants described if it felt natural or not 12 times.

Participants were more likely to describe mouth or mouth movement when explaining their high typicality rating. Participants were about equal in describing body movements, facial movements or the face in general. Participants were more likely to describe eyebrows or eyebrow movement when explaining their low typicality rating and

were more likely to describe if it felt natural or not when describing their high typicality rating.

For the high ratings, participants described it feeling or not feeling natural to them the most with describing mouth or mouth movement following second in times mentioned. For the low ratings, participants were tied in describing if it felt natural or to them and the mouth or mouth movements the most.

For the entire variable of typicality, participants described the character feeling natural to them first and foremost and secondly described the mouth or mouth movement as the reasoning for their rating

CHAPTER 5. DISCUSSION

The following section will present the discussion of the results. The main finding for this research is that there is no significant difference between realistic and stylized characters for the variables of recognition, sincerity, and typicality. For intensity, a significant difference was shown but that significance disappeared for all but one (happiness) of the emotions when analyzed on their own within intensity. This implies there is not a very strong difference and so overall it can be concluded that for this research there is no significant difference in the perception of recognition, sincerity, intensity, and typicality between realistic and stylized characters. This first section will present the discussion on the variable for recognition and will be followed by a section looking at the three variables of sincerity, intensity, and typicality.

5.1 Recognition

For recognition, participants were more likely to correctly identify a stylized character's emotion whereas for the realistic characters the participants were split nearly equally in their chances of giving an incorrect answer or a correct answer. The researcher based her assessment of what the correct emotion was based on the full viewing of the clip. By adding in context, the researcher could see how the animation of the emotion fit

within the narrative and deduce what emotion was appropriate for the story, and the animation of the face being displayed. Clips that had a large number of incorrect identifications Clip 9 Stylized Anger with 9 incorrect, Clip 10 Realistic Fear had 11 incorrect, Clip 14 Realistic Happiness had 10 incorrect and five participants identified curiosity or interest, Clip 16 Stylized Fear had 10 incorrect and participants mentioned Surprise or Shock 7 times, Clip 17 Realistic Sadness had 12 incorrect, and Clip 18 Stylized Happiness had 11 incorrect.

So from these results, the conclusion is that body style does not significantly affect recognition with participants being more likely to correctly identify the emotion when presented with a stylized character and only slightly more likely to correctly identify the emotion when presented with a realistic character.

5.2 Intensity, Typicality & Sincerity

Only the quantitative ratings for intensity showed a main effect of emotion and a main effect of character on intensity ratings overall, indicating that character body style did influence how participants rated intensity. The other two variables, sincerity and typicality indicated an interaction effect between emotion and character but did not suggest a main effect of character or emotion so for these two variables a difference in participant ratings between realistic and stylized characters was not shown. When the participant responses were broken down into individual emotions, anger showed a significant effect of the character's body style for the variables of sincerity and typicality. . Participant ratings of happiness also showed a significant effect of character styles for sincerity and intensity and fear showed a significant effect of character body

style on typicality ratings and was nearly significant for sincerity. At no time was one emotion statistically significant for all three variables, thus there is not one dominant character body style for a particular emotion. As a whole, realistic characters were rated higher for fear, stylized characters were rated higher for happiness, and anger had one instance of realistic characters being rated higher and one instance of stylized characters being rated higher. This implies that for some emotions a particular character style may be perceived as more intense, typical, and sincere than the other character style due to characteristics unique to that style. Thus from this data it can be concluded that character body style only affected participant ratings of intensity and for the emotions of anger, happiness and fear there is a difference in ratings due to character body style, with realistic characters being rated higher for fear, stylized characters being rated higher for happiness, and anger being rated once with realistic characters higher and once with stylized characters higher.

As for the qualitative responses, across both high and low ratings the participants indicated they were affected by the facial parts of mouth or mouth movement and the eyes or eye movement most commonly. They were also affected by their perception of it feeling natural, in particular for the typicality ratings, but as this is not a body part and subjective, this does not aid in the understanding of how the character's body style can affect ratings.

The qualitative responses show that for anger, happiness and fear there is most likely a difference in how the participants view the character body style's mouths or eyes as they marked those as most commonly affecting their judgment. Fear may also have a

similar judgment from viewers where they perceive a realistic character's mouth, mouth movement, eyes, and/or eye movement differently from a stylized character.

5.3 Implications

One implication from this research is that this research does not support film studio's reluctance to create realistic character films based on there being a difference in viewer perception of facial emotion between realistic and stylized character films. While ratings for stylized characters were higher for sincerity and intensity, and realistic character ratings were higher for typicality only for intensity was the difference found to be significantly significant. Since there was not a conclusive difference for all three variables of sincerity, intensity, and typicality, this indicates there was not an overall difference in participant ratings. This implies that neither realistic nor stylized characters will overall be perceived as more or less typical, sincere, or intense, although participants did rate stylized characters higher for intensity and it was a significant difference. When the variable of intensity was considered more closely with regards to specific emotions, only happiness showed that significant difference with stylized characters being rated higher, indicating the ratings are not strong enough to conclude viewers will most likely viewer stylized characters as having higher intensity. While there could be other reasons for the choice of using stylized characters over realistic characters, the list is growing shorter. Since there is no data to suggest that overall viewers perceive a difference in emotion for a different character body style, and since technology grows at an exponential rate and soon the expense of motion capture will not be a factor in making a decision of which style to utilize, this would mean that it is or will be entirely a personal

or artistic taste in character style. Recognizing that both character styles are viable may help film studios open up to trying something new, or trying to artistically balance the two styles in one film.

Animators should take more consideration when animating anger, happiness and fear (since it was nearly significant, it should be considered as well in this). When the data was broken down into the emotions, differences in participant ratings between the two character body styles for specific emotions within the variables of intensity, sincerity and typicality were only noticed in anger, happiness and fear. When a closer look was taken at those three emotions it was noticed that for fear, which was significant for sincerity and typicality, realistic characters were rated higher on average than stylized characters. This implies that participants found expressions of fear to be more sincere or typical for a realistic character. Conversely, for the emotion of happiness, which was significant for sincerity and intensity, stylized characters were rated higher on average than realistic characters. This implies that participants found expressions of happiness to be more sincere or intense for stylized characters. The final emotion that had a significant difference due to character style is anger where for sincerity the stylized character was rated higher and for typicality the realistic character was rated higher. Participants found anger to be more typical for a realistic character and more sincere for a stylized character. The two character styles were perceived as being stronger in different emotions and variables. Animators could study what these differences consist of and manipulate those areas to make their characters more intense or less sincere, allowing for greater emotional depth in their characters.

The low rate of recognition for both realistic and stylized characters suggests that animators should be more concerned with making both character style's character's emotion recognizable. The stylized characters were recognized 58.46% out of the total stylized clips so the rate of recognition is still not extremely high for stylized characters and participants only correctly identified a realistic character's emotion 49.23% of the time. It is possible that the stylized character's exaggerated features aid viewer recognition of stylized character emotions. Humans are very good at noticing tiny deviations in facial emotions and are very strict with real faces (Seyama & Nagayama, 2007). Viewers have certain expectations for emotion and if they are not met, a viewer will notice. Since realistic characters are attempting to imitate real humans, viewers are likely judging them in a similar manner to how they would a real human and this is proving a problem for realistic characters. Animators need to look closer at both realistic and stylized characters to try and improve emotion recognition rates, especially for realistic characters that are most likely being measured with a stricter set of standards than the stylized characters.

5.4 Limitations

The clips were chosen by the author in an attempt to match similar body styles expressing the same emotion. Since the clips were selected from previously created films, the author was limited to only previously created characters and there are not perfect matches of age, sex, or hair color in all instances. Thus, some emotions have a realistic character whose body characteristics such as age, sex or hair may not have matched perfectly the stylized version of the same emotion. This study was also limited by the

emotions that one character in a film whose body specifics matches another character's body characteristics portrays, leaving several instances of good matches of emotion but not of character characteristics (age, sex, etc.) or vice versa. It is also possible there are other character matches or expressions of emotion that were superior to the clips chosen and the researcher did not find them in time or missed them in her considerations of clips. A different set of clips may have resulted in different results.

This study was limited by context as well. The clips were short in order to eliminate context effecting the viewer perception of the emotion in an attempt to control for it, however there were no guarantees that the participant did not recognize the clip from their own personal viewing of that film. Also, context can help aid recognition and understanding of an emotion and so the emotion may have been limited by lack of context, or may have had participant's answer differently due to their former knowledge of the clip's film.

Another limitation is that emotion perception is for the most part unconscious very quick so asking a participant to analyze what about a face is affecting their perception is a difficult question. Humans do not normally consider why they perceive something in a particular way and so they are uncertain about how to explain their reasoning. A interview style study would allow the interviewer and participant to explore the question in a manner that it likely more comfortable to the participant.

As this was a mixed methods study, the author applied her own understanding of the participant responses to code and generate the main themes of the participant answers. The author is limited by her own understanding of the participant answers and was not able to ask participants for explanations.

Out of 75 responses only 13 completed the survey. This limits the study by not providing enough data to really show any significant trends. If more had completed the survey, the results may have been different as 13 people are not a large enough sample to be representative of a large body of people. It is uncertain why many participants quit although most participants quit upon the survey showing them a clip to be played. A few participants quit after completing a few clips but most of those who quit, quit upon seeing the playable clip. An interview study, or study conducted in a lab could help motivate the participant to not quit upon seeing a clip to be played. This lack of completed responses limits the breadth of answers the author could analyze and more responses could have resulted in different results. Also, the author had no ability to ensure the participants answered truthfully, on topic, or responded with an actual part of the face as asked, which limited the study as well.

5.5 Future research

Research should be conducted to further analyze what is causing the discrepancy in ratings between character styles for the emotions of anger and happiness, and since it was nearly a significant difference, a deeper look should also be taken at fear. A variation of many clips could help eliminate the possibility of the clip causing a discrepancy and using the same or similar realistic and stylized models could also help the researcher understand what participants view differently. This would be useful to animators or character modelers as they can take more consideration for the animation of those facial areas for those emotions. By narrowing the scope of a study down to the three emotions participants rated differently, researchers and animators can get a better look at these

possible problem emotions and work on understanding and/or eliminating discrepancies between the two character styles.

A future study utilizing characters and animations of emotions created specifically for the study should be performed using this same framework. Utilizing characters that no participant has seen before may provoke slightly difference responses. It also will allow the researcher to keep the intensity levels and opposite character body style emotions more similar than utilizing pre-existing clips.

A study which divides the participants and variables up into three groups (with all naming the emotion) could reduce participant fatigue with answering all the questions. Other variations of how many clips or emotions could also reduce participant fatigue when answering questions.

With regards to typicality, many of the participants responded by saying a character felt natural. An interview style study could have prompted the participant to respond with a body part, or could have explored how the participants described natural. Future researchers also could consider prompting the participant with a list of facial parts rather than leaving the participant the ability respond with whatever they choose. This may lead the participant a little, but may also give animator's a map of important areas for each emotion and character style. A study that provides a list of the most common body parts listed as a response in this study could help prevent leading a participant to a particular facial area or aspect since participants have already responded with those facial areas.

A study specifically looking at realistic character emotions should also be considered since the recognition rate was lower than stylized characters. A study researching this character body in particular could see if participants in general have difficulty

recognizing emotion overall for this style of computer animated character or if it was the selection of clips in this study that were difficult to identify.

CHAPTER 6. CONCLUSION

This study's over-all purpose was to identify if a computer animated character's body style affected viewer perception of facial emotion expression. This research adapted the research protocol website experience analysis to better serve a computer animated character and utilized the variables of recognition, sincerity, intensity, and typicality. The emotions of happiness, sadness, fear, anger, and surprise were chosen and four clips for each emotion with two representations of each character style were chosen. 13 completed surveys were collected. The quantitative questions were analyzed using an ANOVA and paired t-tests whereas the qualitative answers were coded by the researcher using a categorizing coding strategy.

While a large difference was not noticed by the participants overall, a difference for the emotions of happiness and anger were expressed by the participants in their ratings for sincerity. Participants identified the eyes or eye movements and the mouth or mouth movements as affecting their ratings. For intensity, a significant difference in the participants ratings for happiness was also found as was a significant difference overall between realistic and stylized characters. Participants identified mouth or mouth movements and eye or eye movements overall as affecting their ratings. For typicality,

anger and fear showed a significant difference in participant ratings and participants noted the feeling, or a lack of feeling natural and mouth or mouth movements as affecting their ratings.

Participant recognition rates were low with no significant difference between the two styles. Within this data set, it was more likely the participant would identify a stylized character correctly and was only slightly more likely a realistic character would be correctly identified rather than misidentified. The summation of the results showed a difference in participant ratings overall for intensity while the emotions of anger, happiness and fear showed some differences as well for various variables. From this study, film studios cannot definitively say that one character style is superior overall in its emotion's recognition, intensity, typicality, and sincerity ratings, thus leaving the film studios free to explore the possibility of creating more realistic character films. This study also shows film studios and animators the need to concentrate on the mouth and mouth movement, the eyes and eye movement, as well as exploring just what makes a character feel natural in order to affect participant perception of sincerity, intensity and typicality.

This data does not suggest that a film studio should be reluctant to utilize realistic characters due to viewer perception of emotion. Any differences in viewer perception of computer animated character's emotions are small in the grand scheme of the range of emotions and possible variables a viewer could see and be affected by. Animators need to concentrate on key areas to ensure good emotion expression is being perceived by the viewer, but the low emotion recognition rate may be the thing for animators to concentrate on first before working on differences in emotion with regards to intensity,

typicality and sincerity. However, these differences have been identified and should be addressed.

The choice of clips was a large factor for this study and a similar study could receive very different results depending on the clips chosen or created for it. Great care should be taken with the selection of clips in future research and a deeper look into happiness and anger should be taken in order for animators to better understand what about each character style is being perceived differently.

The ideal study to build upon what was noticed here is a study using characters and character animations created by the researcher so no participant could have seen them before. These character clips would be shown in a manner allowing the researcher to ask the participant for explanations and also motivate the participant to watch a clip rather than quitting the survey upon seeing a clip to be played, perhaps by the researcher's presence in the room. Whether this theoretical future study would provide similar results to this one remains to be seen but for now, this study shows that viewer perception of realistic character's emotions are not limited by their character bodies and should have a bright future in film ahead of them.

REFERENCES

REFERENCES

- Adamson, A., Asbury, K., & Vernon, C. (Director). (2004). *Shrek 2* [Film]. United States: DreamWorks Animation.
- Adamson, A. & Jenson, V. (Director). (2001). *Shrek* [Film]. United States: DreamWorks Animation.
- Andrews, M., Chapman, B., & Purcell, S. (Director). (2012). *Brave* [Film]. United States: Walt Disney Pictures & Pixar Animation Studios.
- Bancroft, Tom. (2006). *Creating Characters with personality*. New York: Watson-Guption Publications.
- Bates, J. (1994). The role of emotion in believable agents. *Communications of the ACM*, 37 (7), p. 122-125. doi:[10.1145/176789.176803](https://doi.org/10.1145/176789.176803)
- Berg, B. (2009) *Qualitative research methods for the social sciences, 7th edition*. Boston: Allyn & Bacon.
- Bird, B. (Director). (2004). *The Incredibles* [Film]. United States: Pixar.
- Box Office Mojo. (2013). Computer-animation [Data set]. Retrieved from <http://www.boxofficemojo.com>

- Claydon, A. (2005). Wanting to believe: CGI animation and the dilemmas of verisimilitude. *Conference proceedings of the Cinema and technology conference*. Retrieved from <https://ira.le.ac.uk/handle/2381/417>
- Doctor, P. (Director). (2009). *Up* [Film]. United States: Pixar.
- Ekman, P., & Freisen, W.V. (1975). *Unmasking the face. A guide to recognizing emotions from facial clues*. Englewood Cliffs: Prentice-Hall.
- Ekman, P., Freisen, W., & Hager, J. (2002). *Facial action coding system investigators guide*. Salt Lake City: A Human Face. Retrieved from <http://face-and-emotion.com/dataface/facs/guide/FACSIVTi.html>
- Greno, N. & Howard, B. (Director). (2010). *Tangled* [Film]. United States: Walt Disney Animation Studios & Walt Disney Pictures.
- Griesser, R., Cunningham, D., Wallraven, C., & Bulthoff, H. (2007). Psychophysical investigation of facial expressions using computer animated faces. *Proceedings of the 4th symposium on applied perception in graphics and visualization*. p.11-17. doi:10.1145/1272582.1272585
- Hager, J. (2003). Research and technical tools for studying the face. Retrieved from http://face-and-emotion.com/dataface/tools/tools_intro.jsp
- Intense. (n.d.). In *Merriam-Webster*. Retrieved from <http://www.merriam-webster.com/dictionary/intense>

- Jorg, S., Hodgins, J., & O'Sullivan, C. (2010). The perception of finger motions. *Proceedings of the 7th Symposium on Applied perception in Graphics and Visualization*, p.129-133. Retrieved from <http://dl.acm.org/citation.cfm?id=1836273>
- Maestri, G. (2006). *Digital character animation 3*. Berkley: New Riders.
- Masahiro, M. (1970). The uncanny valley. (K. MacDorman & T. Takashi, Trans.). *Energy*, 7(4), p. 33-35. Retrieved from <http://www.androidscience.com/theuncannyvalley/proceedings2005/uncannyvalley.html>
- Mauro, R., & Kubovy, M.(1992). Caricature and face recognition. *Memory and Cognition*. 20 (4), p. 433-440. Retrieved from <http://www.springerlink.com/content/61nw74l210277263/fulltext.pdf>
- Maxwell, J. (2005) *Qualitative Research Design*. Thousand Oaks: Sage Publications.
- McDonnell, R., Jorg, S., McHugh, J., Newell, F., & O'Sullivan, C. (2008). Evaluating the emotional content of human motions on real and virtual characters. *Proceedings of the 5th symposium on applied perception in graphics and visualization*, p. 67-73. Retrieved from <http://dl.acm.org/citation.cfm?id=1394294>
- Normura, T. (Director). (2005). *Final Fantasy VII: Advent Children* [Film]. Japan: Square Enix.
- Nunez, David. (2004). How is presence in non-immersive, non-realistic virtual environments possible? *Proceedings of the 3rd international conference on computer graphics, virtual reality, visualization and interaction in Africa*, P.83-86. doi: 10.1145/1029949.1029964

- Owens, T. (Director). (2011). *Dragons: Gift of the Night Fury*. [Film]. United States: DreamWorks Animation.
- Porter, T., & Susman, G. (2000). On site: creating lifelike characters in Pixar movies. *Communications of the ACM*, 43 (1) p. 25-29. doi: [10.1145/323830.323839](https://doi.org/10.1145/323830.323839)
- Ramsey, P. (Director). (2012). *Rise of the Guardians* [Film] United States: DreamWorks Animation.
- Recognizable. (n.d.). In *Oxford Dictionaries online*. Retrieved from http://oxforddictionaries.com/definition/english/recognizable?q=recognizability#recognizable__7
- Seyama, J., & Nagayama, R. (2007). The uncanny valley: Effect of Realism on the Impression of Artificial Human faces. *Presence*, 16 (4). p. 337-351. doi: 10.1162/pres.16.4.337
- Sincere. (n.d.). In *Oxford Dictionaries Online*. Retrieved from <http://oxforddictionaries.com/definition/english/sincere?q=sincere>
- Spielberg, S. (Director). (2011). *The Adventures of TinTin* [Film]. United States: Nickelodeon Movies, Amblin Entertainment, The Kennedy/Marshall Company, WingNut Films, & Hemisphere Media Capital.
- Stylize. (n.d.). In *Merriam-Webster*. Retrieved from <http://www.merriam-webster.com/dictionary/stylize>
- Thomas, F., & Johnston, O. (1984). *Disney Animation: The illusion of life*. New York: Abbeville Press.

- Tinwell, A., Grimshaw, M., Nabi, D., & Williams, A. (2010). Facial expression of emotion and perception of the uncanny valley in virtual characters. *Computers in Human Behavior*, 27(2). P. 741-749. doi:10.1016/j.chb.2010.10.018
- Typical. (n.d.). In *Oxford Dictionaries online*. Retrieved from <http://oxforddictionaries.com/definition/english/typical?q=typical>
- [Untitled screenshot of *The Incredibles* character Dash]. Retrieved January, 2, 2012 from http://www.cracked.com/article_15070_the-10-best-animated-movies-traumatizing-kids.html
- [Untitled screenshot of The Adventures of TinTin character Tintin]. Retrieved January, 2 2013 from <http://www.film.com/movies/the-definitive-differences-between-tintin-and-rin-tin-tin>
- Vorvoreanu, M. (2006). Online organization-public relationships: An experience-centered approach. In S. Duhe, (Ed.) *New media and public relations* (pp. 395-401). Peter Lang Publishing
- Wages, R., Gruevogel, S., & Gruetzmacher, B. (2004). How realistic is realism? Considerations on the aesthetics of computer games. *Lecture notes in computer science*, 3166, p. 216-225. Retrieved from <http://www.springerlink.com/content/3bld6vbwvxtlevbv/fulltext.pdf>
- Wallraven, C., Breidt, M., Cunningham, D., & Bulthoff, H. (2007). Evaluating the perceptual realism of animated facial expressions. *ACM Transactions on Applied Perception*, 23, p.1-20. Retrieved from <http://dl.acm.org/citation.cfm?id=1278764>
- Wells, S. (Director). (2011). *Mars needs Moms* [Film]. United States: Walt Disney Pictures & ImageMovers Digital.

Zemeckis, R. (Director) (2009). *A Christmas Carol* [Film]. United States: Walt Disney Pictures & ImageMovers Digital.

Zemeckis, R. (Director). (2007). *Beowulf* [Film]. United States: ImageMovers.

Zemeckis, R. (Director). (2004) *The Polar Express* [Film]. United States: Warner Bros.

APPENDICES

Appendix A: List of Clips

List of Clips

Clip 1 Stylized Surprise 1 (Doctor, 2009)	http://www.youtube.com/watch?v=aNg4pdkR6XE
Clip 2 Realistic Sadness 1 (Zemeckis, 2007)	http://www.youtube.com/watch?v=Ubb2CRKc5II
Clip 3 Realistic Happiness 2 (Normura, 2005)	http://www.youtube.com/watch?v=vq7Co9dC0B0
Clip 4 Stylized Fear 1 (Adamson, Asbury, & Vernon, 2004)	http://www.youtube.com/watch?v=2-6iW0rJ5GQ
Clip 5 Realistic Surprise 1 (Zemeckis, 2009)	http://www.youtube.com/watch?v=6ebEVUBccME
Clip 6 Stylized Happiness 1 (Owens, 2011)	http://www.youtube.com/watch?v=bfVxgzPY07c
Clip 7 Stylized Sadness 2 (Adamson, Asbury, & Vernon, 2004)	http://www.youtube.com/watch?v=PpEUG0GKqZs
Clip 8 Realistic Surprise 2 (Wells, 2011)	http://www.youtube.com/watch?v=MlbI9Uzbbs
Clip 9 Stylized Anger 2 (Bird, 2004)	http://www.youtube.com/watch?v=zCFVhNz-tos
Clip 10 Realistic Fear 2 (Zemeckis, 2007)	http://www.youtube.com/watch?v=Nr1EAHNVXVQ
Clip 11 Realistic Anger 1 (Zemeckis, 2007)	http://www.youtube.com/watch?v=KbDzZKOVc2c
Clip 12 Stylized Surprise 2 (Ramsey, 2012)	http://www.youtube.com/watch?v=jFwVkd4Seg
Clip 13 Stylized Sadness 1 (Greno, 2010)	http://www.youtube.com/watch?v=poPQtqRr0K0
Clip 14 Realistic Happiness 1 (Zemeckis, 2004)	http://www.youtube.com/watch?v=m__SgIJOtOk
Clip 15 Realistic Anger 2 (Wells, 2011)	http://www.youtube.com/watch?v=zCFVhNz-tos
Clip 16 Stylized Fear 2 (Bird, 2004)	http://www.youtube.com/watch?v=761PPwXOaqY
Clip 17 Realistic Sadness 2 (Spielberg, 2011)	http://www.youtube.com/watch?v=xLQ8OrKcnSo
Clip 18 Stylized Happiness 2 (Greno & Howard, 2010)	http://www.youtube.com/watch?v=IjvT26BDmVc
Clip 19 Stylized Anger 1 (Andrews, Chapman, & Purcell, 2012)	http://www.youtube.com/watch?v=KuHUL0veZ60
Clip 20 Realistic Fear 1 (Zemeckis, 2009)	http://www.youtube.com/watch?v=V8PqFMGaSU8

Appendix B: Survey Questions

What is your age?

Are you a student in one of Purdue University's College of Technology undergraduate classes?

What is your gender?

(Asked for clips 1-20)

What emotion is this character expressing? (Clip 1)

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

What about the character's facial expression made you feel that way?


On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

What about the character's facial expression made you feel that way?

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

What about the character's facial expression made you feel that way?

Appendix C: Research poster presentation and abstract



A study of the effects of computer animated characters' visual style on viewers' perception of facial expressions

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Introduction

Since 1995, 95 computer animated character films have been created and released in theatres. Of those 95, only seven were designed with realistic characters. Why is this? Film studios would not show a blatant trend in using stylized characters if they didn't think using stylized characters is better in some way than using realistic characters. Could it be because film studios feel viewers perceive stylized character's emotions better than realistic character's? There is no current research which supports this conclusion so this study seeks to confirm or deny that one character style is perceived overall as being easier to recognize, or having greater sincerity, intensity and typically when the six identified emotions are displayed. (Ekman, 1975)

Background

Caricatures are easier to recognize and remember than ordinary faces (Mauro & Kubovy, 1992). This is a possible indication of ease in perceiving stylized character's faces which are exaggerated.

The Uncanny Valley- This theory states that there is a point at which realism will drop when confronted with a human character, this drop being termed, The Uncanny Valley (Mori, 1970). The current literature is uncertain what precisely causes these uncanny impressions and it is possible that upon identification of the facial characteristics that cause the Uncanny Valley, realistic characters will become more popular to use. This research however, presents the two styles on equal grounds for comparison.

There are viewer expectations with a realistic character which character designers and animators can ignore or change when creating a non-realistic or stylized character. When one's goal is not realism, one is not limited by the restrictions of reality (Nunez, 2004). It may be easier to perceive the often exaggerated features and facial animations of a stylized character because we don't expect them to imitate human motion and emotion perfectly. However, viewers expect a realistic character to be perfect and very small errors can result in the emotion not being perceived very well.


Research has also shown "... the perceptual sensitivity to facial features was higher for real faces than for artificial faces, and the higher sensitivity for real faces produced unpleasant impressions of abnormality while the lower sensitivity for artificial faces did not" (Seyama & Nagayama, 2007, p. 349). This research is another indication that viewers are more sensitive when viewing a realistic face versus a stylized face.

Previous research found perception of emotional motion is unaffected by a character's physical appearance (McDonnell, Jorg, McHugh, Newell, & O'Sullivan, 2008). However, this research blurred out hands and facial features so it is not known if a character's body style can affect perception of its facial features.

There is no identified research that compares the effects of a computer animated character's body style on perception of facial emotion expression.

The Character Styles

Stylized




Stylized Character - A character design with some level of exaggeration, caricature, simplification, and/or unusual proportions. The design can range from icons and simple characters to just below photorealism (Bancroft, 2006).

In this example, the eyes are too large, the head is overly large when compared to the neck and the facial shape is simplified when compared to normal human anatomy.

Examples: *Shrek, Up, Tangled, The Incredibles, How to Train your Dragon*

Realistic



Realistic Character - "Characters that closely mimic reality" (Maestri, 2006)

Often use motion captured movements for ideally an identical imitation of true human movement.

In this example, the hair coloration is varied in an attempt to imitate reality and the facial features are in regular human proportions.

Examples: *Mars needs Moms, Final Fantasy VII: Advent Children, The Polar Express, The Adventures of TinTin, Beowulf*

Methods

This research will use an online survey as the evaluation instrument. Participants will view 24 brief clips of a computer animated character expressing one of the six identified emotions, fear, anger, surprise, happiness, sadness, and disgust. Two representations of a stylized character body and two representations of a realistic character body were chosen for each emotion. Various types of characters (Male, female, young, old) were chosen to provide a wide base of comparison. If one of the clips for Anger's main character was an old man then all attempts were made to have a corresponding stylized character for that emotion be an old man as well. This was to aid comparison of the styles without being distracted by large differences between the two characters. Participants will first identify the emotion and then rate the intensity, typicality, and sincerity of the emotion being displayed using a 7-point Likert scale with 1 being not very Intense/Sincere/Typical and 7 being very Intense/Sincere/Typical. The participants are also instructed to explain what about the character's face led them to the respective rating. This research is a mixed method, meaning it utilizes quantitative, or numerical data, and qualitative, or descriptive data. By combining the two types of questions, the effects on a viewer's perception can be identified as well as the parts of the face which affect perception.

Overview

Research Question: What are the effects (if any) of a computer animated human-like character's visual style (realistic versus stylized) on participants' perception of facial expression?

This question will focus on four variables.

- **Recognizability** - "able to be recognized or identified from previous encounters or knowledge..." (recognizable, n.d.).
Question: What emotion is being displayed?
- **Typicality** - "how often different variants of a facial expression are encountered in the real world" (Wallraven, Breid, Cunningham, & Bulthoff, 2007).
Question: How usual or unusual is the emotion being displayed?
- **Intensity** - "having or showing a characteristic in extreme degree" (Intense, n.d.).
Question: How intense is the emotion being displayed?
- **Sincerity** - "free from pretence or deceit; proceeding from genuine feelings" (Sincere, n.d.).
Question: How sincere is the emotion being displayed?

Does changing the character's body style result in changes in viewer recognition and ratings of the three other variables when the same emotion is being displayed?

Future Work

This research is ongoing and currently in the data collection and analysis stage. Four clips have been identified for each emotion excluding disgust as no suitable clips were able to be found. The Qualtrics survey will be sent out pending the final approval of Purdue University's Institutional Review Board. After data has been collected, final analysis of the quantitative ratings and qualitative descriptions will begin.

(Ekman, P., & Friesen, W.V. (1975). Unmasking the face: A guide to recognizing emotions from their basic forms. Englewood Cliffs, New Jersey, N.J.: Prentice-Hall, Inc.)
 (Mauro, J., & Kubovy, M. (1992). Evaluating the perceptual realism of animated facial expressions. ACM Transactions on Applied Perception, 1(4), 249-270. Retrieved from <http://doi.acm.org/10.1145/128784>
 (Mori, M. (1970). The uncanny valley. Japanese Animation Magazine, 9, 93-98. Retrieved from <http://www.animeanime.com/uncanny-valley/>
 (Nunez, J. (2004). How to create a realistic character: A guide to creating characters that are believable and relatable. New York, NY: HarperCollins Publishers.
 (Seyama, T., & Nagayama, M. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Seyama_Nagayama.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
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 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
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 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
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 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
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 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from http://www.cse.cuhk.edu.hk/~csn/papers/2007/ICCGV07/07_Wallraven_Breid_Cunningham_Bulthoff.pdf
 (Wallraven, F., Breid, S., Cunningham, J., & Bulthoff, H. (2007). The uncanny valley effect on facial expressions: A study on the perception of facial expressions. In Proceedings of the 2007 International Conference on Computer Graphics and Visualization, 1-6. Retrieved from

This research looks at two types of computer animated character body styles: stylized human characters and realistic human characters. Many computer animated films are created in a stylized manner with far fewer computer animated films being designed in a realistic manner. Box office data indicates that film studios prefer to create stylized films, as they believe they are most likely to do well in the box office and are easier for the characters to express emotion as well as for the viewer to perceive emotion. However, there is no research indicating a stylized character is better overall for the viewer to perceive its facial emotion. This research is studying the effects of a computer-animated character's body style on perception of facial emotion expression. Participants viewed 24 brief clips of a computer animated character expressing one of the six identified emotions; fear, anger, surprise, happiness, sadness, and disgust. Two representations of a stylized character body and two representations of a realistic character body were chosen for each emotion. Participants first identified the emotion and then rated the intensity, typicality, and sincerity of the emotion being displayed. They also explained what about the character's face led them to the respective rating. This research is ongoing and currently in the data collection and analysis stage.

Appendix D: Collected Data

What is your age?

1	19
2	18
3	19
4	20
5	18
6	19
7	21
8	25
9	19
10	23
11	21
12	23
13	34

Are you a student in one of the Purdue University's College of Technology undergraduate classes?

1	Yes
2	Yes
3	Yes
4	Yes
5	Yes
6	Yes
7	Yes
8	Yes
9	Yes
10	No
11	Yes
12	No
13	No

What is your gender?

- 1 Male
- 2 Female
- 3 Male
- 4 Male
- 5 Male
- 6 Male
- 7 Male
- 8 Male
- 9 Male
- 10 Female
- 11 Male
- 12 Female
- 13 Male

What emotion is this clip expressing? (Clip 1)

- 1 Surprise
- 2 Shocked/Stunned
- 3 surprise, shock
- 4 Surprised
- 5 cool beans bro
- 6 Frightened
- 7 amazement
- 8 Surprise/Trying to get someone's attention.
- 9 Shock
- 10 Surprise
- 11 Fear, surprise, and confusion
- 12 angry
- 13 realized/found something

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	6
2	3
3	4
4	5
5	4
6	7
7	6
8	4
9	6
10	6
11	5
12	4
13	5

What about the character's facial expression makes you feel that way?

- 1 Eyes open wide, along with a mouth that has "dropped open"
His eyes got very wide, almost like he was scared, so he is showing some vulnerability
- 2 but not much
- 3 eyes wide, scream out in surprise
- 4 KEVIN
- 5 wtf
- 6 It all goes together
- 7 eyes and face change
While eye movement and mouth movement seem fairly sincere, the unrealistic proportions of the face make it hard to view most emotions as sincere.
- 8
- 9 The jump backwards and gasp
- 10 Large deformation
- 11 Emotion is strongest in the eyes and I think that is portrayed sincerely.
- 12 mouth open, he jumps
- 13 eye, mouth, finges

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	6
2	6
3	5
4	6
5	5
6	7
7	6
8	3
9	6
10	6
11	5
12	4
13	6

What about the character's facial expression makes you feel that way?

- 1 The way his mouth is open shows surprise
He jumps back, eyes widen, points, ect which all shows intensity of something that happened. He is bringing forth his reaction through his emotion rather than hiding it.
- 2 jump back in surprise
- 3 POINT
- 4 wtf
- 5 The eyes
- 6 eyes
eye area movement is minimal, with only a look up and down, and while the mouth moves like surprised, the emotion still does not feel very intense
- 7 How his facial expression changed so quickly
- 8 Large deformation
- 9 This emotion seemed rather intense due to is body movement of jumping back.
- 10 stare openly at others
- 11 good position and intensity

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	6
2	7
3	4
4	5
5	3
6	7
7	1
8	3
9	6
10	5
11	2
12	4
13	6

What about the character's facial expression makes you feel that way?

1	The eyes look down then up, like is just saw something and is accessing it
2	People react in similar ways by calling forth the reason for our surprise.
3	shouting, eyes wide in shock
4	He seems scared for the big bird he's looking at
5	wtf
6	Mouth quivering
7	shocked look
8	Almost seems like an emotion you might see commonly.
9	Very typical I think it is a generic response for shock
10	Not sure/Felt Natural
11	I don't usually see a reaction that intense in day-to-day life
12	stare openly with mouth open
13	right on

What emotion is this clip expressing? (Clip 2)

- | | |
|----|-------------------------------------|
| 1 | Sadness |
| 2 | Sadness, Deafeat |
| 3 | hurt, guilt |
| 4 | Sadness |
| 5 | sad |
| 6 | sadness |
| 7 | sadness |
| 8 | Fear |
| 9 | Sorrow |
| 10 | Verge of Tears |
| 11 | Sadness |
| 12 | anxious |
| 13 | worry, realization of bad situation |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 6 |
| 2 | 7 |
| 3 | 5 |
| 4 | 6 |
| 5 | 3 |
| 6 | 7 |
| 7 | 5 |
| 8 | 6 |
| 9 | 6 |
| 10 | 7 |
| 11 | 5 |
| 12 | 2 |
| 13 | 5 |

What about the character's facial expression makes you feel that way?

- | | |
|----|--------------------------------------------------------------------------|
| 1 | The eyes look like they lost hope |
| 2 | He is avoiding eye contact, looking off into the distance, and frowning. |
| 3 | mouth quiver, lost look in the eyes |
| 4 | Looks like he's going to cry |
| 5 | kind of looked fake |
| 6 | eyes |
| 7 | eyes |
| 8 | Expressions and movements at various parts of the face seem relateable. |
| 9 | The way he is weeping |
| 10 | Eyebrows |
| 11 | His lack of facial movement show his defeatedness |
| 12 | his mouth crumples and frowns |
| 13 | eyes, mouse, head movement |

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 6 |
| 2 | 2 |
| 3 | 5 |
| 4 | 5 |
| 5 | 4 |
| 6 | 6 |
| 7 | 6 |
| 8 | 5 |
| 9 | 6 |
| 10 | 6 |
| 11 | 4 |
| 12 | 2 |
| 13 | 4 |

What about the character's facial expression makes you feel that way?

- | | |
|----|--------------------------------------------------------------------------------|
| 1 | The quivering mouth |
| 2 | He is not showing anger or fear, rather defeat. |
| 3 | short breath |
| 4 | Not knowing what to say, |
| 5 | not intense enough |
| 6 | mouth |
| 7 | eyes low and quivering mouth |
| 8 | The way that the mouth moves, and the microexpressions in and around the eyes. |
| 9 | He can't look away and the weeping |
| 10 | Trembling |
| 11 | His lack of facial movement show his defeatedness and wasn't exaggerated |
| 12 | his mouth crumples and frowns |
| 13 | not drastic |

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- | | |
|----|---|
| 1 | 4 |
| 2 | 6 |
| 3 | 5 |
| 4 | 6 |
| 5 | 4 |
| 6 | 5 |
| 7 | 2 |
| 8 | 4 |
| 9 | 6 |
| 10 | 6 |
| 11 | 5 |
| 12 | 2 |
| 13 | 6 |

What about the character's facial expression makes you feel that way?

- 1 Too dramatic for a real human
- 2 When we loose something, we feel defeated and keep to ourselves, almost avoiding eye contact as this character is doing.
- 3 seen it before
- 4 Looks very lifelike
- 5 looks really really fake
- 6 king
- 7 shocked look on face
- 8 This seems to be a standout emotion that seperates itself from othermore common and less intense emotions.
- 9 Sorrow is often associated with weeping
- 10 Not Sure
- 11 The defeated expression is normal
- 12 his mouth crumples and frowns
- 13 looks real

What emotion is this clip expressing? (Clip 3)

- 1 cocky
- 2 Pride
- 3 authority
- 4 Confidence
- 5 happy?
- 6 calm
- 7 amusement
- 8 Smug happiness
- 9 Hopeful
- 10 Happy
- 11 I don't know
- 12 happy
- 13 confident, going to introduce something

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	5
2	3
3	4
4	5
5	4
6	6
7	5
8	4
9	3
10	5
11	1
12	2
13	4

What about the character's facial expression makes you feel that way?

- 1 The smile
She is not showing a lot of sincerity but her expression is still soft with her eyes and her
- 2 slight grin
- 3 head nod, smile, strong speaking
- 4 Standing tall, chin held high
- 5 she looks happy?
- 6 body
- 7 slight smile
Square Enix has always had amazing visual style, but sincerity on character's faces such as Tifa's here in FF: Advent Children have always been lacking. Because facial features and movements mimic that of anime characters rather than live action, they feel less
- 8 convincing.
- 9 Hard to discern what her expression is
- 10 Smiles at beginning and end
- 11 Not sure what the emotion is
- 12 with smile on her face
- 13 turning head, mouse

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	5
2	6
3	5
4	5
5	4
6	6
7	4
8	4
9	2
10	3
11	1
12	2
13	4

What about the character's facial expression makes you feel that way?

1	Doesn't look stressed, sad, or angry
2	Her hair falls over her face, she is looking determined with her narrowed eyes, her grin shows she is satisfied with something
3	smile to herself
4	Talks with a confident voice, eyes on the prize
5	happy ish but not that happy
6	eyes
7	relaxed look
8	Seems to be a lighthearted expression.
9	The turn to look far off kind of reminds me of hopefulness
10	Not much facial expression while talking
11	Not sure what the emotion is
12	smile
13	everything is average, but head movement is obvious

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	5
2	5
3	4
4	6
5	4
6	5
7	3
8	3
9	4
10	3
11	4
12	2
13	3

What about the character's facial expression makes you feel that way?

1	The smile at the end
2	When we are proud, our expression in our eyes tend to be more soft than hers.
3	nod and smile
4	Doesn't show fear
5	yeah, fake happiness when talking
6	mouth
7	calmness
8	Also an expression that is used commonly not just in Advent Children but in animation,
9	I think it is a typical response
10	Not well defined mouth animation (for words...looks like a fish gasping)
11	People are emotionless sometimes.
12	smile
13	eyes, eye brows, mouth not moving big

What emotion is this clip expressing? (Clip 4)

- | | |
|----|--------------------------------|
| 1 | Scared |
| 2 | Scared |
| 3 | anxiety, fear |
| 4 | Scared |
| 5 | scared |
| 6 | fear |
| 7 | regret |
| 8 | Resigning to a fate |
| 9 | Fear |
| 10 | Apprehension |
| 11 | Fear |
| 12 | scared |
| 13 | shocked, frightened, concerned |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 5 |
| 2 | 3 |
| 3 | 4 |
| 4 | 5 |
| 5 | 4 |
| 6 | 7 |
| 7 | 6 |
| 8 | 6 |
| 9 | 2 |
| 10 | 2 |
| 11 | 5 |
| 12 | 3 |
| 13 | 4 |

What about the character's facial expression makes you feel that way?

- 1 The mouth and the eyes
- 2 He is blinking a lot and pulling away from the wand
- 3 scared body language, trying to escape
- 4 Backing away / look of bracing for something about to happen
- 5 omg
- 6 eyes
- 7 eyes changing and also focusing on object and recoiling from it but not in fear
The change from a look of giving up to that of fearful anticipation especially in the
eyebrows is very lifelike.
- 8 It doesn't really appear that he is afraid maybe just slightly intimidated
- 9 Doesn't move away from wand quickly enough
- 10 His eyes and bracing of his mouth.
- 11 head move back and winked at first
- 12 okay

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- 1 5
- 2 2
- 3 5
- 4 5
- 5 3
- 6 5
- 7 5
- 8 6
- 9 2
- 10 3
- 11 4
- 12 3
- 13 5

What about the character's facial expression makes you feel that way?

- 1 The little curl at the end of his mouth
- 2 He is not shouting o showing anger
- 3 eyes darting, pulling away
- 4 Scared for whats going to happen
- 5 getting realllll tired of answering these questions
- 6 mouth
- 7 mouth
- 8 The way he seems to emote a resigned feeling and quickly change to fearful anticipation comes through in the eyes, brows and mouth position.
- 9 He doesn't seem very concerned just nervous
- 10 Not enough eyebrow movement
- 11 No facial movement was exaggerated.
- 12 grin, head move back, Indrawn breath
- 13 okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- 1 3
- 2 5
- 3 4
- 4 5
- 5 2
- 6 5
- 7 2
- 8 2
- 9 3
- 10 4
- 11 4
- 12 3
- 13 4

What about the character's facial expression makes you feel that way?

- 1 Eyes are too wide open
- 2 We tend to back away from things that we are unfamiliar with or scared of
- 3 cowered in fear is common
- 4 Backing away, squinty eyes, teeth together
- 5 omg
- 6 face
- 7 eyes still on object like he is used to it but still doesnt like it
- 8 These are not very typical emotions at all.
- 9 It was almost fear but not quite what I associate with fear
- 10 Not sure
- 11 His eyes were somewhat fearful, but it didn't seem like he wasn't extremely afraid.
- 12 grin, head move back, Indrawn breath
- 13 okay

What emotion is this clip expressing? (Clip 5)

- 1 Suprise
- 2 Helplessness
- 3 fear
- 4 Fear/Disgust
- 5 awed face
- 6 scared
- 7 shock
- 8 Disgust/surprise...hard to tell exactly
- 9 Suprise
- 10 Surprise
- 11 Fear
- 12 astonish
- 13 shocked, discovery

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	5
2	7
3	4
4	6
5	5
6	7
7	6
8	5
9	6
10	5
11	3
12	3
13	4

What about the character's facial expression makes you feel that way?

- 1 Change from previous emotion during the first half, to open eyes and mouth
His shoulders are hunched, eyes droopys, mouth turned down and slightly hanging
- 2 open.
- 3 brow furroed, pull back, mouth open
- 4 Moving backwards/moving away
- 5 it was totally sincere
- 6 mouth
- 7 complete facial feature change
It is sincere, if not a bit ambiguous beacuse of the way his mouth moves and
- 8 eyes/eyebrows also move
- 9 The gasp and drawback indicate to me surprise
- 10 Gasp with the mouth
Face seemed a bit blank but you could tell the emotional change with his eyes
- 11 widening and mouth frowning.
I get my conclusion not from the facial expression but i see his head move back once
- 12 he saw something and looks like he cry out
- 13 okay

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	6
2	3
3	5
4	6
5	1
6	6
7	6
8	6
9	3
10	6
11	3
12	5
13	4

What about the character's facial expression makes you feel that way?

1	Wide eyes
2	His eyes make him look like he needs help but can't find any.
3	quick jerk back
4	The strength of disgust
5	there is no intensity, he's just like "whatttt"
6	eyes
7	snear to fear change in person
8	Whether surprise or disgust or fear, it seems like an emotion that is intense without being over or underexaggerated for the situation
9	The shock associated with surprise doesn't seem to appear in the clip
10	Facial change is quick
11	Nothing was exaggerated.
12	his eyebrows rose
13	okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	5
2	5
3	5
4	3
5	7
6	5
7	5
8	2
9	7
10	6
11	5
12	4
13	4

What about the character's facial expression makes you feel that way?

1	Rapid change from one emotion to another
2	He seems to be shying away from the situation since he feels helpless, which is something we would do.
3	eyes wide, mouth open
4	Not as common as smiling
5	that's the face I make when I find out there is no cheese it's left
6	eyebrows
7	eyes changing
8	Does not seem like an expression you would see every day.
9	These facial expressions are what I look for if someone is surprised
10	Quick enough change and big enough to be noticeable but not comical
11	Somewhat typical reaction because of its lack of intensity.
12	eyebrows rose and with mouth open
13	okay

What emotion is this clip expressing? (Clip 6)

- | | |
|----|----------------------|
| 1 | Joy/Suprise |
| 2 | Happy,Relieved |
| 3 | surprise, happiness |
| 4 | Excitement |
| 5 | Happy |
| 6 | awe |
| 7 | joy |
| 8 | Happiness |
| 9 | Happy |
| 10 | Unexpected Happiness |
| 11 | Happiness |
| 12 | pleasantly surprise |
| 13 | happy |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 6 |
| 2 | 5 |
| 3 | 4 |
| 4 | 6 |
| 5 | 5 |
| 6 | 7 |
| 7 | 5 |
| 8 | 5 |
| 9 | 6 |
| 10 | 4 |
| 11 | 7 |
| 12 | 3 |
| 13 | 4 |

What about the character's facial expression makes you feel that way?

- | | |
|----|---------------------------------------------------------------------------------------|
| 1 | Raised eyebrows as person is looking at something |
| 2 | His smile shows he is happy, his eyebrows raise as he inhales showing he is relieved. |
| 3 | eyes opened wide, small smile to big |
| 4 | The smile |
| 5 | His initial smile |
| 6 | eyebrows |
| 7 | raising eyebrows and bigger smile |
| 8 | Mouth movement and brows. |
| 9 | He seems to recognize what he sees and is pleased by it |
| 10 | Mouth doesn't change |
| 11 | His eyes just seemed sincere. |
| 12 | smile and with some shinning in his eyes seems to find something |
| 13 | okay |

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 6 |
| 2 | 2 |
| 3 | 5 |
| 4 | 5 |
| 5 | 5 |
| 6 | 7 |
| 7 | 4 |
| 8 | 5 |
| 9 | 3 |
| 10 | 4 |
| 11 | 4 |
| 12 | 3 |
| 13 | 3 |

What about the character's facial expression makes you feel that way?

- 1 Mouth dropped open but it was a smile
- 2 His features are very soft and warm, not scary or angry.
- 3 it looks real
- 4 The width of the smile
- 5 It seemed intense but cartoons can't portray human expressions as well.
- 6 mouth
- 7 not ear to ear smile but big still
- 8 Movements are lifelike, but degeee of movement seems a bit lacking.
- 9 He just cracks a smirk not like jumping up and down happy
- 10 Eyebrows raise
His eyes widening and mouth opening were obvious but not intense. Eyebrows
- 11 were a bit intense though.
- 12 smile and with eyes widely open
- 13 okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- 1 3
- 2 6
- 3 6
- 4 5
- 5 5
- 6 7
- 7 5
- 8 3
- 9 5
- 10 6
- 11 7
- 12 3
- 13 6

What about the character's facial expression makes you feel that way?

- 1 People usually don't stare that long with an open mouth when surprised (if the actual emotion as surprise)
- 2 He is showing normal signs of happiness and relief.
- 3 Happens all the time
- 4 How big he is smiling
- 5 Typical, it's almost a disney movie right?
- 6 eyes
- 7 not major facial changes but some did occur
- 8 Degree of movement makes this uncommonly happy, but not still extreme happiness.
- 9 I associate being happy with smiling
- 10 Subtle for a subtle taste of this emotion
- 11 That type of reaction seems much more normal than the other intense reactions.
- 12 smile, eyes widely open
- 13 okay

What emotion is this clip expressing? (Clip 7)

- 1 Sadness
- 2 Defeat
- 3 defeat
- 4 Depressed
- 5 thinking
- 6 Sadness
- 7 sadness
- 8 Tiredness/Sadness
- 9 Despair
- 10 That moment before brilliant insight
- 11 Sadness
- 12 unhappy
- 13 worry, frustration, unwillingly,

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	5
2	6
3	4
4	5
5	5
6	6
7	7
8	4
9	7
10	4
11	5
12	2
13	6

What about the character's facial expression makes you feel that way?

- 1 Drooping of eyelids
- 2 hunched shoulders, exhales deeply, eyes drooped, frowning
- 3 shoulder drop, eyes down
- 4 Shoulders slumped, head down
- 5 obvious
- 6 Involves eyes and mouth
- 7 downturned head and eyes
- 8 The slow blink makes it slightly sincere, but it feels as if the rest of the face does not move enough to make it very sincere.
- 9 The shoulders shrugged and head down remind me of despair
- 10 The furrowing of the brows at the end of speaking/not looking at anything in particular
- 11 His eyes paired with his body movements made it more sincere.
- 12 I feel that he is sighing and frowning with head down
- 13 sighing, head down, shoulder movement

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	5
2	1
3	4
4	6
5	5
6	6
7	6
8	4
9	5
10	4
11	4
12	3
13	6

What about the character's facial expression makes you feel that way?

- 1 Eyebrows are low
- 2 He looks helpless, not intense
- 3 eyes down, sigh, giving up
- 4 Slow eyelid movement
- 5 obvious
- 6 The whole face is involved. Wholesome
- 7 eyes low
- 8 While the large exhale and slow blink indicate tiredness or sadness, the rest of the body and face so not seem to indicate that this is a very intense feeling.
- 9 While he isn't balled up in a corner crying he does seem rather down
- 10 Slow dejected down-turning of the head
- 11 It was obvious emotion but nothing drastic.
- 12 sighing and frowning with head down
- 13 sighing, head down, shoulder movement--->not big movement but express the right level of that emotion

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	6
2	7
3	4
4	5
5	7
6	7
7	1
8	4
9	6
10	4
11	5
12	5
13	6

What about the character's facial expression makes you feel that way?

1	Eyes are looking down to the floor, a sign of giving up or sadness
2	We all show these characteristics when we feel defeated and want to give up.
3	eyes down
4	Very good movements though the clip, very real
5	i've seen shrek
6	I have made that face before
7	eyes Seems like somethin that is not too ordinary but at the same time, not exactly
8	extraordinary
9	The way he is postured and his frown
10	Not sure
11	That level of sadness seems a bit rarer to me.
12	sighing and frowning with head down
13	close to human expression

What emotion is this clip expressing? (Clip 8)

- | | |
|----|---------------------|
| 1 | Wonder |
| 2 | Amazed |
| 3 | amazement |
| 4 | Shock |
| 5 | he just hit puberty |
| 6 | surprise |
| 7 | amazement |
| 8 | Amazement |
| 9 | Amazement |
| 10 | Amazement |
| 11 | Amazement |
| 12 | suprise |
| 13 | awed |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 5 |
| 2 | 5 |
| 3 | 4 |
| 4 | 6 |
| 5 | 2 |
| 6 | 7 |
| 7 | 6 |
| 8 | 6 |
| 9 | 7 |
| 10 | 5 |
| 11 | 3 |
| 12 | 4 |
| 13 | 6 |

What about the character's facial expression makes you feel that way?

- 1 Wide eyes, open mouth
- 2 His eyes are wide but the rest of his face is soft. His forehead is not scrunched to show anger and the sides of his eyes are turned down.
- 3 large eyes, but relied to much on mouthing the word "wow", not really stunned
- 4 The child saying "Wow"
- 5 idc
- 6 mouth
- 7 open mouth and slight raised eyebrows
- 8 The size of the eyes and positon of the eyebrows make this seem very sincere,
- 9 The wide eyed look
- 10 Large eyes
- 11 His eyes were large which seemed natural, but his eyebrows move oddly.
- 12 mouth open seems like to say Wow. and with eyes widely open.
- 13 okay

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 6 |
| 2 | 5 |
| 3 | 3 |
| 4 | 5 |
| 5 | 2 |
| 6 | 5 |
| 7 | 6 |
| 8 | 6 |
| 9 | 7 |
| 10 | 6 |
| 11 | 4 |
| 12 | 3 |
| 13 | 4 |

What about the character's facial expression makes you feel that way?

- 1 Open mouth
Since both his eyes and his mouth get very wide in disbelief and amazement, there is
- 2 some intensity to his expression.
- 3 wasn't speechless, but pleasantly surprised,
- 4 Expanded eyes
- 5 idc
- 6 eyes
- 7 mouth wide open and bug eyed
The similarity to the human counterpart of a child's amazement is uncanny here...the
- 8 way the eye areas move, and the way the child obviously says "wow"
- 9 He seems very joyful and happy to see what he is seeing
- 10 Little movement as eyes dart around, large open mouth
- 11 His eyes were fairly wide open but the rest of the face didn't follow suit.
- 12 eyes gradually open.
- 13 okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- | | |
|----|---|
| 1 | 6 |
| 2 | 7 |
| 3 | 4 |
| 4 | 6 |
| 5 | 2 |
| 6 | 2 |
| 7 | 2 |
| 8 | 2 |
| 9 | 7 |
| 10 | 6 |
| 11 | 2 |
| 12 | 5 |
| 13 | 4 |

What about the character's facial expression makes you feel that way?

- 1 Little kids usually just stare at something, also he said 'wow' or something which is more realistic than just staring
- 2 His reaction is a typical amazed reaction.
- 3 large eyes
- 4 Children are often surprised by things, and this is a great example of chil
- 5 idc
- 6 whatever
- 7 eyebrows raising
- 8 Not an expression you would normally see in everyday life, and even in animation, this expression seems very realistic.
- 9 Pretty typical to see the long wow with wide eyed amazement
- 10 A little over the top in the pause, but not at all unfeasible
- 11 His eyes were large which seemed natural, but his eyebrows move oddly.
- 12 eyes widely open and mouth open seems like to say Wow
- 13 okay

What emotion is this clip expressing? (Clip 9)

- 1 Shock
- 2 Worried
- 3 relief
- 4 Exhaustion
- 5 wtf
- 6 anger
- 7 shock
- 8 Waking up from a bad dream
- 9 Startled
- 10 Fright
- 11 Relief
- 12 terrified
- 13 waking up from a nightmare

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	6
2	5
3	5
4	5
5	2
6	7
7	6
8	5
9	6
10	4
11	3
12	4
13	4

What about the character's facial expression makes you feel that way?

1	Heavy breathing
2	His mouth is open and his eyes are looking around.
3	deep breaths, shocked look as he glances around
4	Heaving breathing
5	wtf
6	mouth
7	heavy breathing and eyes darting around
8	Mouth movement is very lifelike, but eye movement leaves a bit to be desired as far as human mimicry
9	Heavy breathing
10	Panting mouth
11	His face seemed somewhat unchanging.
12	mouth widely open, keep breathing and frown
13	okay

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	6
2	5
3	6
4	6
5	2
6	5
7	5
8	5
9	6
10	5
11	4
12	4
13	4

What about the character's facial expression makes you feel that way?

- 1 The way he averted his eyes at the end along with the breathing
- 2 The way he is panting shows intensity in his worry.
- 3 chest heaving, mouth open
- 4 Heavy Breathing
- 5 wtf
- 6 whatever
- 7 face doesn't look too flustered
- 8 While the eye movement is lacking, the mouth movements and other facial microexpressions make this expression convey a very unique state.
- 9 His discomfort with where he is.
- 10 Eyebrows and panting
- 11 It seemed obvious but his eyes didn't change much with the realization.
- 12 mouth widely open, keep breathing and frown
- 13 okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	6
2	6
3	5
4	5
5	2
6	7
7	5
8	2
9	6
10	5
11	4
12	4
13	5

What about the character's facial expression makes you feel that way?

1	The heavy breathing along with the look in the eyes When we are worried, our breathing quickens, eyes widen, and in cases of fear as well, we look around frantically.
2	it was believable
3	Happens often when exercising or in moments of high adrenaline
4	wtf
5	I'm angry all the time. Especially with this survey. face doesnt stay that way long changing to looking like he is shaking whatever off his mind quickly
6	A very unique situation and emotional state is conveyed here that cannot be confused with anything else.
7	Awaking and sitting up quickly
8	Fairly realistic, but needs more eyes
9	Relief is common but more facial changing is needed.
10	mouth widely open, keep breathing and frown
11	okay
12	
13	

What emotion is this clip expressing? (Clip 10)

- | | |
|----|------------------------|
| 1 | Anger |
| 2 | Doubt |
| 3 | disappointment |
| 4 | Anger |
| 5 | upset/bitter |
| 6 | upset |
| 7 | frustration |
| 8 | Anger/ Confrontational |
| 9 | Upset |
| 10 | Annoyed |
| 11 | Frustration |
| 12 | angry |
| 13 | unhappy |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 6 |
| 2 | 1 |
| 3 | 5 |
| 4 | 6 |
| 5 | 5 |
| 6 | 7 |
| 7 | 7 |
| 8 | 5 |
| 9 | 6 |
| 10 | 4 |
| 11 | 4 |
| 12 | 3 |
| 13 | 6 |

What about the character's facial expression makes you feel that way?

- 1 She is glaring at someone
- 2 She has one eyebrow raised, arms and legs crossed as if she doesn't want to be bothered, and her eyes are narrowed.
- 3 brow furrowed, arms crossed, quick precise words
- 4 Mad about something, the squinty eyes and the mouth do it
mom makes that face when dad makes a horrible excuse about not attending to her every little need...women...
- 5 eyebrows
- 6 mad looking eyes
- 8 Furrowing of the brow and raised eyebrow
- 9 Her brow line
- 10 Eyebrows
Her eyes/eyebrows were spot on but the lower half of her face seemed to be a separate entity.
- 11 frown
- 12 eye, eyebrow, hand around chest

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 6 |
| 2 | 6 |
| 3 | 5 |
| 4 | 6 |
| 5 | 4 |
| 6 | 7 |
| 7 | 6 |
| 8 | 5 |
| 9 | 5 |
| 10 | 6 |
| 11 | 4 |
| 12 | 2 |
| 13 | 6 |

What about the character's facial expression makes you feel that way?

- 1 The eyes and the way she looks like she talks
- 2 Her intensity is shown because she seems that she already known the truth and is doubting what she is being told, so she is becoming angry.
- 3 interrogation style questions, eyes piercing
- 4 Very mean look to it
- 5 idk
- 6 mouth
- 7 eyes focused and eyebrows moving at end
- 8 The amount of brow furrowing and the raised eyebrow as well as the quick words and mouth position make this very intense.
- 9 She isn't yelling but she is frowning
- 10 Lack of movement other than mouth
- 11 The conflicting parts of her face somewhat balance out.
- 12 frown
- 13 the expressions are at the right position and right intensity

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- | | |
|----|---|
| 1 | 4 |
| 2 | 6 |
| 3 | 4 |
| 4 | 3 |
| 5 | 4 |
| 6 | 6 |
| 7 | 1 |
| 8 | 2 |
| 9 | 6 |
| 10 | 3 |
| 11 | 3 |
| 12 | 2 |
| 13 | 6 |

What about the character's facial expression makes you feel that way?

- 1 Eye brow looks too dramatically raised (her left one)
- 2 We normally give others a chance to explain but when they fail to tell the truth, our expression and reaction to the situation is very much like hers.
- 3 wife questioning husband
- 4 The way that only her mouth is moving but her entire body isn't makes it look more animated
- 5 idc
- 6 eyes
- 7 looks determined and focused
- 8 Does not seem like a level of anger one would normally encountered unless provoked.
- 9 Pretty typical for scolding when upset
- 10 Comical, but stiff
- 11 When frustrated, I would expect more nose movement such as the skin scrunching up.
- 12 frown
- 13 close to human

What emotion is this clip expressing? (Clip 11)

- 1 Anger
- 2 anger
- 3 anger
- 4 Anger
- 5 mad
- 6 excitement
- 7 anger
- 8 Commanding yell
- 9 Anger
- 10 Anger
- 11 Determination
- 12 angry
- 13 denial

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	6
2	1
3	3
4	5
5	5
6	6
7	6
8	4
9	6
10	3
11	2
12	5
13	3

What about the character's facial expression makes you feel that way?

- 1 Eyes brows are furrowed
- 2 He was showing anger and looked frightening
- 3 no emotion in the face just opened his mouth
- 4 Angry face
- 5 it was obvious
- 6 eyes and mouth suggest same thing
- 7 eyes
- 8 While the mouth depicts a yell, the eyes do not seem to move much, making this feel like a slightly confusing emotion.
- 9 Furrowed brow
- 10 Not enough eye-movement/eye-region deformation
- 11 His eyes seemed somewhat blank and his face didn't form that much.
- 12 He seems roaring at others
- 13 okay

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	6
2	7
3	3
4	6
5	6
6	7
7	7
8	4
9	6
10	5
11	2
12	5
13	6

What about the character's facial expression makes you feel that way?

	The way he showed he teeth when we
1	spoke or yelled
2	He seemed to be very upset about something
3	didn't believe himself after he said it
4	Angry face.
5	looks awesome
6	The movement
7	facial features
8	Same answer as previous
9	He was yelling
10	Mouth deformation
11	Same reasoning as with the sincerity.
12	mouth open and gnash the teeth
13	okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	3
2	6
3	4
4	4
5	5
6	7
7	5
8	4
9	5
10	3
11	3
12	5
13	4

What about the character's facial expression makes you feel that way?

- 1 After he speaks his face doesn't move, too much like stone
Someone being very upset would not look sincere and would look intense; however, I
- 2 don't think a person would normally "growl" to show their anger.
- 3 self doubt as he looked down
- 4 The angry face
- 5 yeah..
- 6 He's pumped
- 7 looks calm at being angry
The ambiguity of the eyes make this emotion seem less out of the ordinary and more
- 8 of a day to day emotion
- 9 Strained neck muscles
- 10 Not strong enough to feel natural
- 11 People usually tend to show a bit more movement in the face. Seemed unnatural.
- 12 mouth open and gnash the teeth
- 13 okay

What emotion is this clip expressing? (Clip 12)

- | | |
|----|-----------------|
| 1 | Surpsie |
| 2 | Curiosity |
| 3 | epiphany |
| 4 | Surprise |
| 5 | surprised |
| 6 | surprise/awe |
| 7 | surprise |
| 8 | Fear |
| 9 | Wonder |
| 10 | Stunned |
| 11 | Surprise |
| 12 | curious |
| 13 | discovery, awed |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 6 |
| 2 | 3 |
| 3 | 5 |
| 4 | 5 |
| 5 | 3 |
| 6 | 7 |
| 7 | 6 |
| 8 | 6 |
| 9 | 6 |
| 10 | 6 |
| 11 | 5 |
| 12 | 2 |
| 13 | 5 |

What about the character's facial expression makes you feel that way?

- | | |
|----|---------------------------------------------------------------|
| 1 | Wide eyes, open mouth |
| 2 | He is not showing anger nor remorse. |
| 3 | sudden realization, eyes wide, mouth dropped |
| 4 | The o face |
| 5 | tired |
| 6 | kids are always sincere |
| 7 | eyes widening |
| 8 | Eye enlargement and brow raising make this seem very sincere. |
| 9 | The mouth drop and no recoil makes me think of wonder |
| 10 | Quick animation followed by little movement |
| 11 | The eyes widening. |
| 12 | with eyes widely open, stare |
| 13 | okay |

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 6 |
| 2 | 5 |
| 3 | 5 |
| 4 | 5 |
| 5 | 5 |
| 6 | 7 |
| 7 | 5 |
| 8 | 5 |
| 9 | 5 |
| 10 | 3 |
| 11 | 4 |
| 12 | 2 |
| 13 | 4 |

What about the character's facial expression makes you feel that way?

- 1 raised eyebrows, open mouth
- 2 Since his eyes do widen quite a bit, he shows some intensity in his curiosity.
- 3 quick change as realize something
- 4 The O face.
- 5 omfg
- 6 eyes
- 7 eyes and mouth opening
The child seems very scared...the amount that he raises his brows and his eyes
- 8 enlarge seems to indicate that he is very scared.
The character doesn't seem speechless something I think associates itself with great
- 9 wonder
- 10 Subtle due to little movement after initial "stun"
- 11 You can see a change in his face but it's rather subtle.
- 12 eyes widely open
- 13 okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- 1 5
- 2 6
- 3 5
- 4 5
- 5 6
- 6 5
- 7 2
- 8 3
- 9 5
- 10 3
- 11 3
- 12 2
- 13 3

What about the character's facial expression makes you feel that way?

- 1 open mouth and wide eyes
- 2 His reaction to something unknown approaching is very similar to how we would react.
- 3 eyes wide
- 4 The O face
- 5 sooo cooll broooo
- 6 mouth
- 7 how much eyes and mouth move
- 8 Does not seem like a level of fear one would seem normally.
- 9 This is a generic response to experiencing wonder
- 10 Not sure
- 11 Eyes being that wide is not typical.
- 12 eyes widely open
- 13 okay

What emotion is this clip expressing? (Clip 13)

- 1 Sadness
- 2 Saddness
- 3 loss, ashamed
- 4 SAdness
- 5 sad
- 6 sad
- 7 sadness
- 8 Sadness/Apologetic
- 9 Sorrow
- 10 Release
- 11 Sorrow
- 12 sad
- 13 sad

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	6
2	5
3	6
4	6
5	2
6	7
7	7
8	5
9	6
10	4
11	7
12	4
13	6

What about the character's facial expression makes you feel that way?

1	Eyes looking sad
2	Eyes shut, chin almost touching chest, head bowed,
3	looking down and away, sigh
4	Sigh, head down, crying
5	s
6	face
7	downturned head, sad looking eyes,
8	The head movements along with the lowered eyebrows make this very lifelike
9	His dropped eyes and he is weeping
10	Stillness/smooth downward movement
	He truly seemed sad with the closed eyes which happen when you are about to cry.
11	Lowering eyebrows.
12	lower his head, frown, close his eyes
13	okay

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	6
2	1
3	6
4	7
5	3
6	7
7	6
8	6
9	6
10	3
11	7
12	4
13	3

What about the character's facial expression makes you feel that way?

- 1 Mouth was tense along with eyes looking downward
- 2 His eyes look ready to cry, not intense
- 3 can't make eye contact
- 4 Sighing, head is down, and crying
- 5 s
- 6 hand
- 7 overall combination of facial features forming the overall look
- 8 The way he moves his head coupled with minimal movement of the mouth and lowered, drawn together brow makes this seem very intense.
- 9 He seems very sad but isn't broken down
- 10 Naturally subtle expression
- 11 Somehow he looks like he is about to cry. Not sure how to describe it.
- 12 frown, close his eyes
- 13 okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	6
2	7
3	5
4	4
5	5
6	6
7	6
8	2
9	6
10	5
11	5
12	5
13	4

What about the character's facial expression makes you feel that way?

1	Eyes looked glazed over, giving the impression of tears or something
2	We all bow our heads and close our eyes when we are ready to cry
3	pretty typical response
4	When you loose a family member, this is an expression that is felt
5	s
6	mouth
7	intense look through eyes and head movement
8	Does not seem like a level of sadness one would normally experience.
9	He is weeping
10	Not Sure/Felt Natural
11	This expression is seen in disaster frequently.
12	frown, close his eyes
13	okay

What emotion is this clip expressing? (Clip 14)

- | | |
|----|--------------------------------------------|
| 1 | Curiosity |
| 2 | Satisfied |
| 3 | rememberence, happiness |
| 4 | Curiosity |
| 5 | curious |
| 6 | awe |
| 7 | curiosity |
| 8 | Interest/Happiness |
| 9 | Fascination |
| 10 | Sentimental Nostalgia |
| 11 | Happiness |
| 12 | curiousness |
| | observes something and then the delight of |
| 13 | discovery |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 6 |
| 2 | 5 |
| 3 | 5 |
| 4 | 4 |
| 5 | 4 |
| 6 | 3 |
| 7 | 5 |
| 8 | 5 |
| 9 | 4 |
| 10 | 4 |
| 11 | 4 |
| 12 | 3 |
| 13 | 2 |

What about the character's facial expression makes you feel that way?

- | | |
|----|-------------------------------------------------------------------------------------------------------------------------------------|
| 1 | Eyes staing at the bell |
| 2 | Slight grin, but not a grin due to accomplishments. He seems to be smiling with almost a "smug" attitude that he knows he is right. |
| 3 | smirk and intense gaze |
| 4 | Staring at the bell |
| 5 | eh good enough |
| 6 | face |
| 7 | intense look on the face |
| 8 | The way his expression changes from that of interest in the bell to a smile, showing happiness like he is remembering something. |
| 9 | He seems like he is fascinated but he doesn't really express much emotion |
| 10 | Gaze |
| 11 | Hard to say what seems normal. |
| 12 | he looks carefully at the object |
| 13 | the observation and discovery expression are both not obvious |

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 4 |
| 2 | 2 |
| 3 | 6 |
| 4 | 5 |
| 5 | 3 |
| 6 | 3 |
| 7 | 5 |
| 8 | 5 |
| 9 | 3 |
| 10 | 3 |
| 11 | 2 |
| 12 | 2 |
| 13 | 3 |

What about the character's facial expression makes you feel that way?

- | | |
|----|---------------------------------------------------------------|
| 1 | Eye brows raised a bit |
| 2 | His slight grin does soften his expression |
| 3 | smiles to himself as he remembers |
| 4 | Him staring at the bell |
| 5 | psh no intensity |
| 6 | eyes |
| 7 | overall combination in face of eyes and face structure |
| 8 | His eyes and mouth movements seem genuine |
| 9 | There are no huge visual clues besides a furrowed brow, kinda |
| 10 | Soft and introverted, not much mouth deformation in the smile |
| 11 | He had a gentle smirk |
| 12 | he stare at the object and smile |
| 13 | not obvious |

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- | | |
|----|---|
| 1 | 6 |
| 2 | 6 |
| 3 | 5 |
| 4 | 5 |
| 5 | 7 |
| 6 | 4 |
| 7 | 3 |
| 8 | 3 |
| 9 | 5 |
| 10 | 4 |
| 11 | 5 |
| 12 | 2 |
| 13 | 6 |

What about the character's facial expression makes you feel that way?

- 1 The slight smile at the end
- 2 When we secretly know we are right, we all have the little grin that crawls onto our faces without us even realizing it. This is the same grin he is wearing in the clip.
- 3 it was believable
- 4 Him staring at the bell
- 5 yeah, that bell would totally fascinate me aswell
- 6 mouth
- 7 little smile on the end
- 8 Seems to be an uncommon reaction that is specific to this situation.
- 9 Staring at something with a neutral expression tells me he is fascinated by the object
- 10 Seems natural due to subtlety
- 11 The gentle smirk is common.
- 12 he stare at the object and smile
- 13 close to a introvert human's expression when s/he is alone, observing something

What emotion is this clip expressing? (Clip 15)

- 1 Annoyance
- 2 Angry
- 3 disgust
- 4 Anger
- 5 upset
- 6 displeasure
- 7 anger
- 8 Anger/frustration
- 9 Anger
- 10 Irritation
- 11 Not sure
- 12 dissatisfaction
- 13 slightly angry

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	6
2	1
3	4
4	6
5	5
6	7
7	6
8	5
9	4
10	3
11	1
12	2
13	3

What about the character's facial expression makes you feel that way?

	Eyes brows are furrow then go a little more relaxed so it shows annoyance
1	not anger
2	She is showing anger, not sincerity
3	pursed lips
4	The squinty eyes and stressed face
5	obvious
6	eyes
7	narrowed eyes
	The way the eyes move, the way the nostrils flare and the movements of the
8	mouth.
9	The emotion seems to be used as a tool
10	Not much deformation in the eye-twitch and mouth
11	I'm not sure what she is expressing.
12	frown and shrink his face especially close his mouth lightly
13	not obvious

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	6
2	7
3	4
4	5
5	5
6	7
7	6
8	6
9	3
10	5
11	1
12	3
13	3

What about the character's facial expression makes you feel that way?

1	Mouth, looks like an aggressive frown
2	squints her eyes, purses her lips together, shakes her head
3	arm up to lecture, lip pursed
4	Not intense, but still serious
5	obvious
6	arm
7	overall squishing of face together
8	Obvious frustration and a good amount of anger; all of the microexpressions in the face mimic the real life emotion's effects on the face.
9	The length and facial expression tell me it isn't very intense
10	Large amount of deformation to hit irritated expression
11	I'm not sure what she is expressing.
12	close his mouth lightly and frown
13	not obvious

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	6
2	7
3	4
4	6
5	7
6	7
7	7
8	2
9	7
10	4
11	4
12	3
13	4

What about the character's facial expression makes you feel that way?

- 1 Goes from moment of anger to less than that, showing annoyance it takes her awhile to say something but instead she shakes her head and presses her lips together, showing she is very upset. We all do this when we are looking for the right
- 2 words to say at the right moment to get our point across.
- 3 mother scolding son
- 4 Very lifelike in the eyebrows, eyes, and mouth
- 5 my mom uses this expression
- 6 mouth
- 7 face looks like anger burst coming but turns into a controlled face quickly.
- 8 Not a common expression at all, but well animated,
- 9 Very typical angry mom face
- 10 Not sure
- 11 Although I'm not sure what she is expressing, that is somewhat typical with people.
- 12 frown and close his mouth lightly
- 13 close to daily life humans but too bland

What emotion is this clip expressing? (Clip 16)

- | | |
|----|------------------|
| 1 | Surprise |
| 2 | Fear |
| 3 | shock |
| 4 | Surprised/Scared |
| 5 | surprised |
| 6 | surprise/awe |
| 7 | disbelief |
| 8 | Disbelief |
| 9 | Suprise |
| 10 | Astonishment |
| 11 | Fear |
| 12 | surprise |
| 13 | shocked |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 6 |
| 2 | 1 |
| 3 | 5 |
| 4 | 5 |
| 5 | 5 |
| 6 | 7 |
| 7 | 5 |
| 8 | 6 |
| 9 | 6 |
| 10 | 5 |
| 11 | 3 |
| 12 | 1 |
| 13 | 3 |

What about the character's facial expression makes you feel that way?

- | | |
|----|------------------------------------------------------------------------------------------------------------------------|
| 1 | Wide eyes, twitching of eyes |
| 2 | He looks like he is frozen still, his eyes are very wide with fear, his mouth is slightly open and chin is pulled back |
| 3 | eyes wide, mouth drop |
| 4 | Bigger eyes/ no movement |
| 5 | duh, obvious |
| 6 | mouth |
| 7 | mouth and eyes |
| 8 | Brow movement/eye size, and mouth position. |
| 9 | Change from neutral expression to a gasp and slight recoil |
| 10 | Eyebrows/Mouth |
| 11 | His eyes seemed somewhat fearful, but his mouth somewhat ruined the expression. |
| 12 | mouth gradually open, but not obvious |
| 13 | okay |

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 6 |
| 2 | 5 |
| 3 | 5 |
| 4 | 5 |
| 5 | 6 |
| 6 | 7 |
| 7 | 6 |
| 8 | 6 |
| 9 | 5 |
| 10 | 5 |
| 11 | 2 |
| 12 | 1 |
| 13 | 3 |

What about the character's facial expression makes you feel that way?

- | | |
|----|---------------------------------------------------------------------|
| 1 | Open mouth, wide eyes |
| 2 | He is looking at something above him, while looking very frightened |
| 3 | slack jaw, eyes wide |
| 4 | Look of not knowing what to do/never seen it before |
| 5 | yeah, he's basically like "oh s****" |
| 6 | eyes |
| 7 | mouth downturned slightly |
| 8 | Sme as previous answer |
| 9 | His gasp and recoil aren't too exaggerated |
| 10 | Eyebrows |
| 11 | He seemed aghast but not extremely put off. |
| 12 | mouth gradually open, but not obvious |
| 13 | okay |

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- | | |
|----|---|
| 1 | 4 |
| 2 | 5 |
| 3 | 4 |
| 4 | 5 |
| 5 | 7 |
| 6 | 2 |
| 7 | 2 |
| 8 | 2 |
| 9 | 5 |
| 10 | 3 |
| 11 | 6 |
| 12 | 1 |
| 13 | 5 |

What about the character's facial expression makes you feel that way?

- 1 Overly dramatic
- 2 I would almost think his jaw should drop more as his fear turns to worry
- 3 eyes and mouth open wide in shock
- 4 Common when seeing something daunting
- 5 very very typical
- 6 rare
- 7 face looks confused
- 8 The intensity and degree of movement that this character seems to be expressing appears to be reserved for extraordinary situations
- 9 The gasp is very common
- 10 Too comical
- 11 The reaction is not over-acted and a bit more realistic.
- 12 mouth gradually open, but not obvious
- 13 okay

What emotion is this clip expressing? (Clip 17)

- 1 Sadness
- 2 Sorry
- 3 remembrance
- 4 Confusion
- 5 sincere
- 6 concern
- 7 calmness
- 8 Delivering bad news/Apathy
- 9 Reluctance
- 10 Somber Farewell
- 11 I'm not sure
- 12 helpless
- 13 recalling a unhappy memory

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	6
2	7
3	4
4	5
5	5
6	6
7	5
8	5
9	3
10	5
11	1
12	2
13	6

What about the character's facial expression makes you feel that way?

1	The eyes
2	His head is tilted to the side, his eyes are droopy, he presses his mouth together
3	distant look in eye
4	The look of inemotion in his voice
5	obvious
6	eyes
7	set facial features
8	His facial features and mouth/eyebrow movements mimic a human's very well.
9	Hard to distinguish what he is trying to convey
10	Lack of deformation
11	I don't know what emotion
12	mouth slightly pull down
13	okay

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	6
2	5
3	4
4	5
5	5
6	4
7	5
8	4
9	2
10	2
11	1
12	3
13	4

What about the character's facial expression makes you feel that way?

- 1 The mouth and eyes
- 2 He is sad about something that is hard for him to accept/talk about
- 3 no facial expression, eyes looking at something else
- 4 Head cocked slightly sideways
- 5 obvious
- 6 mouth
- 7 eyes not changing
- 8 He looks as if he is apathetic about something is is delivering bad news stern-faced.
- 9 Movement in the eyebrows and pursing of the lips seems to indicate this.
- 10 Nothing clearly signals an intense emotino
- 11 Lack of deformation - intensity would ruin the emotion
- 12 I don't know what emotion
- 13 mouth slightly pull down
- 14 okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	4
2	6
3	4
4	5
5	4
6	7
7	7
8	5
9	3
10	4
11	4
12	3
13	6

What about the character's facial expression makes you feel that way?

1	A little too over dramatic for a human
2	We all press our mouth together in a "shrug" way when we are forced to accept something that we dont want to
3	reliving something through the eyes
4	Body is still moving when he talks, looks lifelike
5	seen it before
6	humanity
7	not change in facial mood
8	This might be something you would see as an offhand expression; fairly common but still very well animated.
9	His face remains neutral
10	Lack of eye-region animation
11	I don't know what emotion
12	mouth slightly pull down
13	okay

What emotion is this clip expressing? (Clip 18)

- | | |
|----|---------------------------------|
| 1 | Love/longing |
| 2 | Hopeful |
| 3 | love |
| 4 | Happiness |
| 5 | wondering |
| 6 | Longing |
| 7 | happiness |
| 8 | Satisfaction/daydreaming |
| 9 | Contentment |
| 10 | Contentment |
| 11 | Endearment |
| 12 | helpless |
| 13 | anticipating, imaging, thinking |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 6 |
| 2 | 7 |
| 3 | 4 |
| 4 | 6 |
| 5 | 5 |
| 6 | 7 |
| 7 | 5 |
| 8 | 6 |
| 9 | 6 |
| 10 | 7 |
| 11 | 6 |
| 12 | 3 |
| 13 | 6 |

What about the character's facial expression makes you feel that way?

- | | |
|----|------------------------------------------------------------------------------------|
| 1 | Eyebrows raised |
| 2 | Her soft eyes looking into the distance, leaning on her hand shows she is relaxed. |
| 3 | sigh, smile |
| 4 | The big smile |
| 5 | It was sort of noticeable. |
| 6 | Big eyes. Slight smile. Sigh. |
| 7 | face movement |
| 8 | The way the eyebrows and mouth move make this very convincing. |
| 9 | The sigh |
| 10 | Sinking into a smile with a soft gaze |
| 11 | She seemed lost in thought about whatever she was looking upon. |
| 12 | blink her eyes and sigh |
| 13 | eye, eyebrow, mouth, leaning of body |

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 6 |
| 2 | 1 |
| 3 | 5 |
| 4 | 6 |
| 5 | 3 |
| 6 | 7 |
| 7 | 6 |
| 8 | 5 |
| 9 | 4 |
| 10 | 5 |
| 11 | 6 |
| 12 | 3 |
| 13 | 6 |

What about the character's facial expression makes you feel that way?

- 1 Breathing out, closing mouth, then eyebrows, then eyes looking at something
- 2 She seems very relaxed and in a daze
- 3 eyes gazing off into nothing, sigh as if content
- 4 The big smile and relaxed eyebrows and eyes
- 5 Nothing intense here.
- 6 The whole face is involved.
- 7 mouth
Eye movement/blinking, brow movement and mouth movement all make this very
- 8 intense.
- 9 Being content can't really be a very intense emotion
- 10 Eyebrows
- 11 Her eyes gave the appearance of being lost in her mind.
- 12 sigh
- 13 good position with a little bit more than normal amount

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- 1 5
- 2 7
- 3 5
- 4 6
- 5 5
- 6 5
- 7 5
- 8 2
- 9 5
- 10 5
- 11 2
- 12 3
- 13 4

What about the character's facial expression makes you feel that way?

- 1 Too dramatic for a human
- 2 She is showing expressions similar to those we would show if we were day dreaming
- 3 happens when someone remembers a love they have
- 4 The eyebrows and eyes say it all
- 5 its okay
- 6 The amount of emotion expressed it not usual for everyone.
- 7 daydream look
- 8 Definately seems like a standout emotion.
- 9 A sigh and shrug of the shoulders
- 10 Not sure
- 11 I rarely see affection of this magnitude.
- 12 sigh
- 13 a little bit exaggerated but okay

What emotion is this clip expressing? (Clip 19)

- 1 Anger/Rage
- 2 Extreme Anger
- 3 adrenaline, anger
- 4 Anger
- 5 crazy
- 6 anger
- 7 determination
- 8 Anger/Goadng
- 9 Rage
- 10 Challenge
- 11 Fury
- 12 angry
- 13 shouting, yelling, ready-to-fight

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

1	6
2	1
3	6
4	5
5	4
6	7
7	6
8	5
9	6
10	7
11	6
12	3
13	3

What about the character's facial expression makes you feel that way?

- | | |
|----|------------------------------------------------------------------------------------------------------|
| 1 | Wide eyes and wide mouth
His eyes are wide open, he is showing his teeth when he screams which is |
| 2 | frightening, and he scrunches his nose up. |
| 3 | piercing eyes, veins buldging, shouting |
| 4 | The angry dragon face |
| 5 | weirdo |
| 6 | mouth |
| 7 | eyes focused
The way the brow and nose movements mimic a real human's make this very |
| 8 | sincere. |
| 9 | The strain in the neck and yelling |
| 10 | Eyes/Eyebrows |
| 11 | His eyes seem very angry. |
| 12 | mouth widely open |
| 13 | eyes are numb, most emotion is expressed by sound and hand |

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

1	7
2	7
3	6
4	6
5	3
6	6
7	6
8	7
9	7
10	7
11	7
12	3
13	4

What about the character's facial expression makes you feel that way?

- 1 Looks almost crazy with anger
His expression shows he is very angry and he bring forth this anger with a great intensity.
- 2 intense look
- 3 The fact he's going to fight a dragon
- 4 he's not that scary
- 5 eyes
- 6 mouth open with eyes focused
The way the area around the nose, brows and eyes scrunch together as well as an obvious yell make this emotion very intense.
- 8 He seems very intense with his rage with his flared neck and red appearance
- 9 Gritted Teeth
- 11 His eyes and extremely wide mouth show an intense feeling.
- 12 mouth widely open
- 13 mouth were moving as yelling

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

1	3
2	5
3	6
4	5
5	5
6	7
7	1
8	2
9	6
10	2
11	5
12	3
13	3

What about the character's facial expression makes you feel that way?

- 1 Looks too dramatic for a human
I don't necessarily think that if we were angry, we would scream as he is screaming. I
- 2 believe we all feel the need to do so but will not show it in our expressions.
- 3 action scene breeds anger
- 4 Happens when you're going to fight a dragon
little kids make that face to intimidate me, only to realize that they fail horribly and
- 5 they're still getting a time out
- 6 human condition
- 7 looks determined in the face
- 8 Not typical at all- the level of intensity on the character's face is not seen very often
- 9 I think it is very typical to yell and get flushed when extremely angry
- 10 Cartoonish/Over exaggerated
- 11 Anger seems to be an emotion people get carried away with very easily.
- 12 mouth widely open
- 13 should have more prominent eye brow movement

What emotion is this clip expressing? (Clip 20)

- | | |
|----|-------------------------------------|
| 1 | Scared |
| 2 | Scared |
| 3 | disgust |
| 4 | Scared |
| 5 | scared |
| 6 | fear |
| 7 | fear |
| 8 | Fear mostly, with a bit of disgust. |
| 9 | Terror |
| 10 | Worry |
| 11 | Fear |
| 12 | scare |
| 13 | afraid, disgusted |

On a scale of 1-7, how sincere would you rate this character's emotion? 1 is not sincere at all and 7 is very sincere.

- | | |
|----|---|
| 1 | 5 |
| 2 | 7 |
| 3 | 4 |
| 4 | 5 |
| 5 | 5 |
| 6 | 7 |
| 7 | 7 |
| 8 | 6 |
| 9 | 5 |
| 10 | 6 |
| 11 | 5 |
| 12 | 3 |
| 13 | 4 |

What about the character's facial expression makes you feel that way?

- | | |
|----|-----------------------------------------------------------------------------------------|
| 1 | Eyes open wide |
| 2 | The way his mouth turns down and he turns his face to the side shows that he is scared. |
| 3 | cower, quiver mouth as if to protest |
| 4 | Backing away, squinty eyes |
| 5 | obvious |
| 6 | eyes |
| 7 | face downturned and recoiling while changing |
| 8 | The way his mouth and eye/eyebrows change and distort are very lifelike. |
| 9 | The way the face is expressing the emotion seems genuine |
| 10 | Wide eyes and mouth drawn into frown |
| 11 | The eyes widening. Mouth frowning. |
| 12 | frown, twist his mouth |
| 13 | okay |

On a scale of 1-7, how intense would you rate this character's emotion? 1 is not intense at all and 7 is very intense.

- | | |
|----|---|
| 1 | 5 |
| 2 | 2 |
| 3 | 5 |
| 4 | 6 |
| 5 | 5 |
| 6 | 7 |
| 7 | 6 |
| 8 | 5 |
| 9 | 5 |
| 10 | 6 |
| 11 | 4 |
| 12 | 3 |
| 13 | 4 |

What about the character's facial expression makes you feel that way?

- 1 Mouth and eyes
- 2 He tried to hide his expression
- 3 cower, quiver mouth as if to protest, eyes trying to stop it
- 4 Trying not to look at it, but can't
- 5 it was soooooo intense
- 6 eyebrows
turning head and trying not to look directly at whatever while eyes get bigger and
- 7 mouth turns down more
He seems genuinely afraid, but with a bit of disgust mixed in, whether intentional or
- 8 not.
- 9 The exaggeration of the emotion tells me the intensity
- 10 Fair amount of deformation
- 11 Eyes and mouth change was obvious but not overdone.
- 12 frown, twist his mouth
- 13 okay

On a scale of 1-7, how typical would you rate this character's emotion? 1 is not typical at all and 7 is very typical.

- 1 3
- 2 7
- 3 4
- 4 6
- 5 7
- 6 6
- 7 1
- 8 2
- 9 7
- 10 5
- 11 4
- 12 3
- 13 5

What about the character's facial expression makes you feel that way?

- 1 Too dramatic for a real human
- 2 His reaction to being scared is very similar to how people in everyday life act.
- 3 mouth quiver
- 4 Very lifelike, seems like a very real reaction
- 5 my friend makes that face all time when his grandma calls his name
- 6 mouth
- 7 face shows fear well and suggest this is unknown to character
This does not seem like a standard emotion that one would normally see.
- 8
- 9 It is a generic response for terror
- 10 Subtle, but still noticeable
- 11 All features were not exaggerated.
- 12 frown, twist his mouth
- 13 okay