

**Exploring Human Expressions to Build a Guideline
for a 3D Animated Bengali Character**

BY

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This Report Presented in Partial Fulfillment of the Requirements for the
Degree of Bachelor of Science in Multimedia and Creative Technology

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APPROVAL

This Project titled “**Exploring Human Expressions to Build a Guideline for a 3D Animated Bengali Character**”, submitted by Jasem Uddin (ID: 172-40-427) to the Department of Multimedia and Creative Technology, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Multimedia and Creative Technology and approved as to its style and contents. The presentation has been held on 13 February 2022.

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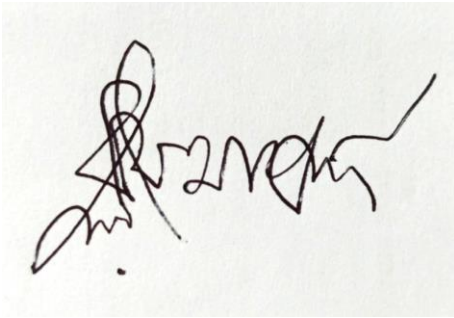
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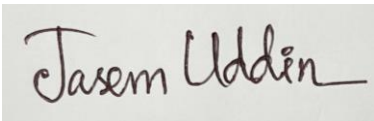
I hereby declare that, this project has been done by me under the supervision of **Arif Ahmed, Associate Professor, Department of MCT, Daffodil International University**. I also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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ABSTRACT

In this modern era, 3D Animation is one of the most important media to communicate with people and to deliver messages. In the meantime, keeping pace with the times, a huge number of 3d animation works have already started in Bangladesh. Like other media, we are trying to express our emotions and we are trying to deliver messages through 3d animated films which are made in Bengali language and Bengali characters. I have noticed that while we are making Bengali 3d animated films, the characters of the films do not communicate with Bengali emotions. Bengali characteristics are not maintained properly in those characters' communication.

The Bengali nation is identically different from other cultures in some characteristics. It can be in facial expressions or in gestures. In order to express our emotions through our stories, it is very important to portray a character with Bengali characteristics. So, the main object of this study is to explore the human expressions of Bengali people to build a guideline for creating 3d animated Bengali characters. I have found some similarities and differences between Bengali characters and western characters through my research. I have shown some of these characteristics in some 3d animated characters. I have also shown some betterment in existing Bengali animated films.

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CHAPTER 1

Introduction

1.1 Backstory

Art is an expression of one's thoughts. It holds several stories, emotions, expressions, feelings. Art can be explained from multiple perspectives. Different people from different cultures and experiences interpret artwork in many ways. Many art forms are invented from the dawn of civilization. Art is practiced all over the world in its many forms. It communicates to any nation by its own language. In the present world, people execute art in so many media. In that continuity, animation is now one of the most powerful media to communicate emotions in today's world. As like other media like photographs, live-action films, music, illustrations, comics, graphic novels etc. animation is now a very strong art form.

We see five forms of animations. They are Traditional animation, 2D/Vector animation, 3D animation, Motion Graphics and Stop motion. Although animation was developed a hundred years ago, the journey of animation in Bangladesh is not too long ago.

1.2 Present state

In the last few years, the practice of animation has been seen largely in our country because of the trend of content creation in digital media. For that very reason, some animated short films were created by some artists in our country. Even from my department of Multimedia and Creative Technology, several students create animated short films every semester. They are expressing the stories of our country through animated short films. Our culture and characteristics are being expressed in those films. The natural beauty of our country is being illustrated quite well. I really appreciate their efforts in those films.

1.3 Objectives

My observation on those Bengali animated films is the characters are not animated in a way of Bengali people. There are a lot of scopes to improve the animation according to a Bengali character. I think that those animated characters are inspired by western animated characters. So those films can not deliver an actual Bengali impression.

I think that animating a character according to a story of Bengali culture is really important to convey the real impression. Each nation is unique in its behavior and cultural aspects. They have a different language, costumes, foods, manners, gestures. Every nation communicates in its own way. It is the beauty of distinction. In our animated films, we must illustrate our cultures, behaviors, and gestures. So, from that point of view, the idea of this research came to my mind. I was thinking how a character should be animated to portray the cultural aspects. The way we express our emotions is different from western people. The way of talking, expressing, and communicating is distinct. The method of communication used by Bengali people such as body language, bodily posture, facial expressions should be incorporated in animated films.

In order to explore how the Bengali people are distinctly different from other cultures and how an animator should animate the characters, I did an extensive study on this.

CHAPTER 2

Research Topics

2.1 Topics:

The main objective of this study is to provide an overall concept of human expressions in order to get an impression of Bengali culture while animating a character. I divided the topics of this research into two sections. They are the Primary section and the Secondary section. Those sections are given below:

Primary Topics

1. What differences and similarities are there in facial expression between western cultured character animation and Bengali cultured character animation?
2. What are the specific body languages of a Bengali character that can be incorporated into character animation?

Secondary Topics

1. How is a character visually different from one culture to another?
2. What are the visual features/attributes of a Bengali character that make difference from western cultured character?

The secondary topics are the initial discussion to work on the primary topics. I started work on the secondary topics first.

CHAPTER 3

Topic Discussion

3.1 Secondary Topic:

3.1.1 Key Qualities by Maldonado and Heyes-Roth

Every nation from all over the world carries a different entity from each other. Everyone's physical structure, costume, eating habits, hair color, skin color, height, facial structure is different. Each story represents a specific nation. The characters in the story capture the image of that nation. By properly portraying the characters, they hold the story of a nation. For representing a nation story, the characters must carry some characteristics.

In a research paper named "*Toward Cross-Cultural Believability in Character Design*" by Heidy Maldonado and Barbara Hayes-Roth ^[1], they briefly discussed how a character can be visually different from one culture to another. They showed what qualities of a character represent a story of a nation. They pointed out ten key qualities. These are Identity, Backstory, Appearance, Content of speech, Manner of speaking, Manner of gesturing, Emotional dynamics, Social Interaction patterns, Role and Role Dynamics. [15] These ten key qualities are briefly described below:

Identity: The identity of a character consists not only of its demographic traits also its idiosyncratic behaviors. It also covers what he likes or dislikes. It represents graphically certain physiological aspects such as physique, skin color, hair type, height facial structure, pupil color, weights, etc.

Backstory: The backstory of a character represents its history of life. There are more things like off-screen life, friendships, love interest, favorite sports, financial stats, political and religious affiliations.

Appearance: Appearance refers to those attributes that we as the viewer can immediately see. Those are age, gender, costume, hairstyle, etc.

Content of Speech: The language, dialect, slang, and colloquialisms of a character are the content of speech. The different language-speaking character acts differently.

Manner of Speaking: Manner of speaking varies from one culture to another. Range of vocal expression changes in different age group characters.

Manner of Gesturing: Hand gesture, head gesture, the way of sitting and standing are different from one character to another in different cultures.

Emotional Dynamics: People from different cultures express their emotions through facial expressions. Emotion in a situation is expressed through facial expressions.

Social Interaction Pattern: The social interaction pattern of a character depends on his nature and his culture. Some behaviors like who should speak first, how frequently should he speak are different from each other.

3.2.1 Visual attributes

Considering all these qualities I have divided the character visual attributes for an animated character into four elements. I have given priority to the visual elements in order to divide them in this way.

These 4 elements are given below:

1. Biological Appearance
2. Personal Appearance
3. Communication
4. Props

Attribute	Visual
Biological Appearance	Character Design & Modeling
Personal Appearance	Character Design & Modeling
Communication	Animation
Props	Character Design & Modeling

Figure 3.1: Types of attributes of animated character

3.2.2 Biological Appearance:

Every nation is different in biological structure. The people are quite different in many ways from each other. The features that can be mentioned from the biological point of view are physique, facial structure, skin color, hair color, hair type, pupil color, weight, height, etc. People from each country have some distinct physical characteristics. The structure of the shoulder and waist are quite noticeable in different nations. If we look at the picture below, you will understand how the body shape of people from different countries is different. From left to right, these are average body shapes of the USA, Japan, Netherlands, France people.



Figure 3.2: Average body shape for different countries [2]

Facial structure is also different for different countries. Although Japanese and Chinese look similar, they also have some distinct features in their appearance. Japanese and Chinese people have smaller eyes compared to western people. Japanese usually have “Chinky eyes”. But the eyes of Chinese people are of medium to smaller sizes and are usually angled downwards. Japanese have a longer and wider face whether Chinese have a rounder face.

Even the skin color is identically different in various regions. We always think that Americans are white, but there are people in America who are black. Asians are brown compared to Africans. Japanese have silky hair whether Africans have curly hair.



Figure 3.3: Average body shape for different countries [3]

So, if we design a 3d animated character, we should keep in mind that every nation has a different biological appearance.

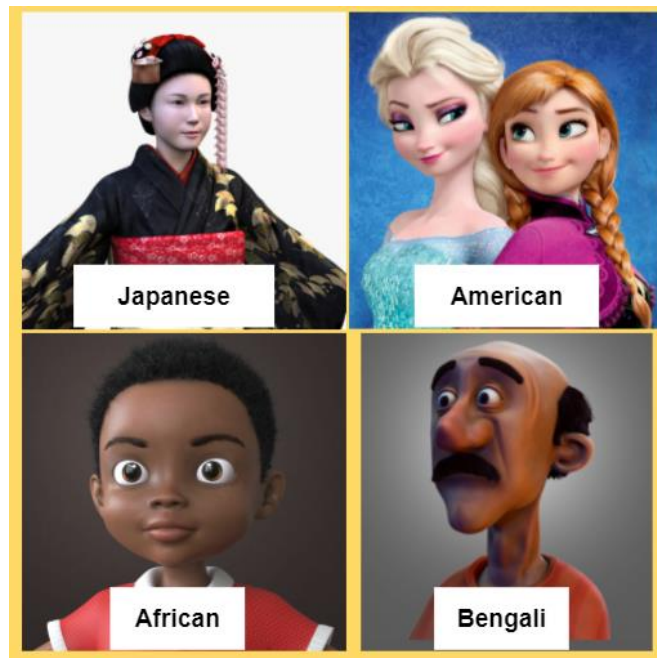


Figure 3.4: Biological Appearance differences in 3d animated character design [4]

3.2.3 Personal Appearance:

Everyone has a different lifestyle in terms of culture and personal tastes. Everyone adopts some lifestyle from his culture. The elements that can be considered in this section are: Costume, Ornaments, Accessories, Hair styles, Beard style. There are some definite costumes worn by specific cultured people. Besides, there are some costume elements like pants, shirts, suits, watch earrings, rings that are worn universally all over the world. Which culture a person belongs to can be identified by looking at his or her costume and accessories. Just as Saree refers to the culture of India, Bangladesh, Pakistan, so Keffiyeh refers to the Arab culture.

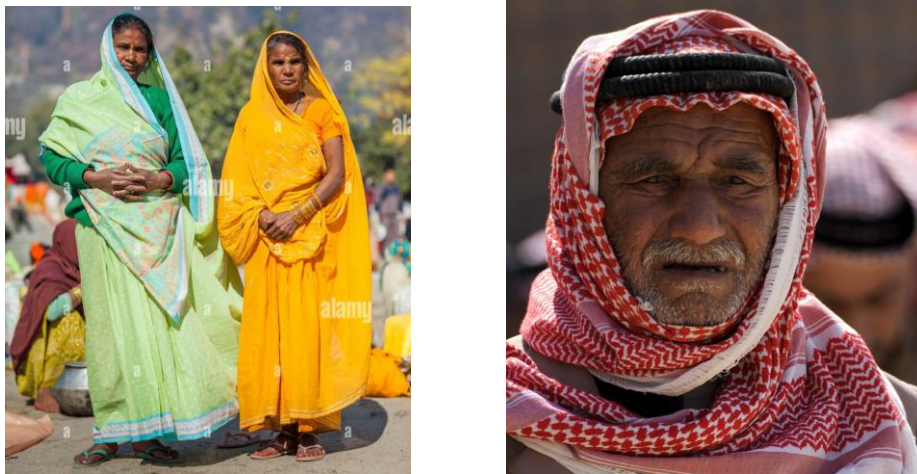


Figure 3.5: Indian Saree and Arabian Keffiyeh

Several traditional dresses are Kimono (Japan), Coiffe (France), Ten-gallon Hat (Texas, USA), Flamenco dress (Spain), Conical hats (Vietnam), Bowler hats (Bolivia), Gho (Bhutan), etc. ^[5]

In addition, in terms of professional diversity, the outfits of each person are different. Generally, in restaurants a waiter wears white shirt, black pants, black bow tie, black shoes. A cowboy wears a cowboy-hat. An office going man wears suits with a briefcase. A delivery man wears a T-shirt, caps. Fire service staff wear fire fighting suits. Police, Army, traffic police, and pilots have different identical uniforms. Even school going students wear a particular uniform. A doctor wears an apron with a stethoscope.



Figure 3.6: Different profession people wear different costumes

The audience can easily relate to the story of an animated movie if the characters are made according to the cultural aspect.



Figure 3.7: 3D animated characters from different personal appearance

3.2.4 Props

Props are those inanimate objects that a character interacts with. Props can be a key indicator as to when and where a story is taking place. Props can indicate the time period and place of a culture. It can introduce the audience as to where a story is taking place. They can represent a particular geographical location of a culture to indicate the country of the story.

Props can also become synonymous with a character's identity. Props that a character consistently utilizes inevitably become an extension of themselves. Audiences will even associate specific props with a certain character. We can't imagine Thor without his hammer. [6]



Figure 3.8: Characters with personal props

There are so many types of props such as hand props, personal props, set props, trim props, etc. Props can indicate a culture. We can identify in which culture that character belongs just by seeing the props.

3.2.5 Communication

The act of transferring information from one place, person, or group to another is called communication. An inanimate object can communicate through its outlook. But a live object who can move, walk, talk, run can communicate in numerous ways. The transmission of the message from one person to another can be affected by a huge range of things. These include our emotions, the cultural situation, the medium used to communicate, and even our location. By speaking, writing, acting, or using other medium, we exchange information and share emotions, ideas and feelings. A character moves or animates only when that character communicates. So, to communicate with each other, animation is required in character.

The people from all over the world communicates differently. There are some specific gestures, symbols in different cultures. Approximately 6,500 languages are spoken in the world. ^[7] Each and every one of them are identically different. Way of communication is different from each to another nations.

There are a huge range of ways in which people communicate and more than one at a time may be given. Communication can be categorized into two categories. They are Verbal communication and Non-verbal communication.

I studied and researched only on the communication section as animation is only required in this section.

3.3 Categories of Communication

We constantly exchange information, meaning people always seem to be either receiving or giving information. The different methods of exchanging information must be understood. Communication can be divided into two types. They are Verbal Communication and Non-verbal Communication.

Verbal Communication: The method of communication in which a message is transmitted verbally is defined as verbal communication. It is done by words, mouth, or a piece of writing. The objective of every communication is to have people understand what we are trying to say. Verbal communication feels like the foremost obvious of the various forms of communication. In oral communication, spoken words are used. It includes face-to-face conversations, speech, telephonic conversations. When nonverbal communication is combined with spoken communication, the message becomes even more subtle. Some examples of verbal communication are given below: • Face to face talk • Talking over phone or digital medium • Video communication • Talking on chatting to friends, family, colleagues.

Non-verbal Communication: Non-Verbal Communication, covering body language, gestures, how we dress or act, where we stand, and even our scent. There are many subtle ways that we communicate (perhaps even unintentionally) with others. For example, the tone of voice can give clues to mood or emotional state, whilst hand signals or gestures can add to a spoken message. These things are often communicated through facial expressions, hand gestures, posture, and even appearance, all of which can convey something about the speaker. For instance, a disheveled speaker with wrinkled clothes and poor posture would communicate a lack of confidence or expertise. A speaker with a nice suit, who stood up straight and spoke clearly, may appear more serious or knowledgeable. Consciously or unconsciously we all make nonverbal communication almost every day in order to communicate our thoughts, emotions, ideas to others. The types of nonverbal communication are: • Facial Expressions • Eye contact • Gestures or Kinesics or body movements • Posture • Paralinguistic • Proxemics or closeness or personal space • Haptics or touch • Appearance • Artifacts • Time managing

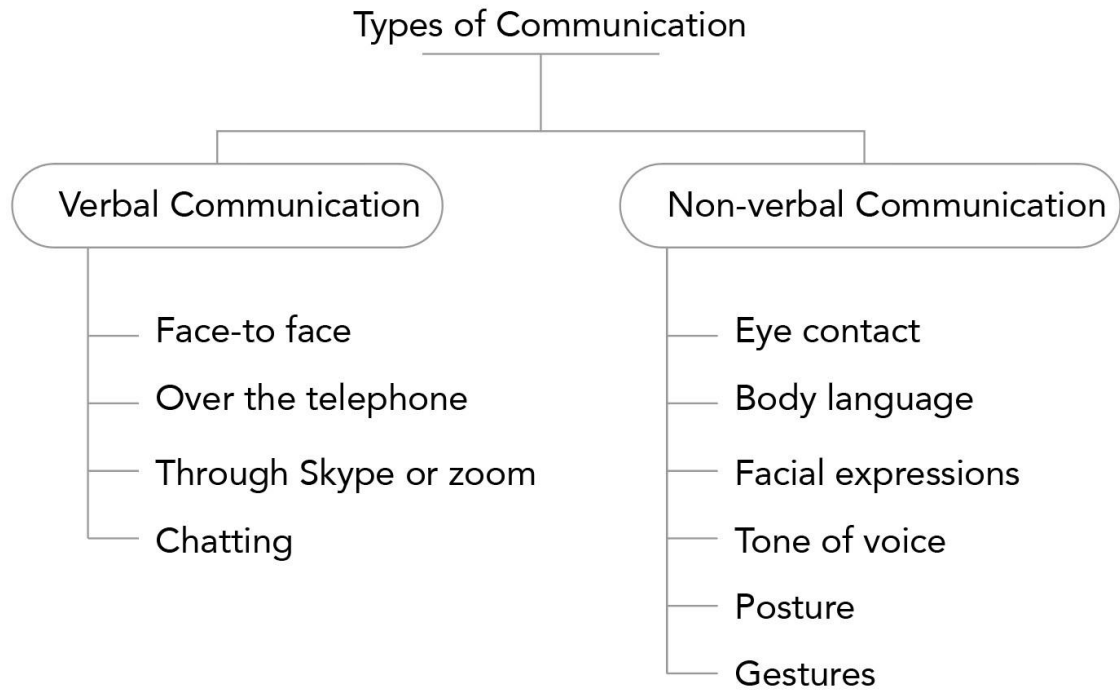
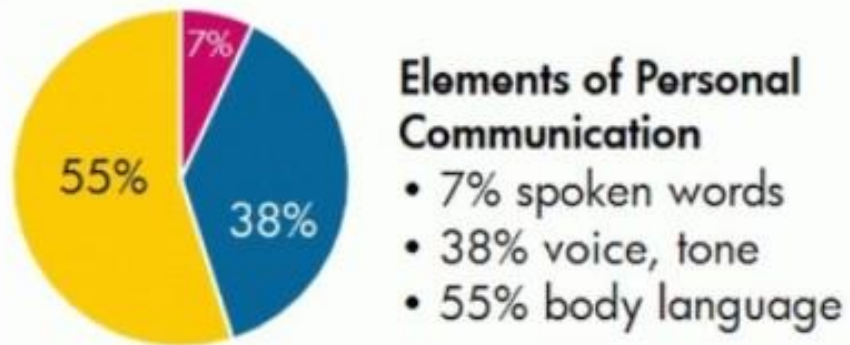


Figure 3.9: Types of communication

3.4 Mehrabian Model

In the 1970s, there was a study conducted by Prof. Albert Mehrabian about verbal and non-verbal communication. It is considered one of the most pathbreaking models in communication. He showed that as human beings our impressions and feelings are based on body language rather than our spoken words. This model is called the Mehrabian Model. It is also known as the 7-38-55 rule. According to this model, only 7% of personal communication depends on verbal communication or the words that are spoken directly. The rest 93% lies in non-verbal communication. In the 93%, tone of voice is 38% and body language is 55%.^[8]

Verbal Communication: 7%
Non-verbal communication: 93%



Source: Professor Albert Mehrabian
University of California Los Angeles

Figure 3.10: Mehrabian Model

3.5 Paul Ekman's Study

Back in the 1800s, Charles Darwin was the first person to advise that facial expressions of emotion are similar wherever you visit in the world. At that time, the maximum of scientist community disagreed with this statement.

But in the late 20th century, Dr. Paul Ekman and his team did research on the universality of facial expression across cultures. They came to the point that facial expressions are universal over the world, which proved that Darwin's theory was correct.

When Dr. Ekman began researching facial expressions of emotions across cultures, he initially presumed that expressions are socially learned. He also believed that it is culturally variable. He began his research on different cultures to see if Darwin's universality argument is correct or not.

At first, Dr. Ekman studied some specific cultures such as Chile, Argentina, Brazil, Japan, and the United States.

Dr. Ekman's primary study comprised of showing these community of people photographs or specific displaying different facial expressions of emotion. He would then interrogate the community to identify what emotion they thought was being shown in these photographs. The larger portion of the people from the different five cultures agreed.

Though that was a huge step towards Darwin's theory that expressions of emotion are emotional, Dr. Ekman was not convinced perfectly. Dr. Ekman came up with a solution to experiment with the theory. He thought what if we elect a community that is totally isolated from the rest of the world which does not have TV, magazines, not even tourists. If the facial expressions of emotion were received from elders or teachers, then surely a stone-age community would have a totally different way of communicating emotion than those in western cultures.



Figure 3.11: Dr. Paul Ekman's study on people of Papua New Guinea

3.6 Basic Facial Expressions

Equipped with a few simple stories and images of facial expressions, Ekman headed into the remote camp and asked each of the tribesmen/women to match a story to an expression. They all expressed the same as other cultured people.

They suggested that there are seven basic facial expressions that is universal. These are – anger, contempt, disgust, fear, happiness, sadness and surprise.

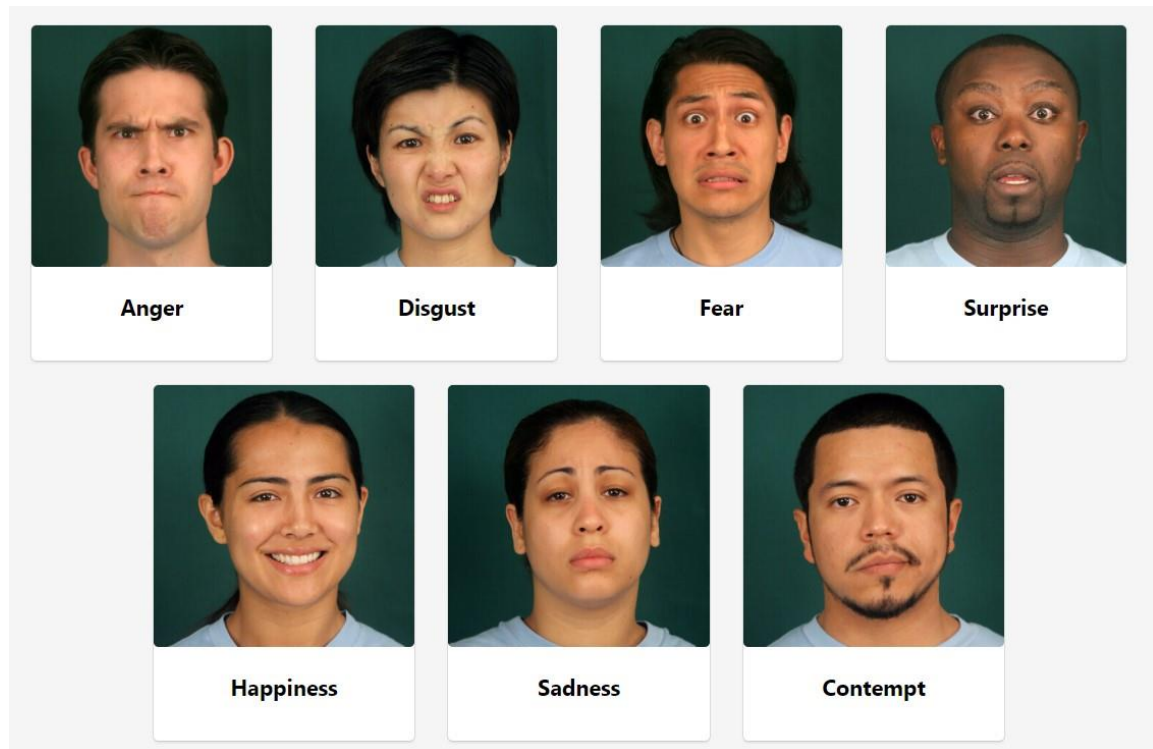


Figure 3.12: The 7 Basic emotions and their universal expressions

Besides these 7 basic emotions, some scientists have mapped 21 distinct emotional facial expressions. Here is the full list of emotional states identified by the scientists from facial expressions - Happy, Sad, Fearful, Angry, Surprised, Disgusted, Happily Surprised, Happily Disgusted, Sadly Fearful, Sadly Angry, Sadly Surprised, Sadly Disgusted, Fearfully Angry, Fearfully Surprised, Fearfully Disgusted, Angrily Surprised, Angrily Disgusted, Disgustedly Surprised, Appalled, Hatred, Awed. ^[9]

Some researchers at UC Berkeley and Google analyze facial expressions. They used machine-learning technology, which is known as a "deep neural network". They studied 6 million video clips. Those clips are uploaded on YouTube from people in 14 countries. Some of the countries are Africa, Europe, the Middle East, Asia, and North, Central, and South America.

At first, researchers used Cowen's Machine-learning algorithm. They worked to log facial expressions that are shown in 6 million video clips of events and interactions worldwide. Those videos' content is like watching fireworks, dancing joyously, or consoling a sobbing child.

From there they get quite surprising results. From the results, they found out that people from all over the cultures share about 70% of the facial expressions, which are used in response to different social and emotional states. ^[11]

CHAPTER 4

Analysis

4.1 Film Contents

To observe the facial expression of Bengali people, I have watched more than 30 movies. I have also watched some other content such as web series, drama, YouTube videos. Notable movies that I watched are – Meghe Dhaka Tara (1960), Charulata (1964), Nayak (1966), Pather Pachali (1955), Aparajito (1956), Apur Sangsar (1959), Ghore Baire (1984), Matir Moina (2002), Chitra Nodir Pare (1999), Runway (2010), Monpura (2009), Chokher Bali (2003), Daruchini Dwip (2007), Oggatonama (2016), Rehana Maryam Noor (2021). Moreover, I watched some web series such as Tekka, Unoloukik, Taqdeer.



Figure 4.1: Poster of Movies and Web Series that I watched

There are some observations of me from these movies. Those are given below:

- Head tilt
- Loudly crying
- Hand gesture while talking
- Glabella lines
- Bigger eyes

4.2 Expression Analysis:

4.2.1 Anger facial expression

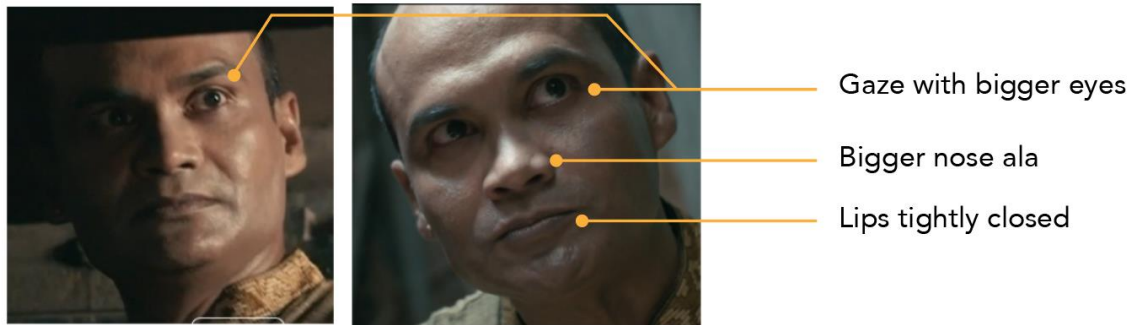


Figure 4.2: Anger expression of Bengali man, (Source: “Tekka” series)

These two images collected from a web series called Tekka. Identical features of this anger facial expression are gaze with bigger eyes than usual eyes shape, bigger nose ala and lips tightly closed. Usually, this type anger expression is seen in Bengali man, who is dominating character against other.

4.2.2 Fear facial expression

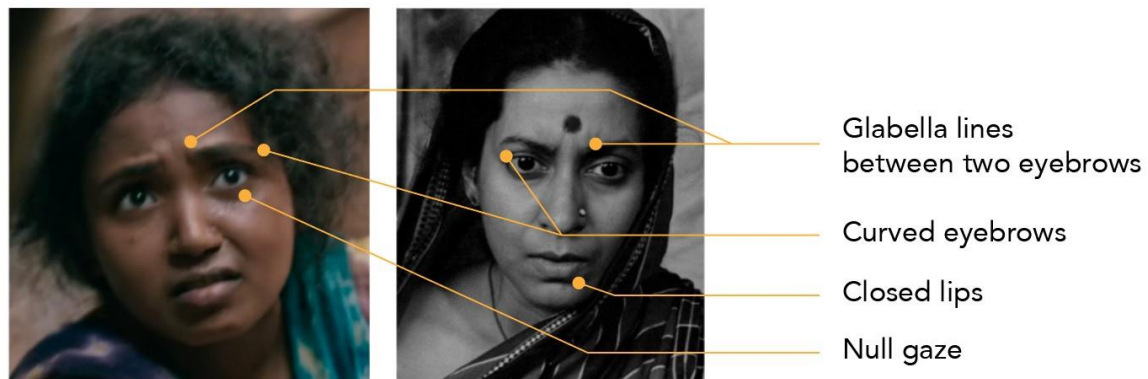


Figure 4.3: Fear expression of Bengali people (Source: “Tekka” series & Aparajita)

Here are two images of Bengali woman that shows facial expression of fear. Identical features of this expression are glabella lines between two eyebrows, curves of eyebrows, null gaze, closed lips.

4.2.3 Loudly crying expression



Figure 4.4: Loudly crying of Bengali woman, (Source: “Tekka” series)

There is a common scene in Bengali people that people cry loudly to express their emotions, especially in a tragedy scene. It is a common scenario in a death scene. Bengali people are more emotional than western people. They cry out very loudly, express out their deep feelings. It is more exaggerated from western expression. If we see the western people, we can see that they do not cry loudly, they usually cry silently. An example image given bellow (see figure 4.5).



Figure 4.5: western girl crying (Source: “13 reasons why” series)

4.2.4 Hand gestures

Bengali people frequently use hand gestures while talking. People subconsciously use hand gestures. They use index finger frequently while on a public speaking stage, especially the politicians.



Figure 4.6: Hand gestures of a politician character (Source: “Tekka” series)



Figure 4.7: Hand gestures of other characters (Source: “Tekka” series)

People use different types of hand gestures to explain the situations and to express their feelings. Sometimes people use it instead of words such as come here, NO, sit down, Thanks, give it to me.



Figure 4.8: Hand gestures (Source: “Unoloukik” series)



Figure 4.9: Hand gestures (Source: “Unoloukik” series)

4.3 Universal Expressions Analysis

4.3.1 Happy

We already know that facial expressions are universal from Darwin's theory and Dr. Paul Ekman's study. If we demonstrate the Happy facial expression between western culture characters and Bengali people characters, we can see that the expression is quite similar (see figure 4.10). 3 features of Happy expression are eye wrinkle, cheek up, mouth wide. On the figure 4.10, we can see that both characters have those 3 features.

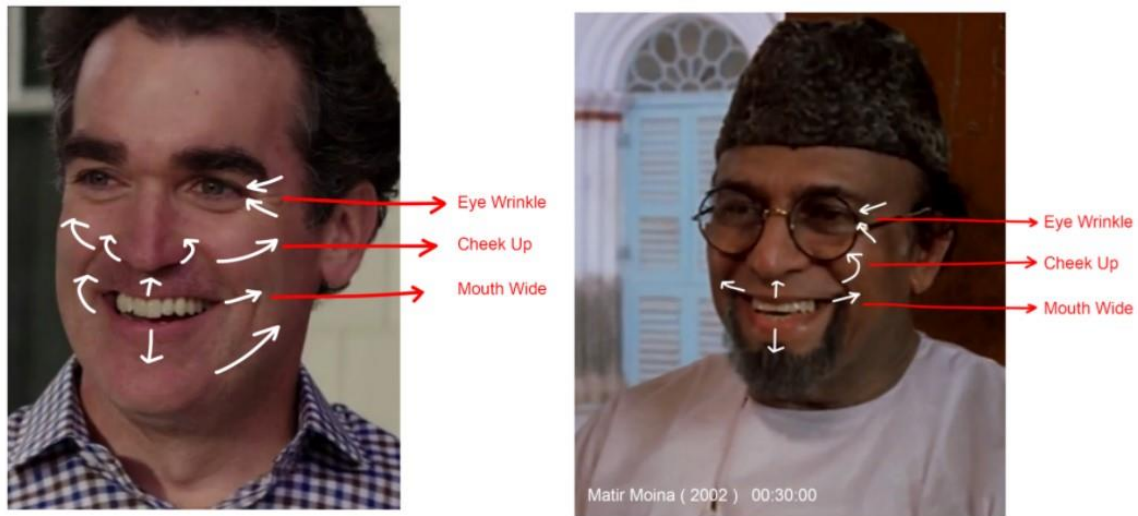


Figure 4.10: Happy expression analysis



Figure 4.11: Happy expression on different character

We can see that all the characters smile in the same way, they all have similar features. (See Figure 4.11)

4.3.2 Sadness

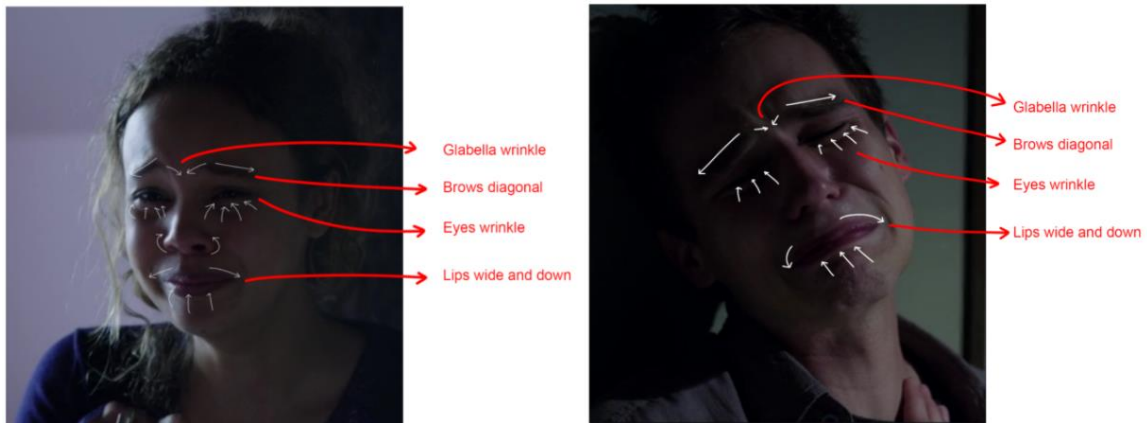


Figure 4.12: Sad expression analysis

The features of sadness are glabella wrinkle, eyebrows diagonal, eyes wrinkle, lips wide and down. On figure 4.12, we can those features on a sad face which is universal.

Bengali people exaggerate some expressions. Crying is one of them. They cry loudly. The facial muscles are get extended to express sadness.

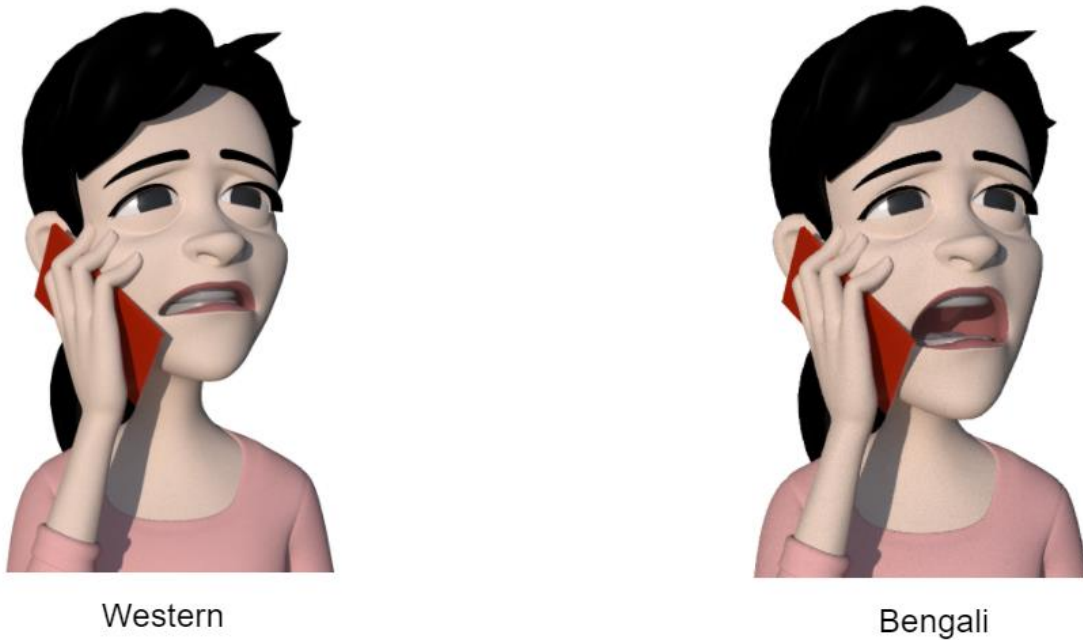


Figure 4.13: Crying expression comparison

4.4 Excluding Facial Expressions

There is another observation about expression. If we only look at facial expressions, we can not get the whole information. Sometimes, body language and facial expression both express the whole emotion. Facial expression can say differently if we skip body language and hand gestures. Face alone can only reveal about mood. It is not the whole pictures. The whole-body including body language, personality, tone of voice and changes in skin tone can say so much about the feelings. The whole bod shows important role to express the emotion. If we see figure 4.14, we can see that these 4 characters is expressing sadness.

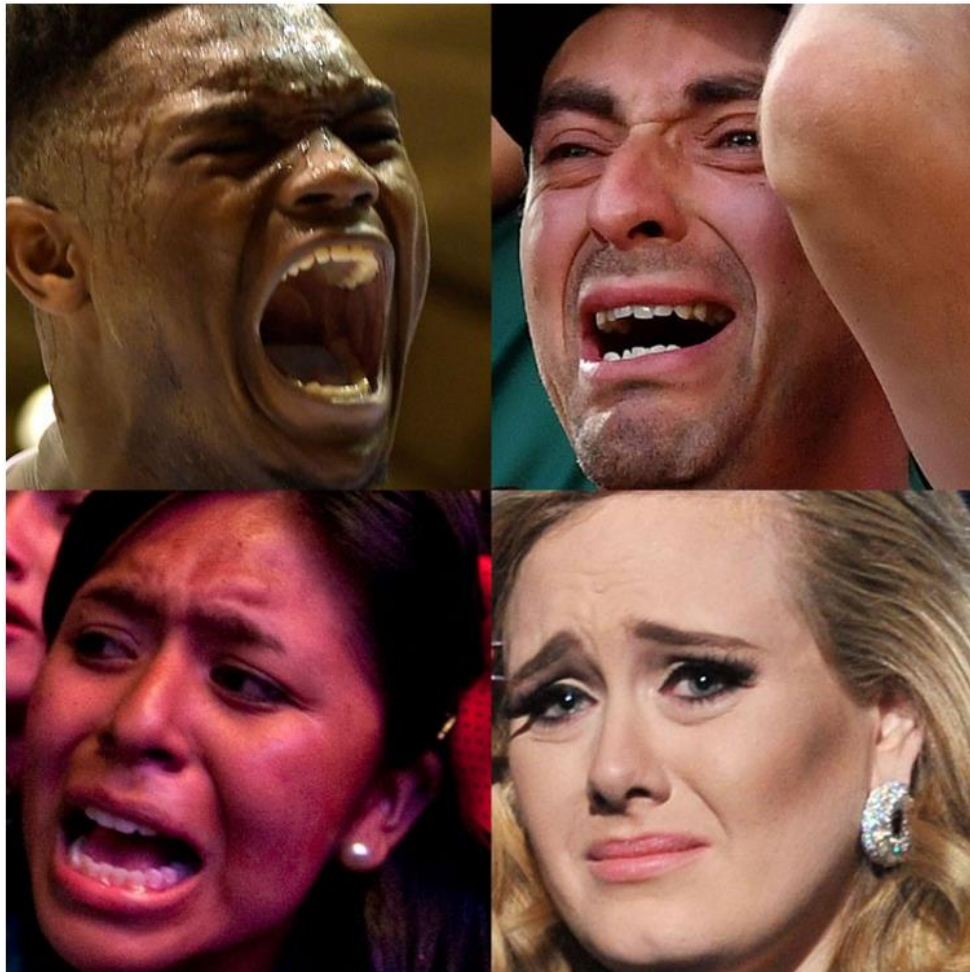


Figure 4.14: Only face does not show the whole story

But it is impossible to understand the whole story just seeing the face. Let's see figure 4.15. Here we can able to see the whole body and hand gestures. We can get more information from the body language.



Figure 4.15: The whole body reveals the whole story of emotions

On figure 4.15, we can see the whole body of those expressions. We can see that those are not expression of sadness. From top left, basketball player Zion Williamson celebrates; Mexico fans celebrate a win in a World Cup group match; singer Adele wins Album of the Year at the Grammys in 2012; Justin Bieber fans cry at a concert in Mexico City. Credits: Lance King/Hector Vivas /Ronaldo Schemidt /Kevin Winter/Getty.^[10]

4.5 Bengali Hand Gestures

Dr. Hakim Arif, Professor, department of Communication Disorders, University of Dhaka, has a dissertation about Bengali everyday emblematic hand gestures as communication acts. He showed hand gestures of Bengali people. He listed 40 hand gestures. The following 40 verbal instructions were provided to 7 subjects to enact BEE hand gestures carrying identical meaning. This is because the BEE hand gestures carry out the meanings of these above-verbal instructions are frequently used in different everyday communication settings in the Bengali community from where the subjects of this project come. ^[12] Those 40 gestures are given below:

1. Giving Namaste (Hindu greetings)
2. Asking pardon
3. Flattering the Boss
4. Giving salute
5. Giving Salam (Muslim greetings)
6. Performing 'Pronam/Salam'
7. Stopping activity
8. Raising the hand to talk
9. Saying 'hi/hello' (approaching people)
10. Begging
11. Showing 'Monazat' (part of Muslim prayer)
12. Showing feeling ashamed
13. Asking for food
14. Telling to sit down
15. Threatening kill someone
16. Blessing someone
17. Giving a flying kiss
18. Showing being upset
19. Telling someone to keep silent
20. Indicating self
21. Pointing to something

22. Showing victory
23. Deliberating
24. Making a horn
25. Showing someone's love sign
26. Showing rudeness
27. Showing ok
28. Showing negation
29. Showing madness
30. That something was well done
31. Draw attention to oneself
32. Being heroic
33. Threatening punishment
34. Overhearing to other people
35. Being friends
36. Having an affair
37. Taking an oath
38. Protesting
39. Being satisfied
40. Being united

I have created some 3d character poses using some of those gestures. I tried to show how these gestures may look on a 3d character. Those are given below:

4.5.1 Giving Namaste

It is a gesture that usually used by Hindu religion people. It is shown by vertically extended palms attached next to the face with all fingers pointing upwards. The head can be bowed a little bit down with a smiley face. People use this gesture to show their respect to each other. It is used as a greeting gesture.



Figure 4.16: Giving namaste (Hindu greetings)

4.5.2 Asking Pardon

This gesture is used for asking pardon from opposite person. It is shown while someone feels guilty. Usually, people use it to ask pardon from the boss or a senior person. It is also shown by vertically extended palms attached next to the face with all fingers pointing upwards. But this time, there will be a sad face expression. The difference between giving namaste and asking pardon is its facial expression. By just changing the facial expression, giving namaste gestures turn into asking pardon gesture.



Figure 4.17: Asking pardon

4.5.3 Giving Salam

This gesture is used by Muslim religion people. It is used as a greeting gesture. People use it to show respect towards senior person. To show this gesture, one hand is raised up to forehead, tilted down a little bit with a smiley face and the eyebrows can be raised a little. This posture is usually held for only a few seconds. Then the hand brings down back to its initial position.



Figure 4.18: Giving Salam

4.5.4 Praying (Muslim)

This gesture is performed by Muslim community. It is also a part of prayer. It is performed to wish something to Allah. The two palms is raised up to chest with curved fingers as bowl.



Figure 4.19: Praying gesture (Muslim)

CHAPTER 5

Recommendations

I did a study on some Bangladeshi animated short films. Recently an animated short film about climate change named "Tomorrow" was released in Bangladesh, directed by Mohammad Shihab Uddin. The purpose of this film is to teach children about fossil fuels and climate change. It won the award for the Best Animation Film at Cannes World Film Festival.

I have some observations on this film regarding character animation. The facial expressions in this film were not good. So, I showed some improvisation on some scenes.

5.1 Surprise Expression



Figure 5.1: Character expression improvisation

In figure 5.1, the left image is from Tomorrow Film and the right image is my improvisation pose. The name of the kid in this film is Ratul. In this scene, Ratul was surprised to see butterflies around him while he sat behind his father. He really felt amazed by those butterflies. But the facial expression of Ratul was not showing surprise. And his posture was not interesting. So, I think that facial expression could be better. I showed the improvisation on the right image. For surprising facial expression, eyes got bigger, eyebrows go up, lips get wider with a smiley. We see that kids try to catch

butterflies. I posed the character in that way. That character's hand gesture says that he is indicating something.

5.2 Aim facial Expression



Figure 5.2: Character expression improvisation

In figure 5.2, the left two images are from Tomorrow film and the very right one is my improvisation pose. In this scene, Ratul was trying to shoot the butterflies with a hand gesture. But the facial expression of that scene was not that interesting. He did not express anything on his face. So, I think there has space to improve. I did a pose which is on the very right. Here, I made the facial expression interesting. The character is trying to aim and shoot with his hand. We see that people close one eye to aim for something to shoot. So, I made a closed eye and made the lips curve to support the closed eye. And the hand gesture is about to shoot.

5.3 Annoying Expression



Figure 5.3: Character expression improvisation

In figure 5.3, the left two images are from Tomorrow film and the very right one is my improvisation pose. In this scene, Ratul suddenly got annoyed by those butterflies. He complained about that to his father. He argued with his father. He seemed very annoyed at that moment. But the facial expression of Ratul was not showing angry. So, I did an improvisation pose which is the very right one. On my character, the facial expression says that he is angry. The features of angry expression are compressed eyebrows, lips curved down, smaller eyes.

5.4 Angrily Disgusted Expression



Figure 5.4: Character expression improvisation

In figure 5.4, the left image is from Tomorrow Film and the right image is my improvisation pose. In this scene, Ratul argued with his father, but his father was trying to convince him that butterflies are nice. Ratul disagreed at that point. He was angrily argued with his father. But the facial expression was not that clear. On my improvisation pose, I showed interesting exaggerated eye movement while arguing. And his hand gesture says that he is trying to explain something.

5.5 Fearfully Surprised Expression



Figure 5.5: Character expression improvisation

In figure 5.5, the left two images are from Tomorrow film and the very right one is my improvisation pose. In this scene, Ratul got scared seeing a character named "Batasher Buro", which means old man of the winds. But his face does not seem got feared. So, I made an improvisation facial expression which is on the very right. On this fear expression, eyes get bigger, eyebrows rise up, mouth open.

5.6 Happily Surprised Expression



Figure 5.6: Character expression improvisation

In figure 5.6, the left image is from Tomorrow Film and the right image is my improvisation pose. In this scene, Ratul was surprised to see a different picture of Bangladesh here. But his expression in this scene was not perfect. My suggested pose is on the right side. For surprised face expression, eyes get bigger, eyebrows rise up, mouth open and wide with a smiley.

5.7 Slightly Smiling Expression



Figure 5.7: Character expression improvisation

In figure 5.7, the left image is from Tomorrow Film and the right image is my improvisation pose. In this scene, Ratul's father was talking with Ratul while Ratul was sitting behind him on the bicycle. He was enjoying Ratul's playful act. But on his facial expression, happiness is missing. On my improvisation pose, there is a happy face looking back.

5.8 Upset Expression



Figure 5.8: Character expression improvisation

In figure 5.8, the left image is from Tomorrow Film and the right image is my improvisation pose. In this scene, Ratul's father was upset while talking with other village members. But on his face, the upset was not properly executed. On my pose, I made the face sad. For sad expression, the mouth gets curved down, eyes get smaller, eyebrows go down, head tilts down.

5.9 Hopeful Expression



Figure 5.9: Character expression improvisation

In figure 5.9, the left image is from Tomorrow Film and the right image is my improvisation pose. In this scene, Ratul's father was trying to convince the village members. He was trying to share some ideas. I think there is more space to improve that pose. I did more exaggeration on the pose to make it more interesting.

5.10 Lip Sync

Lip sync is one of the major things in character animation. The mother language of Bangladesh is Bangla. So, there will be a difference between western lip-sync and Bengali character lip sync. I did a sample sequence list for making lip sync for the Bangla language. That is given below:

আমার সোনার বাংলা, আমি তোমায় ভালোবাসি

Word		Open/closed sequence
আমার	-	closed - open - closed - open
সোনার	-	slightly open - open slightly open
বাংলা	-	closed - open
আমি	-	closed - open - closed - open
তোমায়	-	slightly open - closed - open
ভালোবাসি	-	closed - open - slightly open - closed - slightly open

Word		Wide/narrow sequence
আমার	-	no change
সোনার	-	narrow - slightly wide
বাংলা	-	narrow - normal
আমি	-	Normal - wide
তোমায়	-	narrow - wide
ভালোবাসি	-	normal - narrow - slightly wide

Figure 5.10: Bangla language lip-sync

In figure 5.10, I showed how lips are performer to pronounce a word. Lip sync in animation is a visual illusion of lip movements. If we pronounce a word, we make the lips open and closed as well as wide and narrow. For a word, Lips move in both directions.

CHAPTER 6

Used Software

For this research and improvisation works, I worked on some software. For research, I used two browsers Google chrome & Opera Mini most of the time. For collecting the information, I used Google Slides & Google Docs.

For the improvisational work, I used 3D software AUTODESK MAYA 2020. I also used Adobe Photoshop cc 2020 for analysis of the expressions.

6.1 Autodesk Maya

The complete name of this software is Autodesk Maya. It is also called just Maya. It is a 3D computer graphics software. It is usually used on Windows, macOS, and Linux. It was originally developed by the Alias system corporation [13]. Now it is currently owned by Autodesk Inc. [14]. Artists use it to create assets for 3D animated films, TV series, TV commercials, Motion Graphics, Visual Effects, Advertising photographs, and many more.



Figure 6.1: Autodesk Maya Logo

Using this software, 3D artists can create heavy models, which help us give ultra 3d effects that create a realistic view at the user end. It is used in the film industry to create animated movies and cartoons and also provides us a huge variety of scope to make live 3d models that give actual 3d effects. It can be also used in the Gaming industry to make trendy video games. It is industry-standard software. Maya works really faster and gives optimum performance to the audience. It was used in some popular films such as *The Lord of the Rings: The Two Towers*, *Spider-Man (2002)*, *Ice Age*, etc.

6.2 Adobe Photoshop

It is a raster graphics making software. Adobe Photoshop is a photo editing and 2D graphics creation software that was developed by the giant company Adobe. It provides a huge variety of image editing features and the capability to create complex 2D graphics. It has become the industry standard for many creatives as it is very versatile. It is usually of the first programs many learn to use for creative works.



Figure 6.2: Adobe Photoshop Logo

Adobe Photoshop comes with professional tools. Those tools are made it easier for artists to bring their ideas to life. The best features of this software are its ability to create multiple layers that can be altered independently of each other. It is a raster graphics making software. Artists use it for Photography, Graphic Design, Illustration, Product design.

CHAPTER 7

Working Process

For making expression pose of 3D animated character, I used maya software. Some of those work process images are given below:

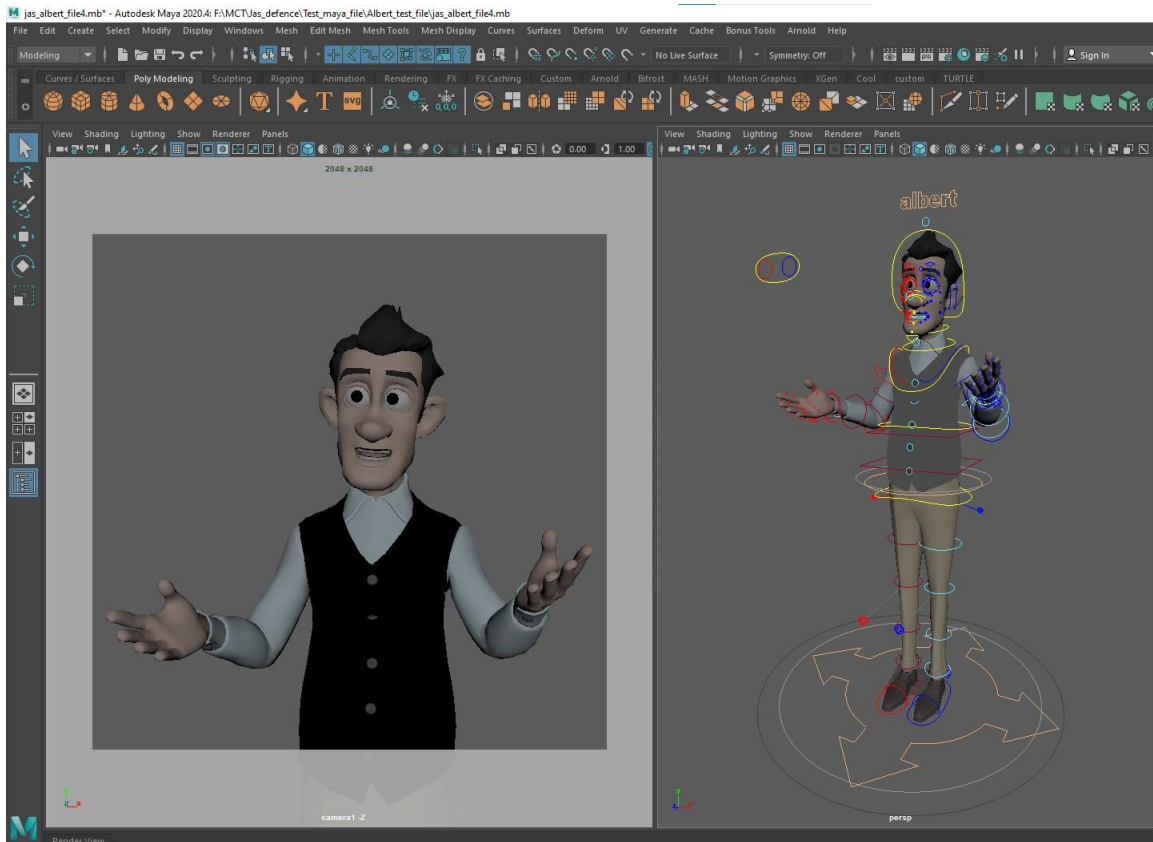


Figure 7.1: Character expression work in Maya software

In figure 7.1, it is a 3d character that is rigged properly with controllers. I manipulated those controllers to making an expecting pose. I used a camera for framing the pose. For this pose, I moved both hands, tilted the head, changed the brows, eyes direction, mouth expressions and shoulder position. More working images are given below:

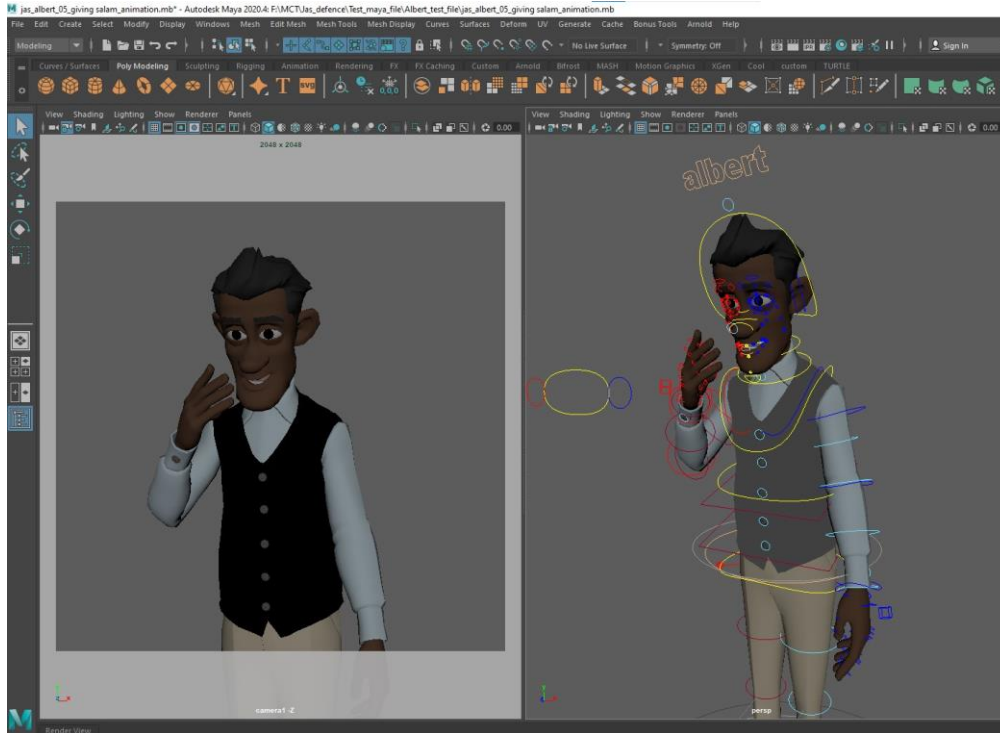


Figure 7.2: Character expression work in Maya software

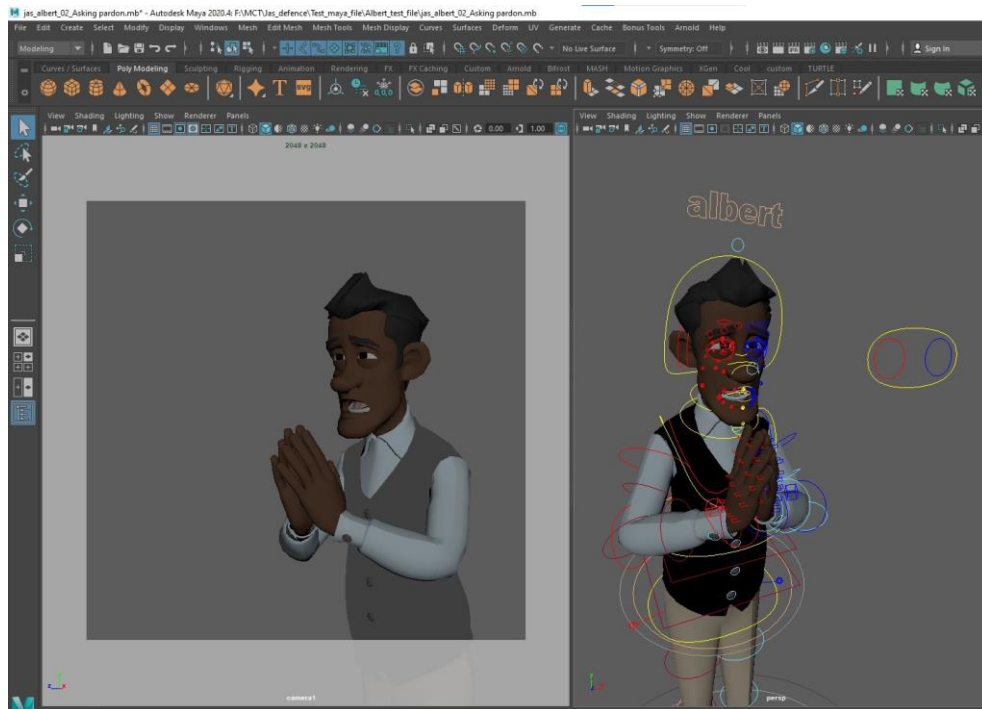


Figure 7.3: Character expression work in Maya software

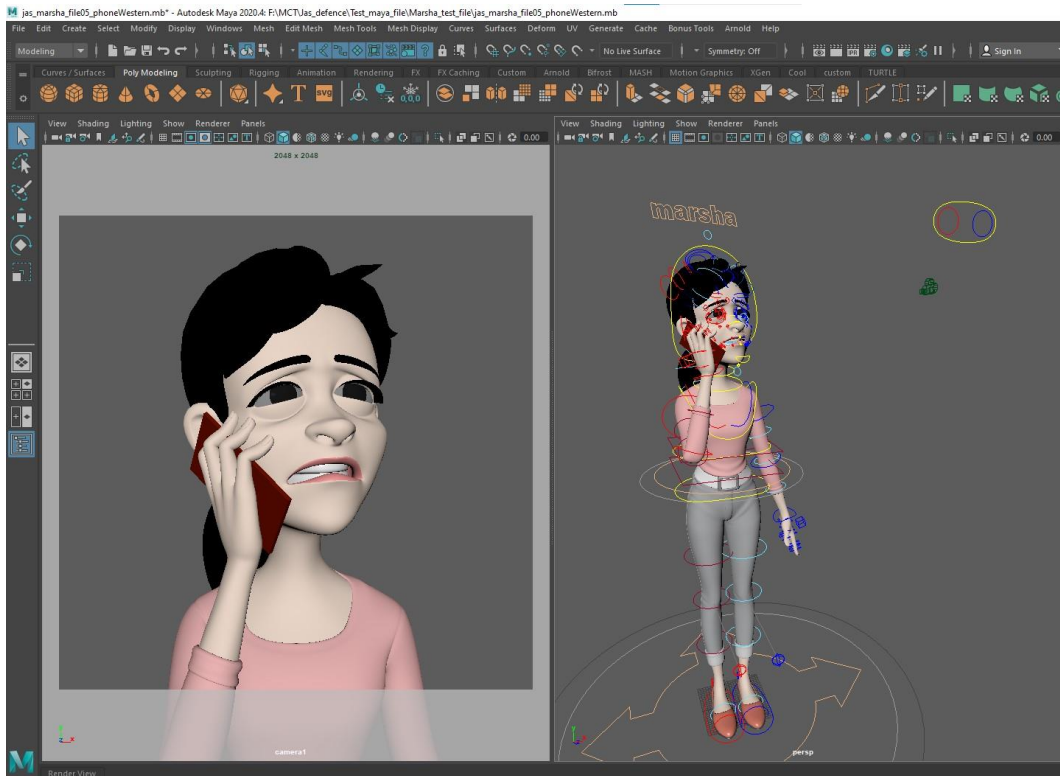


Figure 7.4: Character expression work in Maya software



Figure 7.5: Character expression work in Maya software



Figure 7.6: Character expression work in Maya software

For animating, I used keyframe animations. I used the parameters of the controls.

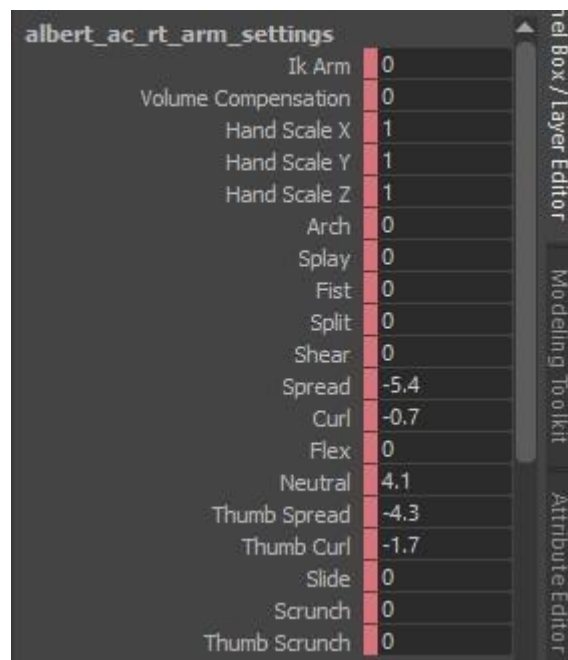


Figure 7.7: Character expression work in Maya software

CHAPTER 8

Conclusion

Through this research, we can know how a character represents a culture, what attributes are considered to make a character visual. We can also know how much facial expressions and body language impacts character visuals. I also showed basic facial expressions. Then I compared Bengali facial expressions and western facial expressions. I also added some Bengali identical gestures that make Bengali people unique. I made some poses to show how the Bengali gestures will look on 3D animated characters. Then I made some improvisation pose to show how the expressions can be executed on Bengali animated films.

So, from this research and suggestions, 3d artists can get an initial idea of how a character can be visualized representing a Bengali culture in animated films. I hope Bangladeshi artists would think to represent Bengali cultural character expressions in their films.

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