

Team Black

Individual Report

Marco Dell'Orco

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Rationale

This report covers the author's individual contribution to the team project while giving a brief overview of the project itself. Although the individual contribution was constant throughout the project development, this report focuses on two specific areas in which the contribution heavily affected the development of the project:

- Psychology research (Facial expressions & Body language)
- Level design/development (Dialogues and choreography)

The report ends with a critical analysis of the project to evaluate the effectiveness of the techniques used and final considerations about the results achieved. Several appendices help explore more in depth the different areas of the report.

Introduction

The project developed aimed at establishing an emotional bond between the player and a non playing character (NPC, a.k.a. computer controlled asset of the game). The main question which drove the team throughout the project has been the following:

“Is it possible to create emotional connections in games through interactivity and how quickly can these emotions be invoked?”

To find an answer to the proposed question, the team created a ruleset to be used when developing meaningful and emotionally deep characters within games. The process to gather the required understanding of games and emotions included a detailed research into character development, psychology & body language and game design. The ruleset was then applied to an NPC while producing a level with double ending using the Half Life 2 engine in order to test the efficiency of the created ruleset.

Research

A UCLA study indicates that only up to 7% of human communication effectiveness is determined by spoken words, the remaining 93% is determined by non-verbal cues.

This author focused his research on the realms of psychology which deal with body language, facial expression and non verbal communication although areas of games and character development were also studied. By gathering information about human communication of emotions and human perception of emotions, the author was able to give a critical contribution to those phases of the project which required the developed asset to feel as natural and captivating as possible. Following is a breakdown of the most important literature found.

Paul Ekman & Wallace V. Friesen

The book “*Unmasking the Face: A guide to recognizing emotions from facial clues*” (2003) explains in detail the six universally recognized emotions discovered by Ekman, giving an insight on the nature of the emotion and on how the brain translates said emotion into a facial expression.

Along with this, the book also presents a series of pictures for each emotion (Anger, Disgust, Fear, Happiness, Sadness and Surprise) with a breakdown of the face into three areas in which changes take place according to which emotion is felt and to its intensity:

- Forehead & Eyebrows
- Eyes, Eyes outline & Cheekbone
- Mouth, Lips outline and Jaw

To complete the book, sections about misinterpreting facial messages and facial deceit give a solid overview on two of the most critical aspects of body language.

These are presented as elements such as the face’s *Three signal types*, the *Communication barrage* and *Controlling the face*, which have proven to be extremely valuable while processing the video recordings of the tester’s faces. These elements allowed a deeper understanding of the way in which people convey/decipher a facial message, on how a *super partes* observer might fall into the trap of over-reading those signals and on how the situation affects the way in which people convey/decipher facial signals.

Allan Pease

The book “*Body Language: How to read others’ thoughts by their gestures*” (1981) describes body language through the explanation of those gestures which can be often seen in normal day-to-day life.

The gestures analysed within the book encompass the whole body, from eye signals to legs and lower body ones. Going further with the explanation, the analysis moves on to the meaning of specific interaction with objects such as glasses, tables and chairs, explaining how simple objects are often used to convey a message or depict an emotion. For example, a court layout and furniture size is designed to empower the judge and instill a sensation of smallness in the accused; the judge’s position has “the back protected” by the wall, a big desk and a chair with high back. The accused on the other hand, has the crowd behind, a simple table to “protect” from the incoming frontal “assault” (if not completely exposed), with only a small chair to sit on.

On top of all this valuable information, Pease also writes about understanding body language, giving what he calls “a framework for understanding” in which he speaks about perceptiveness, intuition and the different origin of different signals (identifying: Inborn, genetic, learned and cultural signals) while connecting with Ekman’s and Friesen’s research on the universally recognised emotions.

Francesco Padrini

Francesco Padrini is a psychologist and psychotherapist; he is also a lecturer at the University of Studies of Milan.

Padrini published the book *“The Secret Language of the Body”* (1994, original title: “Il Linguaggio Segreto del Corpo”) in which he explains the workings of body language with relation to emotional energy, detailing how society and culture cause humans to establish emotional blocks in order to prevent certain emotions from showing freely. These blocks are sustained by constant contraction of specific muscles which stop the emotion from becoming of public domain. Furthermore, Padrini connects and analyses Alexander Lowen’s *“Bioenergetic Analysis”*, which aims at restoring the free flow of emotional energy within the body by involving both body and mind in psychotherapy sessions.

This book is heavily centered on the understanding of one’s self rather than on the interpretation of other’s signals, thanks to this, the author was able to indirectly improve his ability to understand others by gaining a deeper knowledge of the workings of the brain within the body.

Application

The author applied the knowledge gathered to support several areas of the project as it was being developed as well as for the analysis of the facial recordings gathered during the test stage. These areas and the way in which they were affected will be explained in grater detail further in this report.

Level Design/Development

Script

While the conversation script for the artifact was being developed, this author was capable, thanks to the research undertaken, of giving valuable feedback on both what information was supposed to be delivered to the player and on how said information should have been delivered in order to create the emotional bond identified for each stage of play. The feedback varied from correcting contrasting elements to amplifying emotional content.

An example of the changes suggested is the introduction of the sequence in which the NPC and the player converse about the secretary. This sequence aims at deepen the player's bond with the NPC while underlining the friendship between the two.

Choreography

The choreographed scenes were heavily affected by the author's research on body language and facial expressions.

The initial layout of the emotions to be portrayed during each spoken section provided the skeleton of the emotional flow of the artifact. Once the skeleton was implemented, a tweak list was made to accentuate facial expressions and/or body language in those sections identified as "climax points" for the emotions to be conveyed at that stage. To give an example, the NPCs body language and facial expressions were accentuated during the initial sequence, at the sentence:

"Eheh... What could go wrong?!?"

This change was made to increase the emotional "jump" portrayed when the crisis takes place as well as portraying a relaxed environment depicting a standard day at work.

After this stage, a third list of fine tweaks was developed to group the different actions and facial expressions and have smooth, believable set of sequences for the final build.

Voiceovers

While spoken words make up a very small portion of human communication, they also convey non-verbal messages which could not be ignored in order to produce a realistic and captivating game experience.

Tone and volume of the words spoken are perfect examples of the kind of messages that human voice conveys disregarding from the words spoken; for example, yelling at a child with an angry tone of voice will most likely get the child crying even if the words spoken are the most kind.

For this reason, the author was deeply involved with the recordings of the voiceovers to give guidelines to convey the right emotions; furthermore, the guidelines also helped the actors produce voiceovers which would fit the choreographed sequence to an overall realistic product.

An example of the author's guidelines is the clear distress and panic hearable in the NPC's voice as the crisis deepens and the threat becomes "personal" for the NPC, on the sentence:

"The door is sealed! I don't know what's happened!"

Data Analysis

The knowledge gathered during the research stage was extensively used while analysing the facial recordings of the testers. The analysis plan was divided into 2 sections:

Data Ordering

Before carrying out the analysis, every facial recording was matched with the replay recording of the game session of that tester in order to be able to monitor the ingame behaviour and produce, therefore, a more accurate analysis of the facial and upper body emotions displayed.

Analysis

The analysis of the recordings was carried out in three stages or levels, following, the analysis process and sample results are detailed to further explain the method and approach used for the analysis.

The first level of analysis was composed of a first run-through of the video, noting down the facial and upper body signals, recording the source of the signal as well as its nature. For this stage, the replay was used as mere timeline pointer, while the audio playing when the reaction was recorded was noted down as potential trigger of the change.

The second level of analysis was composed of a second run-through of the video, noting down the in game behaviour of the tester to detect “unwanted” patterns such as wandering around the environment ignoring the

NPCs as well as “wanted” patterns, such as the increase of activity when subjected to the crisis. For this stage, the audio was used as mere timeline pointer while the facial recording was discarded.

The third level of analysis was composed of a third run-through of the video to double check the recorded facial and upper body reactions. For this stage, the audio was used as mere timeline pointer.

The methodology used to record state changes in testers has been provided by the different knowledge gathered on books by internationally known writers and experts in the field, from how to detect body signals to how to record them effectively.

The data gathered by these three stages was then organised into the five sections of the build identified by the team for the questionnaires:

- 1. Meet and greet**
- 2. Getting to know your partner**
- 3. Plot thickening**
- 4. Crisis**
- 5. Ending**

Once the data had been organised, it was used first to cross-reference the results of the questionnaires, then to support the conclusion reached by the analysis of all the data available.

A sample analysis of these recordings is shown below:

TESTER X

Section 1:

Immersion response as plot is delivered (source: lips and lower face muscles, neutral TO grin)

Section 2:

Immersion response on “I think she likes you” (source: lips and lower face muscles, neutral TO grin)

Section 3:

Increased awareness/attention on switch flicking (source: eyes, eyebrows and forehead)

Section 4:

Increased awareness on first explosion (source: face, mild aware TO fully aware + eyes quickly scanning the environment)

Immersion response on “Brilliant! Now I can get out” (source: face, fully aware TO neutral)

Immersion response on lockdown (source: face, neutral TO alarmed, quick change + eyes quickly scanning the environment)

Immersion response on NPC’s fate (source: face, neutral TO sorrow grin once realized NPC’s fate)

Section 5:

Immersion response on receptionist reaction (source: face, neutral TO frown)

Following is a sample of what signals were detected which lead to the record of an emotional change:

Section 1:

One corner of the lips slides outwards and raises, muscles tension surrounding the lips produce stretching of the mouth region and “raising” of the lower face lines

Section 2:

One corner of the lips slides outwards and raises, muscles tension surrounding the lips produce stretching of the mouth region and “raising” of the lower face lines

Section 3:

Eyebrows lower (internal part leading the change), eyes change shape (smaller, focused), forehead “lowers” creating tension across the middle of it

Section 4:

Eyebrows contract and are lowered, eyes outline contracts to focus vision further, lines appear on eyes corner pointing outwards, forehead tension creates vertical lines just above the nose bridge, mouth muscles contract making mouth smaller and tighter

Face relaxes going back to default/initial status

Face jumps back to previous state, while changing, eyes get bigger first and eyebrows raises, mouth slightly opens before gripping tight again once eyes, eyebrows and forehead are contracted

Both corners of the mouth lower, one is pulled outwards and lower compared to the other side, lower part of the face is pulled downwards as a result, inside of the eyebrows raises for a few seconds

Section 5:

Lower face contracts and lowers the features of the face, mouth corners lower further, eyebrows raise further (one more than the other), forehead shows lines pointing outwards and downwards above the eyes, external corner of the eyes pointing downwards

The change in state recorded also includes those elements that showed a lack of immersion or detachment from the events taking place. These were recorded in order to have some “unfiltered” feedback that could help the team understand what elements didn’t work as expected and why. In addition, when no change in state was recorded for a particular section, it was noted down as “section didn’t work for tester” which helped the team to narrow down the effectiveness of the techniques implemented within the artifact as well as finding patterns within similar types of testers using the entry questionnaire as source.

Although the team member who carried out the analysis has been the one with the most knowledge in the realms of body language and facial signals, the decision of having one team member carry out the entire analysis left the video recordings open to misinterpretation. Furthermore, some reactions registered as emotional response to the artifact might simply be the reaction to a personal memory that was recalled either by an in game event, or by a thought that the tester had. Although the artifact would still have most likely triggered such reaction, the reaction itself could have been not directly dependant on the team’s work.

Since no clear solution could be seen, a trainee psychologist (Ilaria Guerzoni) from “La Sapienza” (one of Rome’s most acclaimed universities) has been informed of the project, giving her an overview of the test carried out as well as an overview on the data gathered. The suggestion given to the team after analysing the information provided has been to implement the video recordings

analysis as support material and cross referencing, rather than using it as results data in its own rights.

The outcome of the observational analysis has been mostly supportive of the conclusions that were reached by the team from the analysis of all the other data gathered. Furthermore, it showed that the objective of making a quickly likeable NPC had been achieved, as well as giving a rough indication of which sections of the artifact worked best and which ones did not.

NOTE: Elements such as hats and glasses can impair the reading of facial expressions; however, after careful consideration the team decided that it was realistically not possible to have all the testers remove core items such as glasses. Testers with hats were asked to raise them in order to show the forehead if needed.

Considerations

The results gathered indicate that the project was successful at invoking the desired emotions within the limited amount of time set to invoke them (average: 5 minutes per run). The desired emotional flow pattern can be detected in the graphs outlining the emotional status of the testers with regards to the section of the artifact they were experiencing (appendix).

Section 1 shows mostly a neutral entering status which is consistent with the idea that players would be getting acquainted with the narrative and with the characters of the build. Relevant positive feedback can also be seen which is also consistent with players showing the first stages of immersion within the characters and the plot.

Section 2 shows an evident increase of positive feedback as the bond between the player and the NPC is established.

Section 3 shows a step back towards neutral feelings as the plot thickens, this shows a good level of immersion as the “light hearted” conversation switches to something more important, the task at hand. (facial recordings support this hypothesis with a substantial increase of awareness detected)

Section 4 shows a predominance of “negative” feelings and shock as expected by the team once the crisis started.

Section 5 shows a substantial increase of positive feedback with regards to the artifact ending with the NPC escaping. On the other hand, the artifact ending with the NPC trapped in the generator room didn’t provide enough evidence to support that the desired emotional status had been reached. With the feedback gathered, the team was able to establish that the failure occurred as the sequence was not clear enough and left many testers unsure about the NPC’s fate.

The author is confident of having produced a unique and essential contribution to the project and to the team. The areas researched have proven to be vital to the project and also increased the team member’s understanding of human emotions; in addition, the technical contribution of the author increased both realism and flow during the design and building stages of the project. Future projects will surely benefit from the knowledge gathered through the course of this year in the realms of facial expression, body language, game and character design, time management and quality assurance.

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