

# **Human-Robot Interactions**

## Assignment 2: Non-Verbal Interaction

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### **1 Story**

The interaction begins with the robots greeting the user and beckoning them closer to ask whether they would like to hear a story. If the user says yes (using response cards as an indication), the robot will continue with the story. If the user says no, the robot will become sad and the user can cheer it up again by patting its head.

If the user decides to hear the story, the robot will continue with the story:

'The other day I went to see a basketball game at the stadium downtown. It was so cool with so many people cheering and drums playing { it was like a big party. When I got inside, I felt really excited. The game was awesome, with great plays that made everyone cheer. The crowd and the stadium were so huge and also so loud.

After the game, even though our team didn't win and I was a bit sad, I was allowed to go onto the court. I got the ball and bounced it around, threw it and even got it in the basket! Everyone cheered and I even got to meet some of the players. It was a day full of basketball, a huge stadium, and a lot of happy feelings.  
Pretty cool, right?'

### **2 Gestures**

#### **2.1 Greeting and Beckoning (designed by Lauren)**

The interaction begins with the robot greeting the user by saying "Hey you, over there!" with a wave of the right hand, followed by "Come closer, I want to ask you something" with a beckoning signal of the left hand. This pose can be seen in Figure 1.

The preparation begins before the dialog with the robot raising its right arm and when it says the greeting it waves its right arm until the beckoning call. The



Figure 1: The robot during the wave gesture

preparation for the beckoning call begins while the robot is saying its greeting by raising its left arm slightly and when it says “Come closer” it begins to wave the user closer to itself.

## 2.2 Upset Robot (designed by Yara)

This gesture is used after the user declines to listen to the robot’s story. The robot will say the sentence: “It makes me very upset that you don’t want to hear my story.” In preparation for this gesture, the robot will bring its arms up to the middle of its body while slightly folding into itself. This will continue until the arms are in front of its face and the robot is leaning forward. The robot is basically “balling up” which is a protective gesture that shows that someone needs to be emotionally comforted [The Body Language Project, 2015] (see Figure 2). The robot will also lower its head as having your chin below



Figure 2: The robot looking down during the 'upset' gesture

a horizontal level indicates that you are sad [Parvez, 2022]. The actual stroke happens during the word "upset", where the robot will shake its head left and right to indicate its sadness. After this, the robot will stop shaking its head. However, it will only relax and slowly come back up again after it is consoled by the user (see Subsection 3.2) as it will stay sad. Then, it will first look up and straighten its back after which it will lower its arms back to its sides.

### 2.3 Big (designed by Yara)

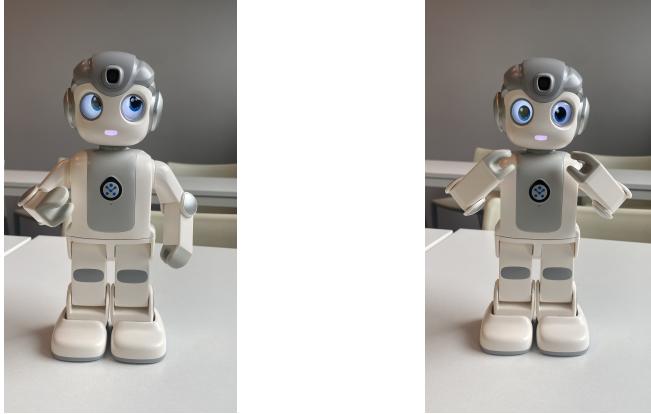
To prepare for this gesture, the robot will lower itself and bring its arms to its chest. This makes the robot look very small. During the target word, the stroke will happen where both the robot's body and its arms go up simultaneously. This makes the robot very big to visually represent the word it expresses (see Figure 3). After the target word, the robot will lower its arms again.



Figure 3: The robot with its arms wide at the end of the 'big' gesture

#### 2.4 Bounce and Throw Ball (designed by Lauren)

For this gesture, the robot imitates bouncing a basketball and throwing it as it tells the story about its time at the basketball game. In the first part of the gesture, the robot uses its right arm and moves it up and down to symbolize bouncing the ball as seen in Figure 4a. It prepares slightly before the target word by setting both of its arms in the correct position. After this, it uses both arms, as seen in Figure 4b to show it throwing the ball after the target word 'threw' before retracting to its neutral position to finish the story.



(a) The robot while moving its arm to mimic bouncing the ball (b) The robot during the throw part of the gesture

Figure 4: Robot performing Basketball playing gesture.

### 3 Non-Verbal Signals

#### 3.1 Reading a card

The first non-verbal signal we implemented was the use of reading a card in response to a question. Here the robot asks the user whether they would like to hear a story. They can use two cards to indicate yes or no. If the user presents the card representing ‘yes’ (ID 0), the robot will continue with the story. However, if the card representing ‘no’ (ID 1) is shown then the robot will turn sad and use the “Upset Robot” gesture presented in Subsection 2.2.

#### 3.2 Touching the Head

The second non-verbal signal we implemented was a way for the user to console the robot after refusing to listen to its story. The robot will be sad and hold the “Upset Robot” gesture from Subsection 2.2. The user can then touch or tap the robot’s head to help cheer the robot up again.

## References

- [Parvez, 2022] Parvez, H. (2022). Body language: Head and neck gestures. <https://www.psychmechanics.com/body-language-gestures-of-head-and-neck/>. (Accessed: 11.03.2024).
- [The Body Language Project, 2015] The Body Language Project (2015). Body language of the fetal position. <https://bodylanguageproject.com/>

[nonverbal-dictionary/body-language-of-the-fetal-position/](https://www.nonverbal-dictionary.com/body-language-of-the-fetal-position/). (Accessed: 11.03.2024).