

# USER STUDY SCRIPT

## RESEARCH QUESTIONS/ HYPOTHESIS

- **Research question :**
  - 1) What are the behavioral differences and similarities between VI and sighted children in a conversational task?
  - 2) Can a mediator robot foster inclusion in mixed-visual ability group conversations?
  - 3) How does a robot influence group dynamics in small-group conversations?

## PARTICIPANTS

Children between 5 and 13 years old

Pilot study: 42 participants ( 42 sighted )

conditions : Directive / Organic / Baseline / Training

User Study :

78 children, 40 girls and 38 boys (ages 6 to 14), in 26 groups of 2 sighted children and one child with VI ( $M=9.35$   $SD=2.06$ ) from the same class in 9 mainstream schools

conditions : Directive (inclusive in python) / Organic / Baseline / Training

## PREPARATION

- 
- Initial questionnaire - individual
  - a) Children self-reported their familiarity with their peers in a 7-point scale (tangible)
    - (A) : Inclusion : perceived distance from the other
  - b) Answering the activity challenges (B) (oral)
- Questionnaire per robot condition (individual) (C):
  - a) Measure Perceived fairness, recall behaviors (C) (oral)
  - b) Self-reported measures **give their opinions** and **being heard measures** answered with a five-point Likert scale (tangible) to the following questions in each robot's activity. *"Were you able to give your opinion"* and *"How much did you feel heard?"*.
  - c) self-reported the inclusion perception **Inclusion-exclusion continuum** was assessed after each robot activity.
- End questionnaire with open questions (D)
  - What did you like best?

- What did you like less ?
- Which robot behavior did you like the most?
- Anything else you want to add ?
  
- Consent form signed
- Devices:
  - Computer with a bluetooth with windows 10
  - Dash
  - Base – 3 pillows (red, blue, yellow)
- Recording Materials:
  - Microphones - 3
  - Camera - 4
  
  - Pre-configure an OBS with 4 synchronized cameras in the same frame

What do you need to do before each evaluation session? This can be a checklist, e.g. charge devices, print questionnaires, start system, setup recording devices, etc.

- ☐ Use toys to complete relation between peers (A) - students and 3 toys
- ☐ Receive student individual responses to the activities (B)- Students
  
- ☐ Recharge robot
- ☐ Use a place with easy access to all children, to assemble the scenario
- ☐ Assemble recording materials, in order to see children face and interactions with the robot (Adjust OBS if needed)
- ☐ Test the microphone in each child
- ☐ Check bluetooth (of Dash)
- ☐ Power on PC

## PROCEDURE

How will you conduct the study? Describe each step of your experiment.

### Initial preparation:

- Teacher organized the groups

### Questionnaires : in github

### Initial conversation with each child Individual questionnaire :

#### (A) Questionnaire relation with the other members - Individual – Tactile (use the three toys)

*1. Assume that you are the puppet <color1>, and your colleague <name2> is the puppet <color2>, and your colleague <name3> is a puppet <color3>. Describe your friendship with them.*

2. Each square indicates how is your friendship and can have the following values: "I do not know them", "I know them from school", "I know them from the classroom", "We occasionally play", "We play every week", "We are always together", and "We play outside of the school".

3. You must place yourself (in the You Square) and put your friends as close or as far away from you)

Update de name. group and the age of each participant

## **B. Activity Answers – Individual - Oral - Initial**

- ☐ B1: Desert Island: choose 3 objects to take on the boat trip (and why) and which one was selected to take to the desert island when the shipwrecked and why
- ☐ B2: Spaceship: Activity of choosing 5 crew members out of 8 to go on a space trip that will save humanity and why
- ☐ B3: Animation character/ Tv series: choose your favorite cartoon character to see with your friends and why
- ☐ B4: Balloon trip: choose an animation or movie character to go on a balloon ride. And why did you choose the character?

## **Before the activity**

- 1) Check microphones with the child talking
- 2) Identify the pillow for each child
  - a) Record child name in Dash. My8 voice for RED; My9 for YELLOW; My10 for BLUE
- 3) Do the A questionnaire The Inclusion of Other in the Self (IOS) Scale
  - a) First, before we start, I need you to indicate with these three toys (each one with a color representing each of you) how you usually talk to your two colleagues or not (the closer the rings are, the more often you talk and play with them). check questionnaire for the speaking text
- 4) Collect individual responses to activity challenges (B)
- 5) Check camera

## **Group sessions**

## Preparation

- 1) Check microphones and cameras
- 2) **Record children's names in dash**
- 3) Guide each child to their specific pillow (based on their colour)
- 4) Randomly select activity orders C1, C2, C4 for this group

## Introduction:

- Hi, I'm <name> and I have a lot of fun activities planned for today! The idea is to solve together the activities that you had done before. In some situations we will use a robot to mediate your conversation. I need your help to try it, do you want it? Let's do the same activities that you did alone but now in a group.

## Oral description of each activity:

- ☐ **B1: Desert Island:** choice of object to take on the boat trip and when shipwrecked to take to the desert island and why
  - In this activity, I will ask each of you to present the object you chose to take with you on the boat trip and which one you took to the deserted island when the shipwreck occurred and explain why.
  - The objective of this challenge is that together you choose one of the three objects chosen to go to the island, and that everyone thinks makes more sense.
  - You will have around 3.5 minutes to present and discuss among yourselves, and at the end tell me what you have chosen, everyone should come to an understanding.
  - (if in a robot condition) The robot alerts you when there is one minute left. The robot will move between you, it will have different colors (yellow, blue and red indicating each of you)
  - (if in baseline) Researchers alerts if there is one minute left
  - (record the chosen group decision in the questionnaire and whether it was the same as the individual answer)
- ☐ **B2: Spaceship:** Activity of choosing 3 crew members to go on a space trip that will save humanity and why
  - In this activity I will ask each of you to introduce the 5 crew members you chose to take on the space trip and explain why.
  - To remind you the possible crew members are:
    - ☐ A 30 year old song
    - ☐ A 60 year old politician
    - ☐ A 40 year old police officer
    - ☐ A 23 year old student
    - ☐ A 32 year old teacher
    - ☐ A 35 year old doctor
    - ☐ A 6 year old girl

❑ A 10 year old boy

- The objective of this challenge is for them to choose the three chosen crew members together to go on the ship and populate a distant planet. Everyone must agree with the decision..
- You will have around 3.5 minutes to present and discuss among yourselves, and at the end tell me what you have chosen, everyone should come to an understanding.
- (if in a robot condition) The robot alerts you when there is one minute left. The robot will move between you, it will have different colors (yellow, blue and red indicating each of you)
- (if in baseline) Researchers alerts if there is one minute left
- (record the chosen group decision in the questionnaire and whether it was the same as the individual answer)

❑ B3: Animation character: choose your favorite cartoon character and why

- In this activity, I'm going to ask each of you to present your favorite cartoon/TV series that you chose and explain why.
- You will have around 3.5 minutes to present and discuss among yourselves, and at the end tell me what you have chosen, everyone should come to an understanding.
- (if in a robot condition) The robot alerts you when there is one minute left. The robot will move between you, it will have different colors (yellow, blue and red indicating each of you)
- (if in baseline) Researchers alerts if there is one minute left
- (record the chosen group decision in the questionnaire and whether it was the same as the individual answer)
- 

❑ B4: Balloon trip: choose an animation or movie character to go on a balloon ride.

- I will ask each of you to present the animation or movie character to go on a balloon ride that you previously chose and explain why..
- Now imagine that all of you are in the same balloon, and that you only have space for one of the characters. Which one would you choose to go on a trip with?
- Discuss among yourselves and choose which cartoon should come out of the balloon
- You will have around 3.5 minutes to present and discuss among yourselves, and at the end tell me what you have chosen, everyone should come to an understanding.
- (if in a robot condition) The robot alerts you when there is one minute left. The robot will move between you, it will have different colors (yellow, blue and red indicating each of you)
- (if in baseline) Researchers alerts if there is one minute left

- (record the chosen group decision in the questionnaire and whether it was the same as the individual answer)

## **1st session**

### **CONDITION BASELINE - without the robot, with microphones**

**Phyton:baseline -grpID'=XX -cID1=1 -cID2=2 -cID3=3 -debug\_active=True UPDATE GROUPID**

**Duration : 3,5 minute maximum**

**Goal:** collection of the way they argue

**Random activity selection between B1, B2 and B4**

## **2nd session**

### **CONDITION CONTROL - with the robot, with microphones**

**Phyton:control -grpID'=XX -cID1=1 -cID2=2 -cID3=3 -debug\_active=True UPDATE GROUPID**

**Duration : 3,5 minute maximum**

**Goal:** learn robot behaviours

**Activity selection between B3**

## **3rd and 4th session**

### **CONDITION counter balanced (Directive condition , Organic condition) - with the robot, with microphones**

**Phyton:<condition> -grpID'=XX -cID1=1 -cID2=2 -cID3=3 -debug\_active=True UPDATE GROUPID**

**<condition> = encouragedriven (if Directive condition)**

**<condition> = followdriven (if Organic condition)**

**Duration : 3,5 minute maximum**

**Goal:** collection of the way they interact in the robot condition

**Random activity selection between B1, B2 and B4**

**Individual questionnaire after session ( C )**

In the end of the 4th session - Individual questionnaire after activity (D)

## DEPENDENT MEASURES

### Quantitative Measures

- **Objective individual measures.**
  - a) Uniqueness
    - i) **Generated ideas** is the normalised count of each child's creative moments (Yu, Junnan 2020).
    - ii) **Accepted ideas** is the number of each child's ideas included in the group's final decision (Mutlu 2009).
  - b) Participation
    - i) The **Speaking time and turn** are the normalised duration and counts when a child speaks (Mutlu 2009).
  - c) Children Dynamic
    - i) **Engagement** measure is the normalised time that each child spent in an engagement behaviour speaking and listening to the conversation (not distracted with something else) (Gottman 1975)
    - ii) The **praising and being praised** are the normalised counts when a child gave or received verbal positive reinforcement (Gottman 1975, Tennent 2019) -> Belonginess
    - iii) The **gaze to the robot** and **gaze to the group** are the normalised time each child was looking at the robot or the group, respectively.
- **Objective group measures.**
  - a) **Group unevenness of speaking time and accepted ideas** are the sum of the absolute value of individual deviations of each group for speaking time and accepted ideas measures, respectively. (Tennent 2019)
  - b) **Performance time** is the activity duration, i.e. the time taken by the group to reach a decision.
  - c) The **obedience measure** is the normalised number of times that each group acknowledges and obeys the robot's encouraging actions.
- **Children's subjective perceptions.**

- a) The **Proximity** measures the closeness of each child's friendship with the other group members (Aron 1992)
- b) The **perception of inclusion** is built upon self-reported measures **give their opinions** and **being heard measure** answered with a five-point Likert scale. The **Inclusion-exclusion continuum** metric (forsyth 2018)

**Thematic analysis** based on open questions and video coding,

1. robot's recalled behaviours
2. robot's perceived utility
3. fairness

## DESIGN

Three independent variables in a mixed design.

The mediation strategy was manipulated as a within-subjects factor with three conditions:

- *Baseline*, children played an activity without any robot;
- *Directive*, the activity included a mediator robot with the directive strategy; and
- *Organic*, the activity had a robot that follows children's flow and only occasionally mediates. The second and third conditions were counterbalanced, while the baseline characterizes children's initial group dynamics.

The second independent variable was children's visual acuity. All groups were composed of two sighted children and one child with VI. As a result, we used this independent variable with two between-subjects levels, sighted and visually impaired. This independent variable was not used for the analysis of group measures.

The last independent variable was the group's baseline participation balance, which was split into two between-subjects levels: balanced and unbalanced groups. We classified a group as unbalanced if one of the children talked more than 50% of the time and classified the group as balanced otherwise. Based on these criteria, we had 12 unbalanced and 14 balanced groups.