

User Study

Introduction

This user study aims to investigate the impact behaviour and action has on perceived trustworthiness in virtual characters. The study will be carried out on the 4k-screen in the Visualization Studio at KTH which is 2.4 x 4 meters. A virtual character will be displayed on the screen and the users will play a trust game with it. This process will be iterated for all five different virtual characters and also repeated three times to get better results.

The user will sit in front of the screen using a mouse and keyboard to interact with the virtual characters. The expected time for each game is approximately one minute which results in a total time of 15 minutes (1 minute x 5 characters x 3 game sessions = 15 minutes).

Participants will initially be briefed of the study by reading a text description and signing a consent form. They can at this stage ask questions if anything is unclear. Participants then answer a questionnaire about their demographics, similar to the prestudy. Following this they will play the trust game with all virtual characters.

After the user study on the 4k-screen, users will receive a price depending on how well they performed. Everyone will receive something but the more money earned total will get them something better. There will be three different prices:

Examples could be: Small candy bag → Candy bar → Big candy bag

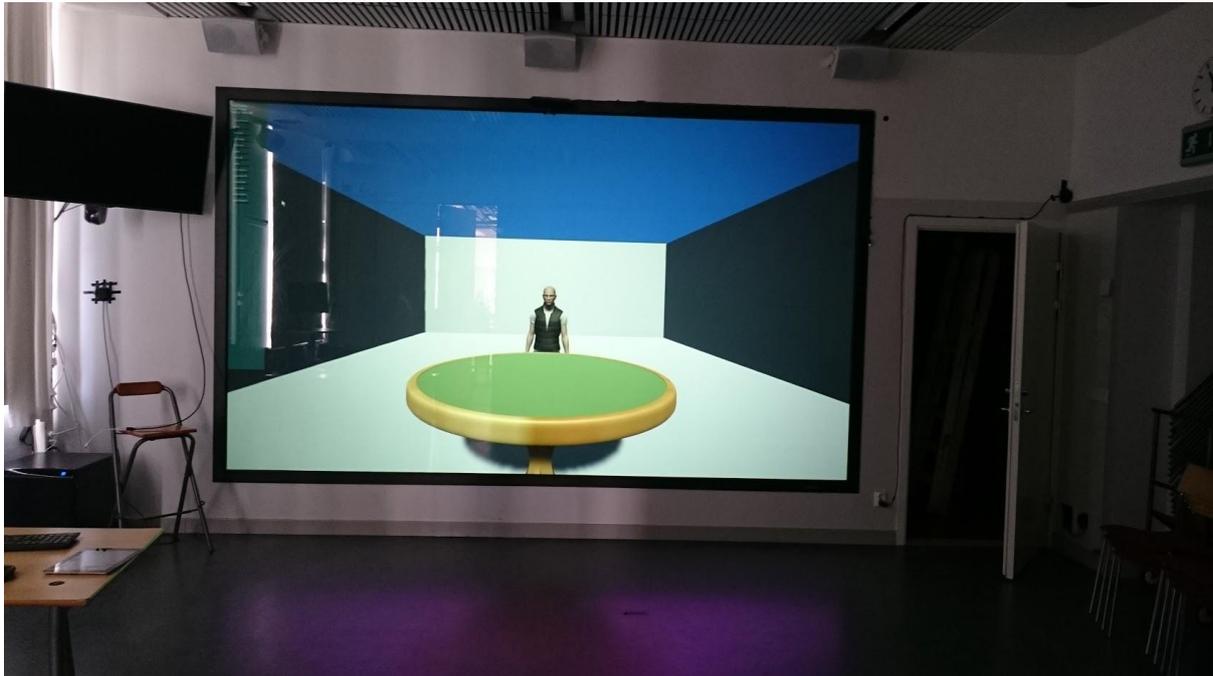


Figure 1: Picture of an early demo on the 4k-screen

Research Question:

How does the behaviour and action of a virtual character influence its trustworthiness?

Hypotheses:

- An untrustworthy action will lower the next investment from the user while a trustworthy action will increase it.
- The virtual character with a congruent trustworthy personality (trustworthy behaviour and trustworthy action) will receive the most overall virtual money and the virtual character with a congruent untrustworthy personality will receive the overall lowest virtual money.
- The actions of the virtual characters will have a bigger influence than its behaviour when it comes to the amount invested by users. The virtual character with a trustworthy behaviour and an untrustworthy action will receive overall less virtual money than the virtual character with an untrustworthy behaviour and a trustworthy action.
- The two virtual characters having a trustworthy behaviour will receive almost the same amount invested initially but have an opposite progression (the trustworthy action will increase the following investment while the untrustworthy action will decrease it). Same process for the virtual characters with untrustworthy behaviour.

Setup

There are five different personalities for the virtual characters which is determined by the behaviour and action. Each virtual character will be mapped randomly to one out of five available appearances (in this scenario called A, B, C, D or E) so that the appearance of the virtual characters should have no impact on the final results. There will only be three different, fixed behaviours: trustworthy, neutral and untrustworthy. These are determined by facial expressions, body language and gaze. Lastly there are three different actions: trustworthy, neutral and untrustworthy. These are determined by how much the virtual character gives back to the user of the invested amount.

Virtual Character Personalities		
Behaviour	Action	Appearance
Trustworthy	Trustworthy	A-E (Randomly picked from 5 available)
	Untrustworthy	A-E (Randomly picked from 5 available)
Neutral	Neutral	A-E (Randomly picked from 5 available)
Untrustworthy	Trustworthy	A-E (Randomly picked from 5 available)
	Untrustworthy	A-E (Randomly picked from 5 available)

A within-group design will be used for the user study to gather as much data as possible and to avoid biases of only playing with congruent contra incongruent personalities.



Figure 2: Example of an appearance mapped to the behaviour angry



Figure 3: The same behaviour as in Figure 1 but mapped to another appearance



Figure 4: The same appearance as in Figure 2, but mapped to another behaviour

User group

Participants will be students from KTH. They will receive extra credits for participating and the goal is to have at least 20 users.

Content

Appearance

A set of possible appearances will be investigated in the prestudy so that five of them can be used in this user study. These five appearances should be as neutral as possible or perceived as similarly as possible in a neutral idle state. They will be based upon the same model (MCS Female) and the factors that will differ between them are:

- Name
- Hair
- Clothes
- Blendshapes (facial and body dynamics)

Action

The actions of the virtual characters will be determined by an algorithm deciding how much the virtual characters should give back of the amount invested by the user. A trustworthy action means a bigger amount back while an untrustworthy actions means a lower amount back to the user. The neutral action will entail a range from nothing back to a very small amount back.

Behaviour

The behaviour of the characters will be annotated in the prestudy in terms of trustworthiness. Both should either be very trustworthy and very untrustworthy or trustworthy and untrustworthy so that the intensity of the two factors are the same.

The behaviour will be determined by the following factors which will be investigated in the prestudy:

- Gaze
 - How much the virtual character looks at the user and how much the virtual character looks away
- Head Behaviour
 - How quickly the virtual character blinks and how often but also how quickly it moves its head
- Idle Behaviour
 - If the character has a quick and twitchy idle behaviour or a normal one
- Facial Expressions
 - Expresses different emotions through facial expressions which indicates different levels of trustworthiness
- Body Expressions
 - An untrustworthy expression could be crossed arms or facing away from the user while a more trustworthy body expression could be openly facing the user

Trust Game

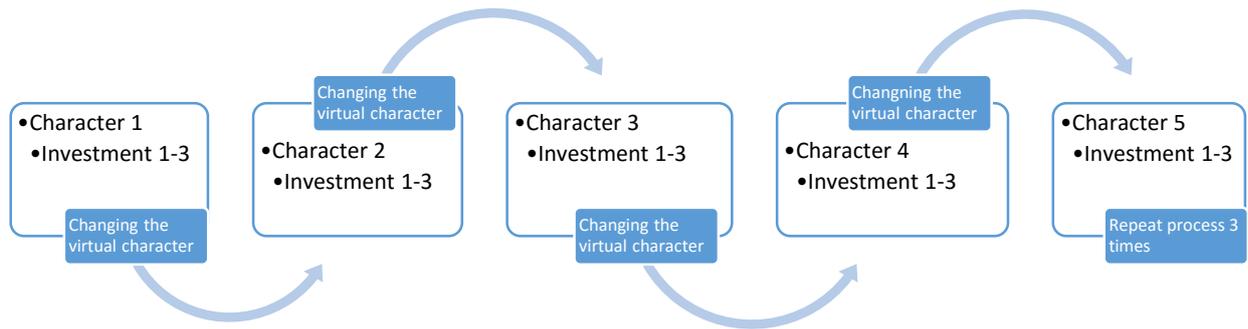
The trust game in this user study is an instance of the investment game. The user can choose the amount invested in the virtual character, ranging from 1 to 100 virtual money. When the amount has been given, the virtual character decides, depending on its personality, how much to give back. This process will then be iterated three times before the user will play against another virtual character.

The game scenario will be repeated three times, each with a random ordering of the characters to gather the most accurate data.



Figure 5: Trust Game demo showing the interaction between user and virtual character

Scenario



This is a flow chart of the process for each user. There are five characters for each iteration and each game session entails three investments. This process is iterated three times to get as much and as reliable data as possible. Before playing with a character the first time and after playing with a character for the last time, participants rate it for attractiveness, confidence, valence, trustworthiness and good/evil. A 5 point likert scale will be used in the following format:

Trustworthiness

(Very Untrustworthy = 1, Neutral = 3, Very Trustworthy = 5)

Confident

(Very Nervous = 1, Neutral = 3, Very Confident = 5)

Valence

(Very Negative = 1, Neutral = 3, Very Positive = 5)

Attractiveness

(Very Unattractive = 1, Neutral = 3, Very Attractive = 5)

Good/Evil

(Very evil = 1, Neutral = 3, Very good = 5)

Data collection

Data from the user study will be written to file via Unity and then translated by hand over to excel or similar software.