

Studying the Acceptance or Rejection of Newcomers in Virtual Environments

Pilar Herrero, Angélica de Antonio, and Javier Segovia

Facultad de Informática. Universidad Politécnica de Madrid.
Campus de Montegancedo S/N.
28.660 Boadilla del Monte. Madrid. Spain
{pherrero, angelica, fsegovia}@fi.upm.es

Abstract. In this paper, we present an experiment, called the “Old Man Experiment” carried out at the Universidad Politécnica de Madrid. This experiment pursued three objectives: to study the acceptance or rejection of newcomers, to study the field of “mixed reality” in more depth and to investigate perception. The “Old Man Experiment” was conducted as part of the Amusement Esprit Project 25197.

1 The Old Man Experiment

This is an interactive experiment, in which any spectator can take part. The experiment is based on a huge screen on which an avatar representing an Old Man will show up. The screen, large enough to represent the Old Man in full size (we used a 3m x 2m screen), must be located in a public space, and people must be allowed to get close to it. The system includes a hidden camera with two angles of vision (72° and 180°), to detect people moving and approaching. Our experiment was designed as it is showed in the Figure 1.

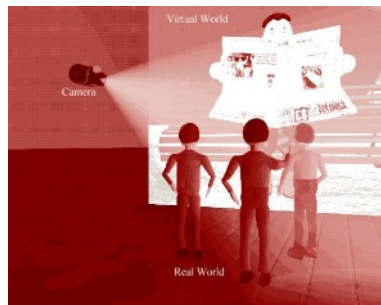


Fig. 1. The Old Man experiment

The Old Man was designed with *Alias Power Animator* on *Silicon Graphics O/2* stations, and the software was developed using *Direct3D* and *Microsoft Visual C++* tools. A *Frame Grabber SDK* and a *Data Translation DT3153* card were used to capture and observe the images.

This is a two-scenario experiment. The first scenario shows the Old Man going for a walk around a beautiful green park near the Amusement Centre on a glorious evening, and the second scenario takes place in a square of the Amusement Centre. In both scenarios, the Old Man sits down on a bench and quietly starts to read a newspaper while a bird flutters by. It is then, while the Old Man is sitting on the bench (see Figure 2), that he starts to interact with his audience.

When people approach the bench, the Old Man will react. He is programmed to attract people or reject people depending on the situation. If anyone approaches the Old Man while he is reading his newspaper and gets too close, the Old Man could get a fright and drop the newspaper, shield himself with the newspaper or show some interest in the person. Some of the above-mentioned Old Man's gestures are illustrated in the Figure 2.



Fig. 2. The Old Man reactions

The behaviour of the Old Man is governed by an algorithm that contains two different situations. The first one, called attract situation, happens when the Old Man tries to catch the user's attention. In this scenario, the Old Man looks at the spectator and the application generates pre-programmed animations and gestures to catch the spectator's attention. In the second one, called rebuff situation, the Old Man rebuffs the spectator, trying to make him go away.

For the attract situation, we have defined different areas of reaction, as shown in Figure 3 and Table 1 below:

Table 1. Intervals in "Attract Situation"

Area	Range	The Old Man's Reaction
A	$(x_1, x_2), (x_5, x_6)$	Looks at the spectator
B	$(x_2, x_3), (x_4, x_5)$	Tries to catch spectator's attention
C	(x_3, x_4)	Watches the spectator's reaction

Where the values of the variables x_1, x_2, x_3, x_4, x_5 and x_6 depend on the angle of vision of the camera with which we are working. In this experiment, we located the origin of co-ordinates at the camera's position, the user's y-co-ordinate was a fixed value ($y_1=1$ metre) and the user's x-co-ordinate was $x_1=-1, x_2=-0.75, x_3=-0.5, x_4=0.5, x_5=0.75$ and $x_6=1$.

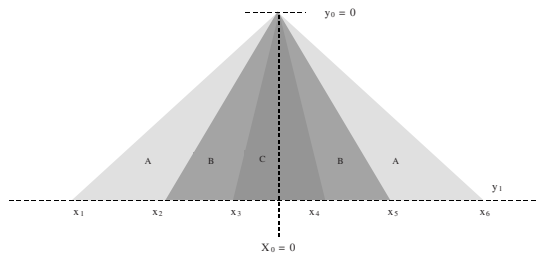


Fig. 3. Intervals in "Attract Situation"

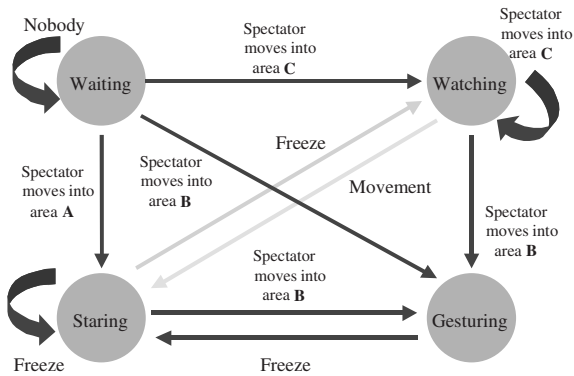


Fig. 4. State diagram in "Attract Situation"

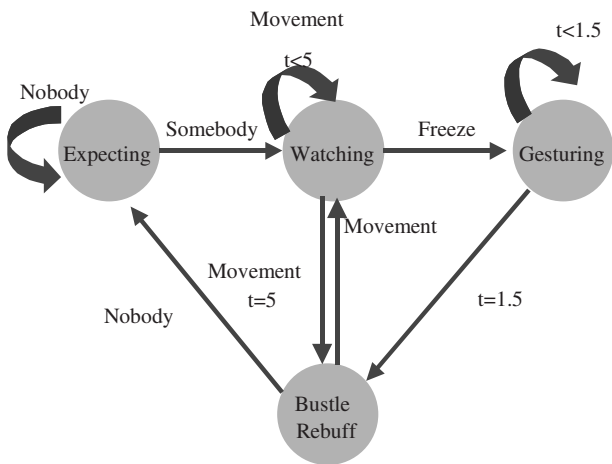


Fig. 5. State diagram in "Rebuff Situation"

According to the state diagram in the attract situation (Figure 4), the Old Man waits reading his newspaper until he perceives the presence of a spectator. Then, if the person is in area A, the Old Man looks at the spectator, if the person is in area B, the application issues gestures of attraction, and if the person is in area C, the Old

Man watches where the spectator goes. If the Old Man is watching the spectator and the spectator stops, the Old Man looks at him for a while. However, if he moves again, the Old Man will start to watch where he goes. If the Old Man is watching where the spectator is going and the spectator moves into area B, the application issues gestures of attraction. If the program issues gestures of attraction and the person stops, the Old Man will look at the spectator for a while.

As for the rebuff situation, the Old Man reacts according to the state diagram showed at the Figure 5. He waits reading his newspaper until he perceives the presence of a spectator. Then, the Old Man watches where the spectator is going for a while, after which the program issues a gesture of rejection. If the Old Man is watching the spectator and the spectator stops, the Old Man will look at him for a while. However, if the spectator stays still, the application will issue another gesture of rebuff. If the spectator moves while the program is in this state, the Old Man will again watch where the spectator goes until the spectator moves off.

2 Conclusions

In this paper we have presented an experiment, called the “Old Man Experiment” carried out at the Universidad Politécnica de Madrid. This experiment pursued three objectives: to study the acceptance or rejection of newcomers, to study the field of “mixed reality” in more depth and to investigate perception. This experiment was conducted as part of the Amusement Esprit Project 25197 [1,3] and it was running in parallel to another experiment, called *Run & Freeze* [2], which was also part of the Amusement project and which used the same system of perception for different purposes [4].

As a conclusion of this experiment, we realised the relevance of introducing a significant set of reactions to newcomers, how important the lateral area of perception is, and how user intentions and the Old Man’s reactions are different in different areas. The “Old Man” was a very simple agent furnished with a simple model of perception - the camera’s focus- and endowed with a very simple behaviour.

References

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