

# Acted affordances as an assessment of presence in virtual environment

Jean-Claude Lepecq, Lionel Bringoux, Jean-Marie Pergandi, Thelma Coyle & Daniel Mestre

## Introduction

This study aims at assessing behaviorally the subjective sensation of presence inside a virtual environment (VE).

The subject's task was to walk through a virtual aperture of variable width.

In the case of presence, the subject's body orientation, while walking, was expected to be adapted to the width of the aperture.

## Method

19 male subjects participated.

Each subject (Fig 1) was equipped with stereo glasses and with reflective markers on the glasses and on both shoulders.

The VE was displayed inside an immersive room (Fig 2).

The VE (Fig 3) was composed of two adjoining rooms connected via a sliding door. This door formed an aperture whose width was variable.

The subject was instructed to walk forward from the starting room (green disk) straight to the arrival room (blue disk), and hence had to walk through the virtual aperture (Fig 4).

The aperture could be one of 9 widths : 40, 45, 50, 55, 60, 65, 70, 75, 80 cm. For each trial, the maximal shoulder rotation was calculated while the subjects walked through the virtual aperture.



Fig 1. The subject's equipment.

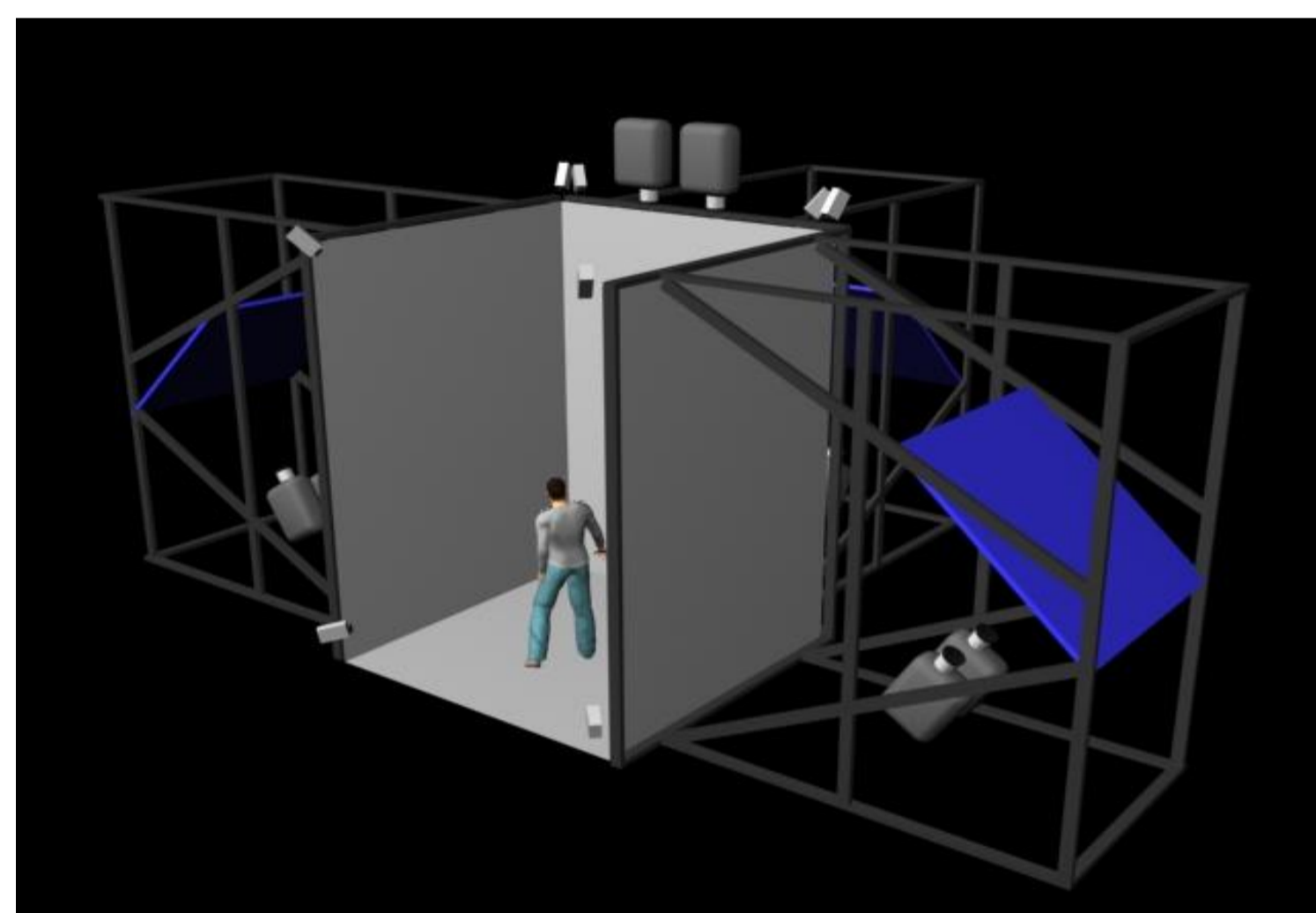


Fig 2. The immersive room



Fig 3. The virtual room and the sliding door.



Fig 4. Walking through the virtual aperture.

## Results

The population was divided into two subsets .

- 17 subjects adapted their body orientation to the aperture width (Fig. 5 A).
- 2 subjects did not rotate the shoulders while walking through the aperture (Fig 5 B).

Two groups with "small" and "large" shoulder width were selected.

The "large subjects" tended to have greater angles of shoulder rotation than the "small subjects" (Fig 6 A).

This difference disappeared when the same shoulder rotation data are replotted against the "Aperture width / Shoulder width" ratio (Fig 6 B).

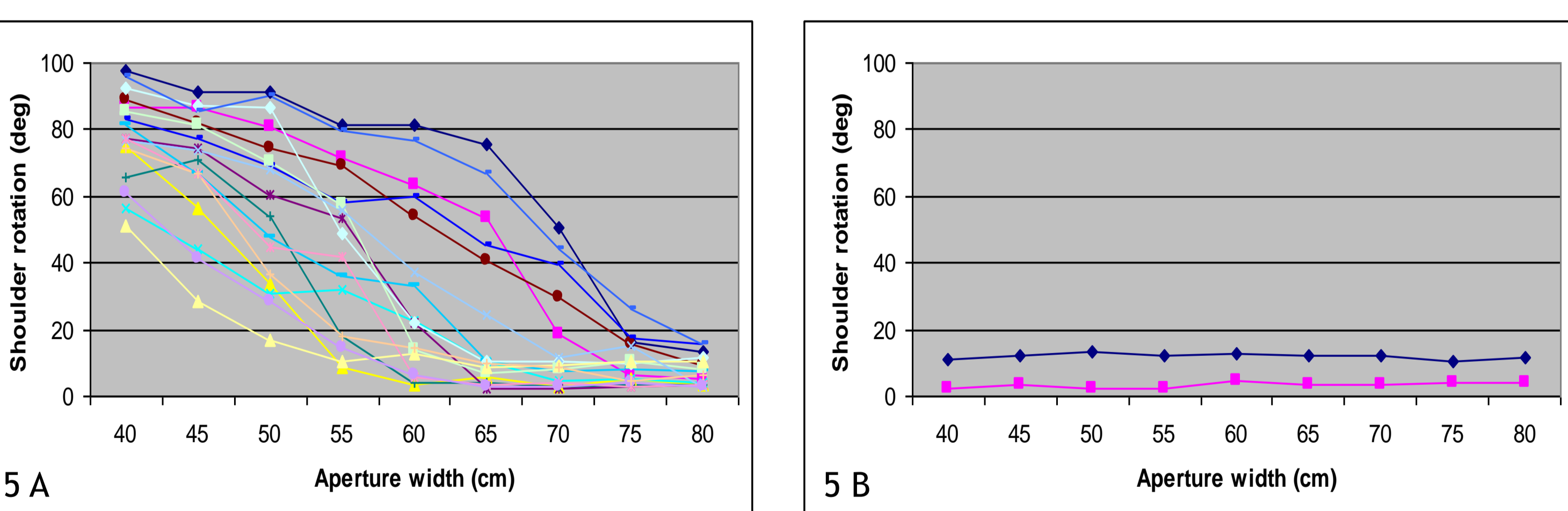


Fig 5. Individual max angle of shoulder rotation as a function of aperture width.

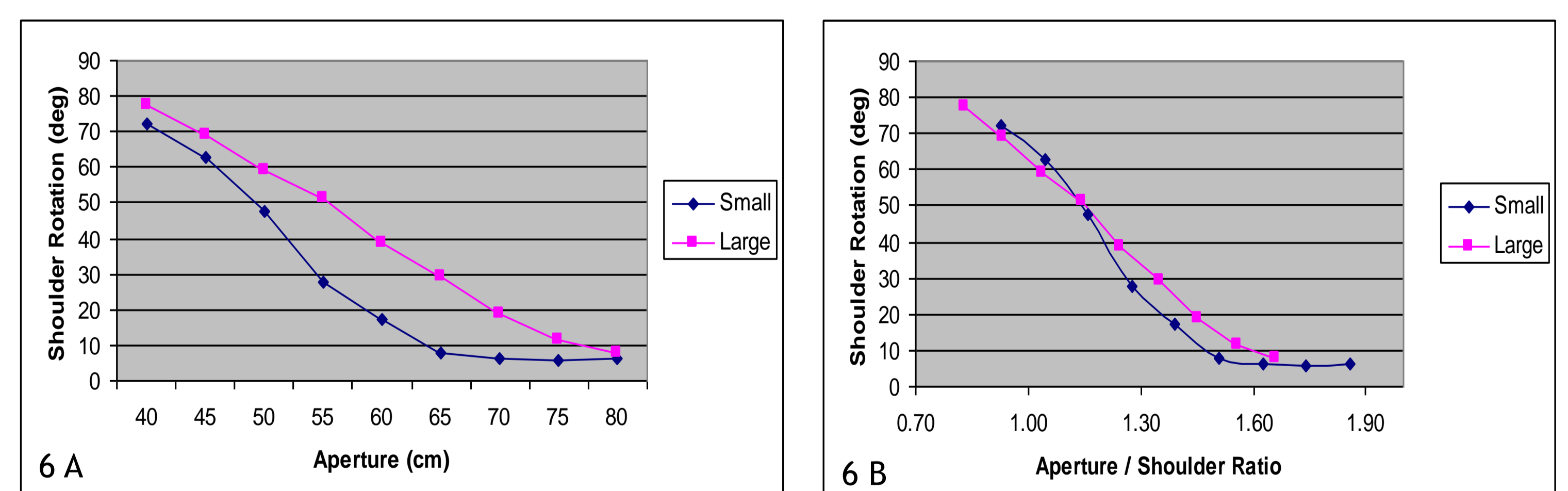


Fig 6. Max angle of shoulder rotation for "large" and "small" subjects.

## Conclusion

The locomotor postural patterns of subjects having to walk through a virtual aperture strongly resemble those of subjects who have to walk through a real aperture.

Here, presence is assessed by a particular sensorimotor adjustment which relates the size of a body feature (shoulder width) to the size of some characteristics in the virtual environment (width of the door).

Eliciting "acted affordances" in virtual reality research could contribute to behaviourally assess presence in virtual environments .