# Guide to the Redirected Walking Threshold Study

## Introduction

# Redirected Walking is defined as manipulating the mapping between real and virtual motions to allow users of virtual reality to explore large virtual spaces using limited physical spaces. An open problem with redirected walking is finding a level of manipulation that is high enough to minimize the necessary physical space but small enough to avoid simulator sickness by remaining imperceptible. Previous research has found general guidelines for perception thresholds, but these guidelines are ineffective due to the wide variance of thresholds between users and advances in head mounted displays. Therefore, our objective is to create a process that will quickly and accurately calibrate the perception threshold for individual users.

# To accomplish this, users will be placed in a virtual room where they will turn to look at a painting. As they turn, a scaling of virtual rotation relative to the real world will be applied. The level of scaling is called Rotation Gain. Two mathematical methods typically used to find the perceptibility thresholds for hearing sounds will be used to assess each user’s perceptibility threshold for Rotation Gain. The two methods, an adaptive staircase method and the “Best PEST” will be compared for efficiency.

# Results of this study will refine current redirected walking techniques, help create more immersive experiences in virtual reality for training, games, and other applications as well as help diminish the physical restrictions with current certain environments.

## Experiment procedure:

1. Have the participant review and sign the informed consent form.
2. Administer the pre-experience questionnaires: the Simulator Sickness Questionnaire (SSQ) and the Visualization of Views test.
3. Play the scene *Assets -> Scenes -> Training Scene -> Play.*
4. When participate indicates that they are ready to move forward, stop the training scene and open the scene *Assets -> Scenes ->* *Redirected Walking Scene*.
5. In the Inspector, choose a **unique** participant ID and enter it into the variable *Redirected User -> Rotation Tests -> User ID.*
6. Check which estimation method the user will start with according to the counterbalancing measures and use the inspector to select the right option in *Reticule -> Button Manager -> EXPERIMENT*
7. Play the scene.
8. When participant indicates verbally that they are done with the verification scene, stop the game and give the participant the SSQ and a break.
9. Repeat steps 4-7 using the other estimation method from *Reticule -> Button manager -> EXPERIMENT*
10. Check to make sure there are three .txt files in the “*Assets”* folder that are titled “*[userID]\_test.txt” ,* “*[userID]\_Results.txt”,* and “*[userID]\_finalResults.txt”.*