
# Human Behavior Experiment in Virtual Reality

## Complex Computer Rendering Methods In Real-time


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# Human Behavior Experiments In Cognitive Science

- Aim to investigate various aspects of human cognition, including:
  - perception,
  - attention,
  - memory,
  - decision-making,
  - problem-solving,
  - and language processing.

- To understand the underlying cognitive processes that govern human behavior and how they influence our interactions with the world.

# Why Using VR For These Experiments

**Ecological Validity**: VR provides a highly immersive and realistic simulation of real-world environments.

**Control and Manipulation**: VR environments offer researchers precise control over experimental variables and avoid unnecessary factors.

**Experimental Flexibility**: VR provides flexibility in designing experiments that would be challenging or ethically sensitive to conduct in the real world.

**Standardized and Reproducible Procedures**: VR allows researchers to create standardized experimental procedures that can be replicated across participants and research sites.

**Behavioral and Physiological Measurements**: VR technology can integrate various sensors and measurement devices to capture participants' behavioral and physiological responses in real-time.

**Participant Engagement and Immersion**: VR provides a compelling and engaging experience for participants, leading to increased motivation and involvement in the experiment.

# Examples Of Papers Using VR To Do Human Behavior Experiments

- *Pan, X., Gillies, M., Barker, C., Clark, D. M., & Slater, M. (2012). Socially anxious and confident men interact with a forward virtual woman: An experimental study. PLoS ONE, 7(10), e32931.*

- *Peck, T. C., Seinfeld, S., Aglioti, S. M., & Slater, M. (2013). Putting yourself in the skin of a black avatar reduces implicit racial bias. Consciousness and Cognition, 22(3), 779-787.*

- *Felnhofer, A., Kothgassner, O. D., Hetterle, T., Beutl, L., Hlavacs, H., & Kryspin-Exner, I. (2014). Is virtual reality made for men only? Exploring gender differences in the sense of presence. Interactive Technology and Smart Education, 11(3), 238-252.*

- *Silva, W. S., Aravind, G., Sangani, S., & Lamontagne, A. (2018). Healthy young adults implement distinctive avoidance strategies while walking and circumventing virtual human vs. non-human obstacles in a virtual environment. Gait & posture, 61, 294-300.*

# Chosen Paper Introduction

- **Purpose**: To examine how healthy young adults utilize avoidance strategies when navigating virtual environments and encountering obstacles that are either virtual humans or non-human objects.

Gait & Posture 61 (2018) 294–300

Contents lists available at ScienceDirect

Gait & Posture

journal homepage: www.elsevier.com/locate/gaitpost

## Healthy young adults implement distinctive avoidance strategies while walking and circumventing virtual human vs. non-human obstacles in a virtual environment

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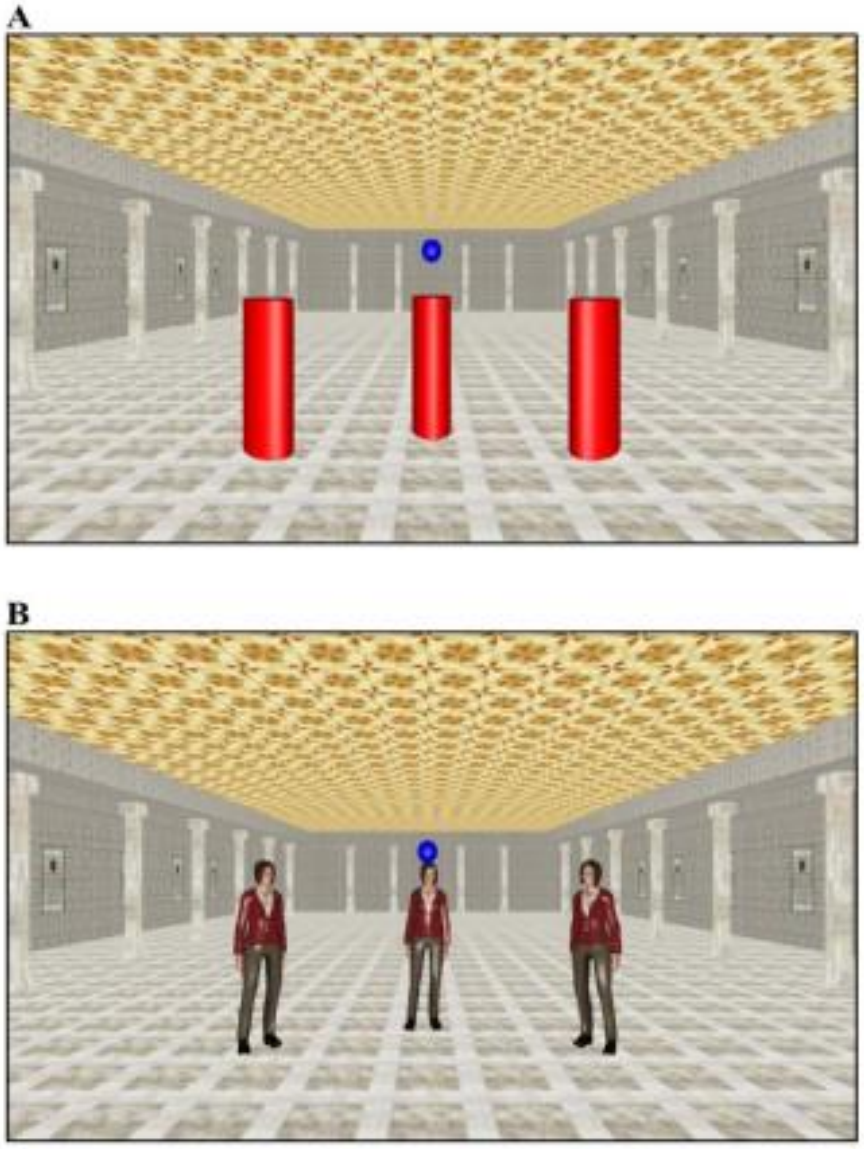
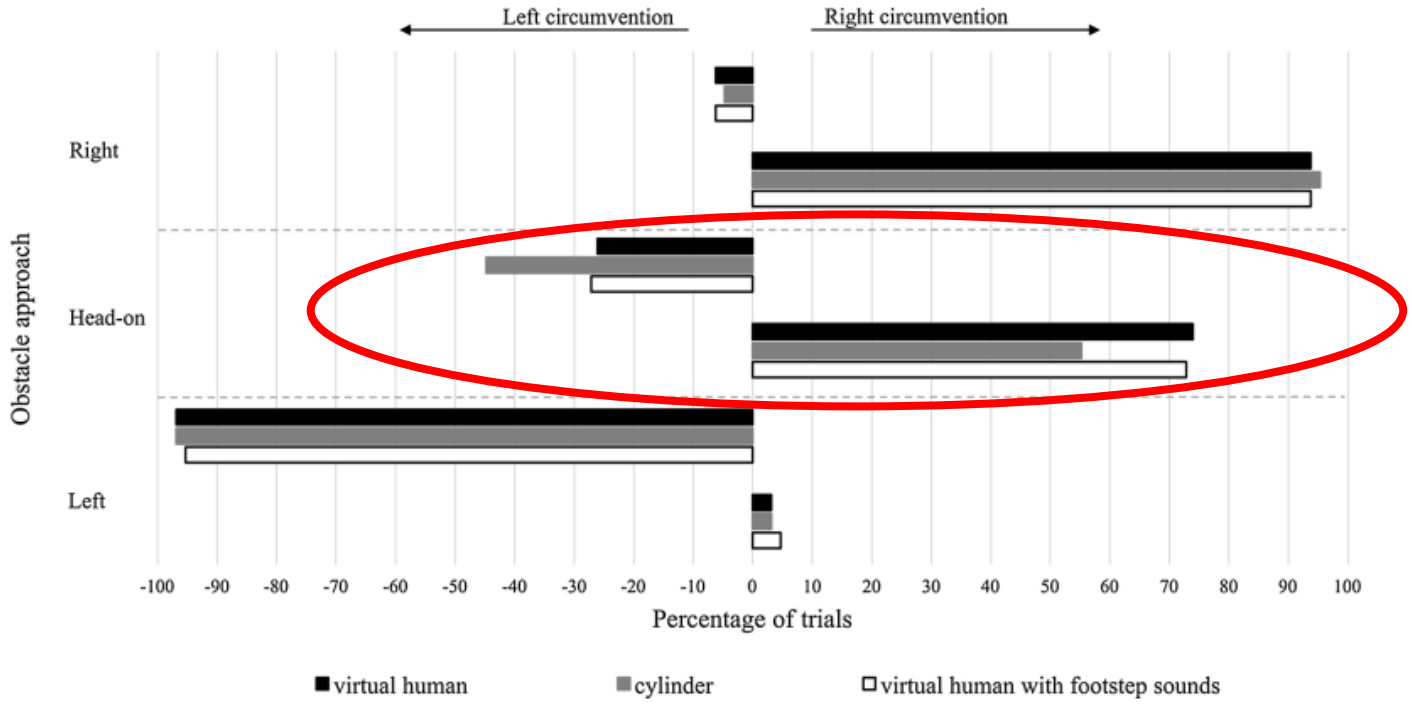
# Paper Experiments

- The researchers conducted an experiment using VR technology.
- After participants walked 0.5m, one of the 3 obstacles (left, head-on, right) randomly started approaching the participants, while the other two obstacles moved away.
- Participants were instructed to walk at comfortable speed towards the blue point and to avoid a collision with the obstacles.
- Obstacle subjects:
  - Cylinder,
  - Virtual human with footstep sounds,
  - Virtual human without footstep sounds.



# Paper Results

- **Right Obstacles**: The participants chose mostly right circumvention for all kinds of the obstacles.
- **Left Obstacles**: The participants chose mostly left circumvention for all kinds of the obstacles.
- **Head-on Obstacles**:
  - **Cylinder**: Around 50/50 for right/left circumvention.
  - **Virtual Human** with and without footstep sounds: Around 70/30 for right/left circumvention.



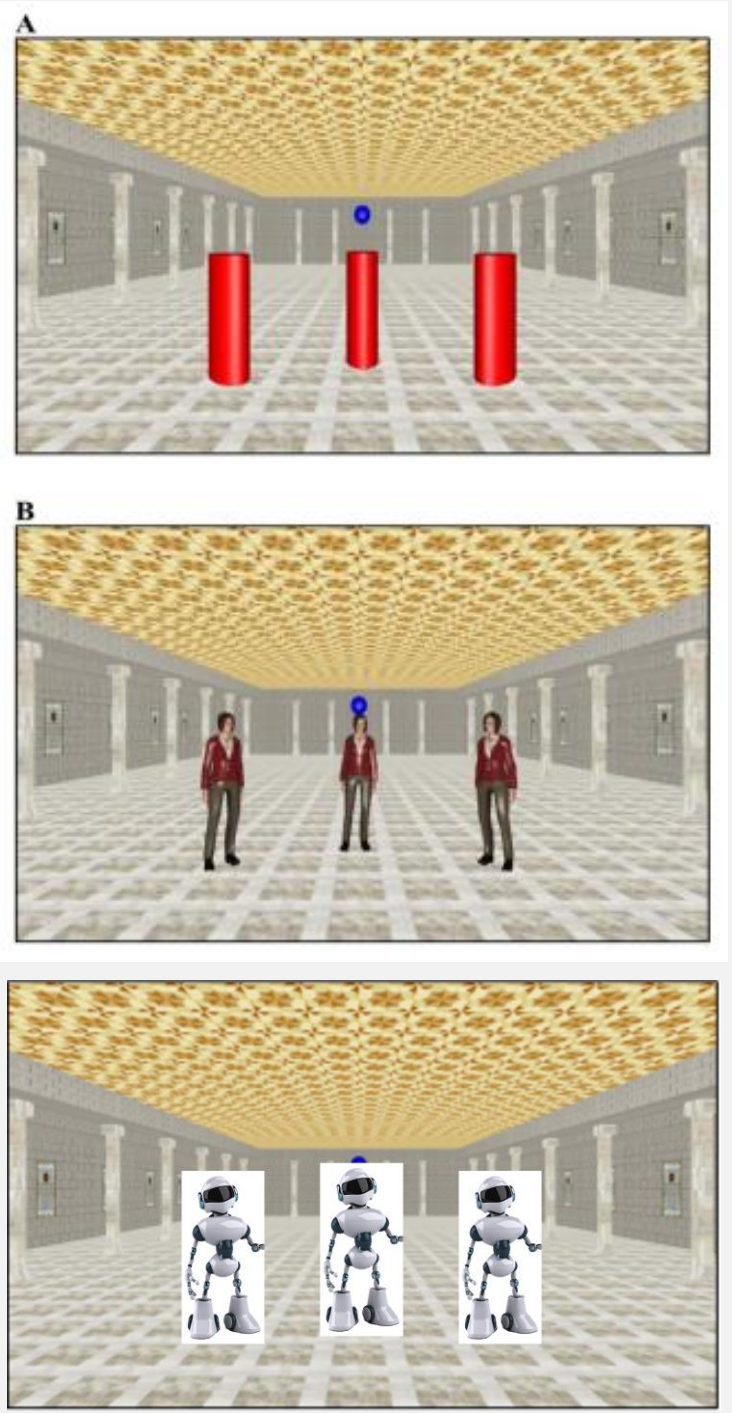
# Research Question

Robot obstacles are human obstacles or non-human obstacles?

# Our Experiments

- Same procedure with previous study

- Obstacle Subjects:
  - Cylinder,
  - Virtual human (without footstep sounds),
  - **Robot.**



# Project Targets

- **Step 1**: Survey programming environments (Unity, WebXR, etc.)
- **Step 2**: Store and extract data from cloud storage (Google Drive, OneDrive, etc.)
- **Step 3**: Create a human behavior experiment in VR environment.
- **Step 4:** Collect data from participants.
- **Step 5:** Analyze the collected data to see if there are any trends in circumvention among objects.

**Conclusion**: *With a VR headset and a network connection at our disposal, anyone can complete the experiment.*

# Thank you for listening