Self-Illusion: A Study on Cognition of Role-Playing in Immersive Virtual Environments

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Roadmap

1. Background
2. Introduction
3. Contributions
4. Experiment & Results
5. Discussion & Conclusion

1.0 Background

- Virtual Reality

- Psychology / Cognition
  - Self-Illusion

- What’s the weakest point in security?
  - Human, i.e. Social Engineering

2.0 Introduction

Presence in VR is a fundamental issue

- How the world is perceived
- How stimuli respond

Goal: Measuring and manipulating the realism or coherence of immersive VE

Two Components Found to Contribute to Realism:

- place illusion (PI) - Place Perception
- plausibility illusion (Psi) - What's apparently happening compared to what is really happening

Question: Can totally new experience can still be achieved with realistic responses when role-playing….do humans perceive themselves as themselves or as their role in Virtual Environments?

3.0 Contributions

1. Propose Self-illusion, an illusion of self-concept that may occur while an individual plays a role in the VEs
    - Believing self to be the actual role in VEs while knowing for sure it's not their role in real life
2. Novel non-human role and view, we devise a mixed-design experiment with different levels of manipulation to explore the mechanism involved in human self-illusion (the human is cat)
    - Users mimic cat behavior with associated stimuli in real life
3. Validate the existence of self-illusion with measurement. Behavior data shows that self-illusion influences the experience in a VE.
4. First systematic evaluation of self-illusion in the field of virtual reality

4.0 Experimentation

Rationale, why cat?

1. Behavior patterns should be known and not created, (monster, alien, etc)
    - Human roles discarded due to needing the behavior to be truly distinct from normal behavior patterns.
    - Most people know what a cat does, so there is no deviation in data analyzation. While some users may immediate a snake or frog incorrectly or use strange patterns.

4.0 Experimentation

Equipment:

HTC Vive (Wireless)

Motion Capture, Fingerless glove

- Allow for capturing motion of fingers, but also allows fingers to be exposed to the physical world
- Cat avatar can be controlled

4.0 Experimentation

~77 Student Participants (18-28)

- All were not told about the experiment beforehand
  - Only told to act like a cat before starting

2 of 4 Different Levels of “Realism” were applied

1. High quality graphics
2. Low quality graphics
3. No Physical Object Interaction
4. Physical Object Interaction

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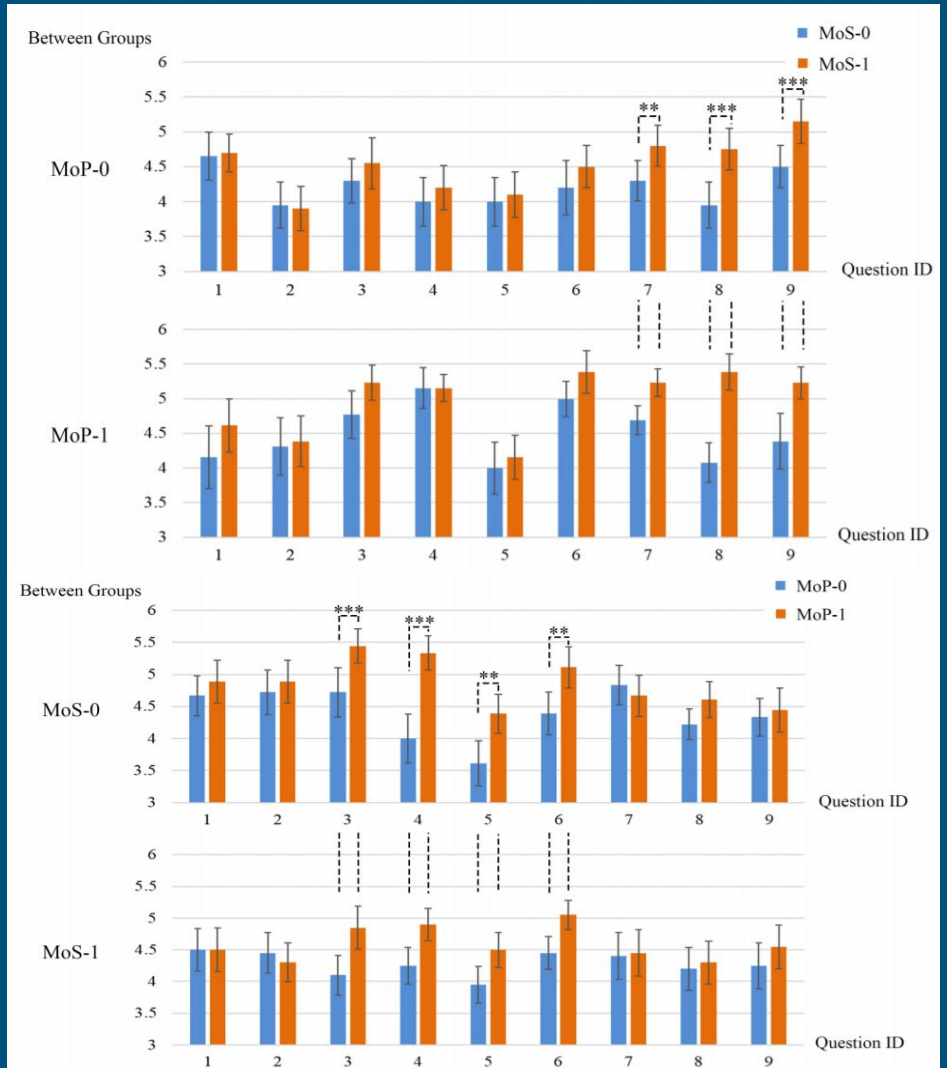
Event & Appearance	Manipulation	Level 0	Level 1
Virtual scenario	MoP	Lower realistic rendering	Higher realistic rendering
Avatar	MoS	No avatar & Cannot see one self	Personalized avatar & Can self's avatar
Interaction with tangible proxy through fingers	MoP	No scratch appeared in VE & Haptic perception not correspond to VR	Scratch appeared in VE & perception corresponds to V
Task-oriented playing	MoS	Consistent with tutorial in video	Inconsistent with tutorial

4.0 Results

Questionnaire and Behavioral Data were collected

Red - Added Realism
Blue - Reduced Realism



4.0 Results

	a	*b*	*c*	*d*	*e*	*IR*	*CR*
MoP-0 × MoS-0	9	19	3	1	7	35	4
MoP-1 × MoS-0	3	25	4	2	3	31	6
MoP-0 × MoS-1	3	17	12	9	0	20	21
MoP-1 × MoS-1	1	10	18	9	3	14	27

Behaviors:

a. Aggression (hitting / attacking)
b. Petting
c. Intimacy (licking etc)
d. Mimicking other cats
e. Purposeless (doing nothing)

5.0 Results

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IR - Incoherent (Human-like Behavior) a - b - e
CR - Coherent (Cat - behavior)

Chi-squared test was done showing significant difference between the two groups

- Pearson χ 2 (3) = 37.139, $p < .001$

Researcher note some participants continued cat behavior unconsciously during questionnaire such as scratching the table

5.0 Discussion & Conclusion

- The brain is influenced by many objective and subjective factors and this paper is only a small subset of what is possible
  - Researchers encourage others to incorporate greater factors of manipulation
    - Analyze brain region, EEG, etc

- With VR still in its infancy for development and adoption (although gaining traction exponentially and technologically)
  - Disconnecting oneself from real world and virtual world will continue to grow more difficult and indecipherable

- This will provide growth to a plethora of security vulnerabilities and oversights as it allows for easy manipulation of user behaviors at an unconscious level