

From Class Bots to AI-vatars: Embracing AI-Infused Pedagogy in Non-Technical Undergraduate Classes to Augment Student Learning and AI Literacy

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Overview

- Long Background
 - Avatars — Research & Theory
 - Virtual Reality for Teaching
- PedAlgogies
 - Philosophy
 - LLMs
 - Instructor-customized
 - Student-personalized
 - Early Research Insights

About Me



Stanford
(04/05)



(2012)



(2022)



Science,
Technology,
& Society



Media
Psychology



Computer
-Mediated
Communication

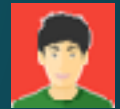
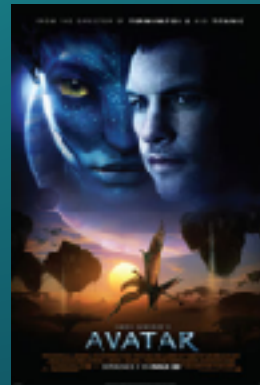
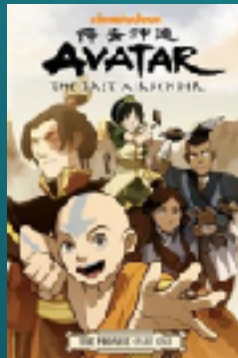


Human-
Computer Interaction



'Avatar'

- From Hinduism, 'descent'; a god to earthly form
- Popularized in fiction and video games
- Defined:
 - A mediated self-representation that an intelligent user controls during dynamic interactions (Ratan & Pandita, 2024)
- Not necessarily digital, visual, realistic, or anthropomorphic.



Why is avatar use so powerful?

Social Cognitive Theory (Bandura)

- Enactive Experience
 - Doing something
 - Most impactful on learning/behavior
- Vicarious Experience
 - Observing something being done
 - Less impactful
- Mediated Enactive Experience (Peng, 2008)
 - Doing something through an avatar
 - MORE impactful than vicarious, though not as impactful as enactive



The Proteus Effect (my one true theoretical love)

- People act in ways that are consistent with avatar characteristics
 - (Yee & Bailenson, 2007)
- Variety of domains
 - Avatar height → Aggressive Negotiating
 - Attractiveness → Social Confidence
 - Older → More conservative investing
 - Healthier → More exercise/healthy eating
 - Inventor clothing → Creativity
- First Meta-analysis: $r=.24$ (relatively strong), $K = 45$ (Ratan et al. 2020)
- Second Meta-analysis: VR > PC $r=.29$ (even stronger), $K = 56$ (Beyea et al. 2022)



Proteus Effect, Gender & STEM

Study 1: Customize M or F avatar, play Wii *SwordPlay*, math task

- If female avatar, worse math performance (Ratan & Sah, 2015)

$t(64) = 3.64, p < .01, \text{Cohen's } D = .91$



Study 2: Self or game-story avatar, threat or sexist threat, play *Destiny* (Ratan et al., 2020)

- STEM+Gender Stereotype endorsement *reduced* by
 - Threat + game-story avatar (avatar as buffer from identity)
 - Sexist Threat + self avatar (stereotype reactance)

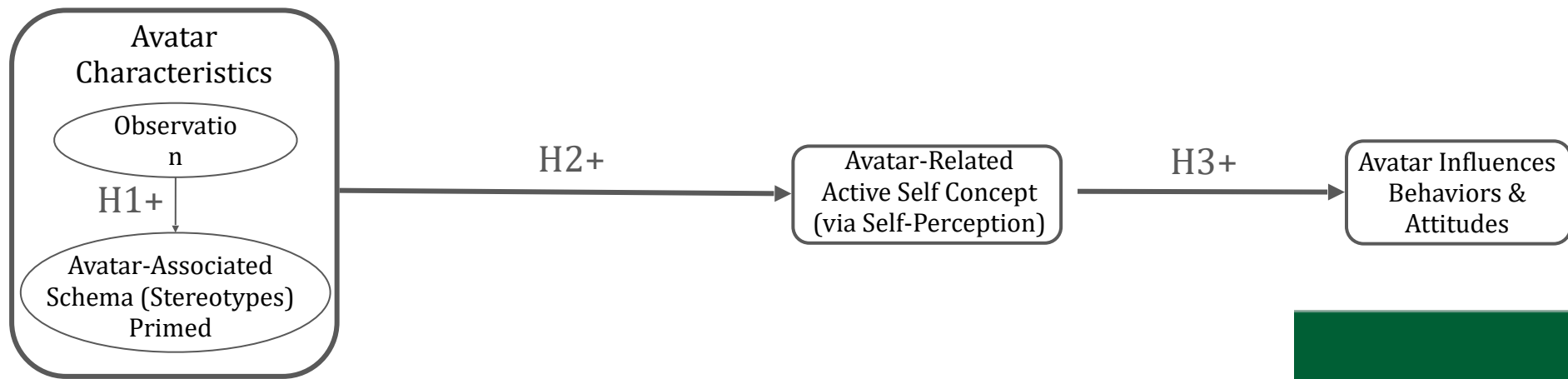
$F(1, 118) = 5.63, p < .05, \eta^2 = .06$ (full model with threat interaction)



Study 3: STEM game, use/customize STEM/non-STEM avatar (Cherchiglis & Ratan, 2019)

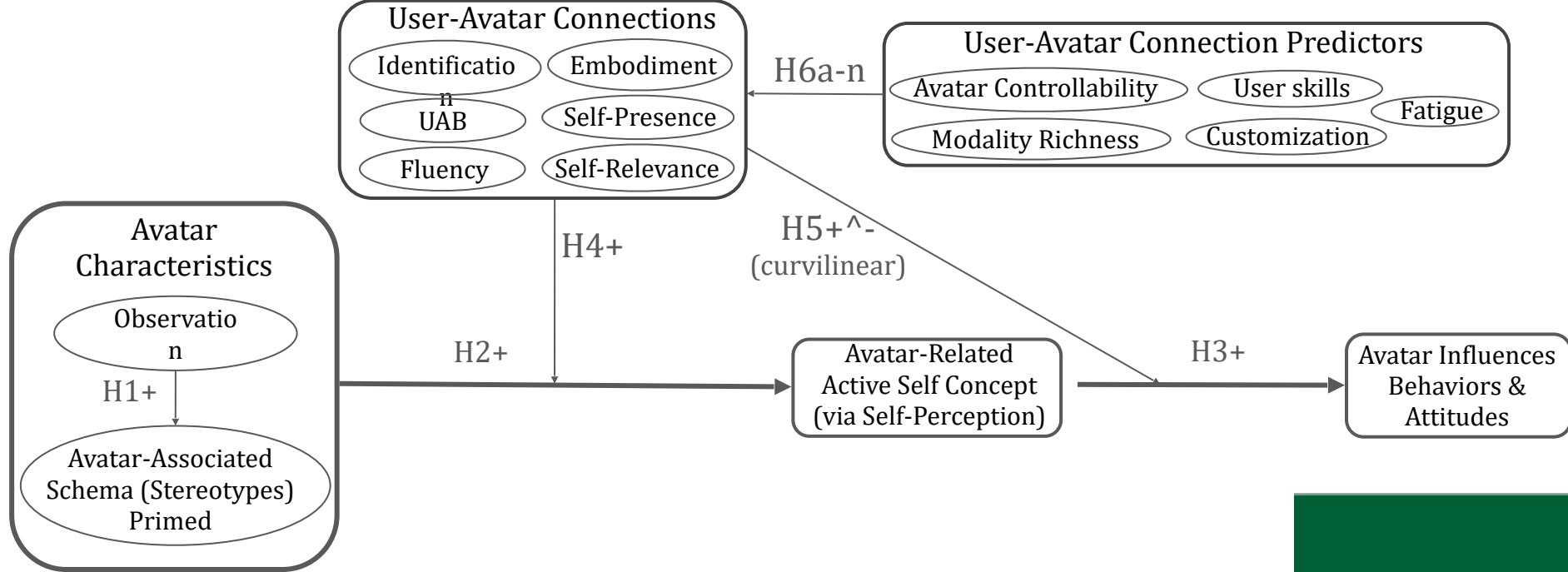
- Science-y avatars $\square$ STEM-learning self-efficacy & Interest (boys)
 $F(1,24) = 16.11, p < .01, \eta^2 = .49; F(1,24) = 13.91, p < .01, \eta^2 = .45$
- Avatar identification $\square$ STEM-learning self-efficacy & Interest (boys)
 $F(1,24) = 6.46, p = .02, \eta^2 = .28$ (boys); $F(1,24) = 8.98, p < .01, \eta^2 = .35$
- Avatar embodiment $\square$ STEM-learning self-efficacy (girls)

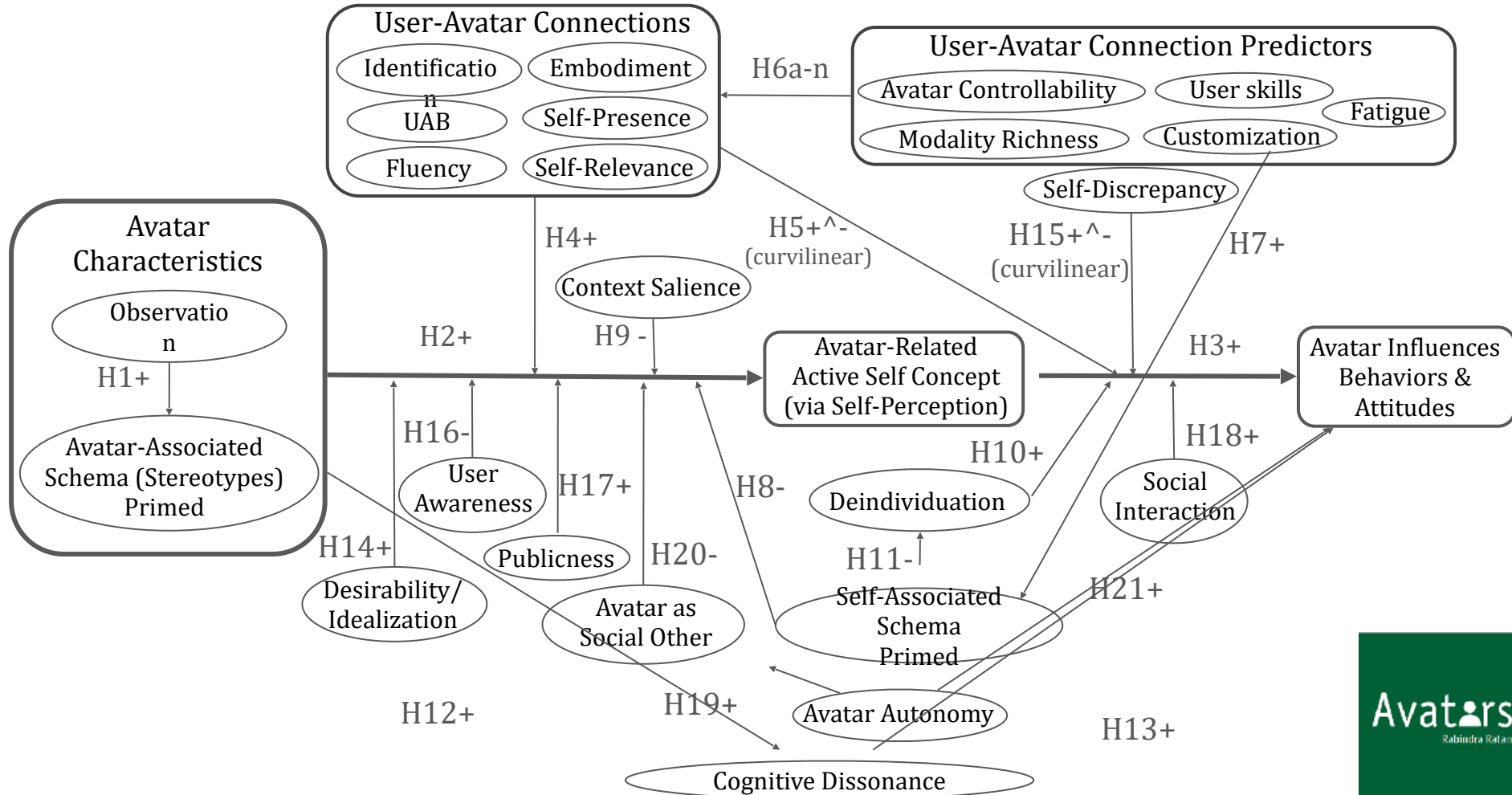




Model of Avatar Effects
(detailed in forthcoming book,
Avatars: What they are and why they matter)







Teaching in VR

All my MSU classes in VR since 2022

- Live in CA, Bay Area (remote work agreement)
- *Understanding Virtual Reality; Avatar Psychology*
- 25-40 students per class

120 VR headsets in lab

- ~40 Quest 3s, ~80 Quest 2s

Students borrow for the term

- & usually return

Lunch bags for storage

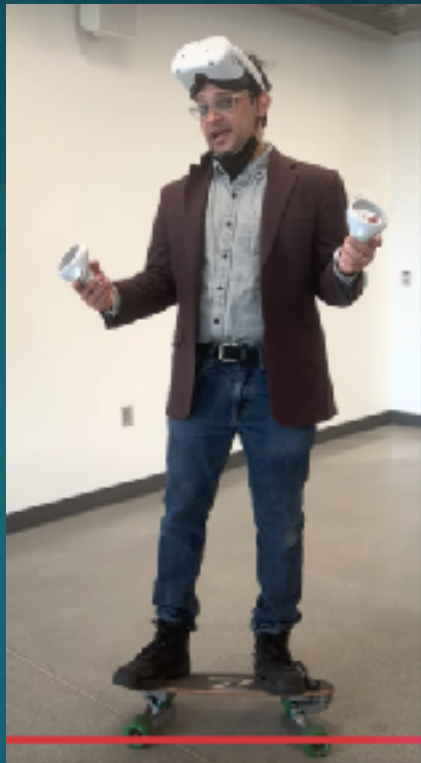
- Sufficient padding
- Increases return rate
- Cheap!



My fundamental conclusion

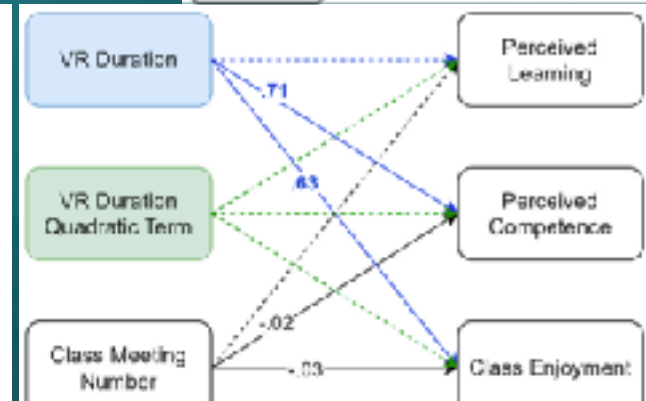
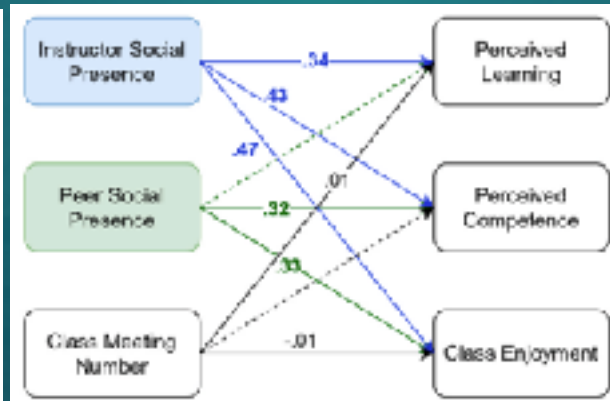
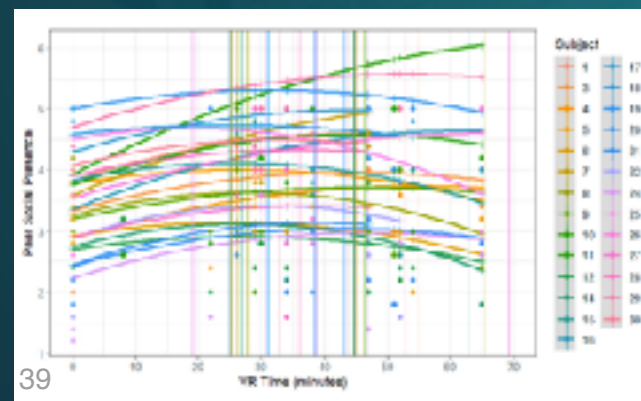
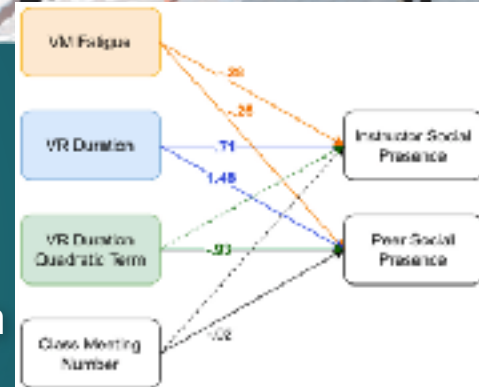
With VR, you can teach...

- (m)any thing(s)
 - Most subjects
- Better—by augmenting...
 - Engagement
 - Presence: spatial, social, self
 - Retention
 - Enjoyment
- Assuming you design to
 - Anticipate challenges (literacy, accessibility, audio, ...)
 - Emphasize effective pedagogy (active discussion)



VR class Research

- Recent Study ([Ratan et al., 2025. Time Matters in VR...](#))
 - 15-week class, $N = 30$, ~12 surveys per student = 377 observations.
- More time in VR (vs. Zoom) →
 - More instructor & peer social presence
 - more Class enjoyment & perceived competence
 - Meeting Fatigue
 - less i/p social presence, enjoyment, perceived learning & competence
- Curvilinear relationships
 - VR Time → Peer social presence & perceived competence peak ~45 mins, but large variance
 - Individual peaks from 20 to 290 minutes
- Takeaway: Aim for ~45 mins in VR, but allow switching to flatscreen



From VR to AI Pedagogies

My Philosophy of AI in Education

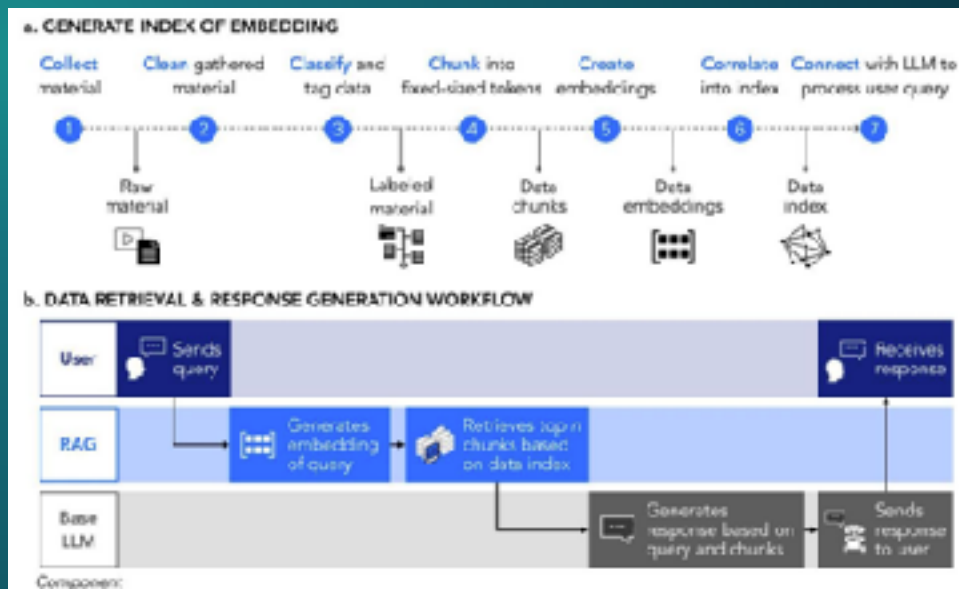
- Experiment w AI in classrooms to align technology benefits with course goals
 - Akin to my work avatars & VR
- Embrace AI as a *means*, avoid it as an *end*
 - AI literacy should help build field expertise
- Use AI to augment engagement via:
 - Social Presence/Active Learning (e.g., class discussions)
 - Save passive learning for HAI (e.g., flipped classrooms)
 - Self-presence (e.g., feeling personally connected to class)
- Instructor-Customized vs Student Customized LLMs
 - Former for social presence, latter for self-presence

Instructor-customized LLMs: Recent Implementations & Research

1. VHIL-E Study
 - a. Single class assignment
2. Classbot Study
 - a. LLM activity woven throughout

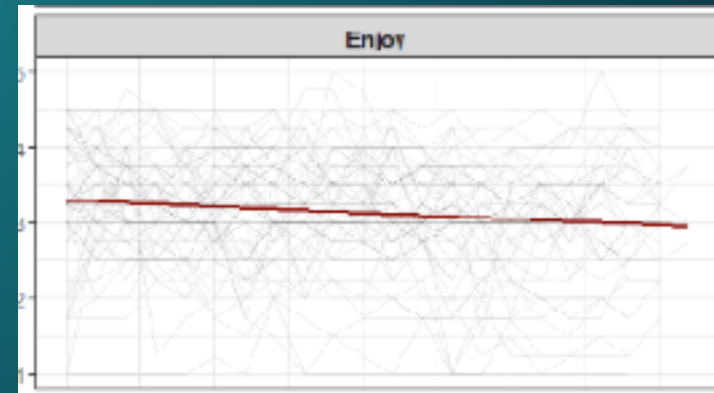
1) VHIL-E

- An Explication and Classroom Field Study of the Virtual Human Interaction Lab's Expert (VHIL-E)
 - Bailenson, J., You, J., Markowitz, D., Petersen, G., Ratan, R., Santoso, M., & Wang, P. (2026). An Explication and Classroom Field Study of the Virtual Human Interaction Lab's Expert (VHIL-E) LLM. Cyberpsychology, Behavior, and Social Networking.
- Retrieval-augmented generation (RAG) → Content (VR) Expert
- Students asked RAG or a base/RAG hybrid Qs about weekly readings
- Hallucinations sig. lower for RAG
 - 70% for Base/RAG Hybrid model
 - 31% for RAG-constrained model
- No diff found for multiple choice Qs



2) Prof Robbot Classbot

- MSU Understanding Media class (N = 150)
- Classbot conversations replaced textbook
 - Given a list of ~10 topics to learn
- Prep notes assignments
 - Briefly define all concepts, deeply explain 1
 - 2 truths and a hallucination
 - Generate image to synthesize two concepts
- Class Meeting Fodder
 - Class-prep responses on SLIDO
 - Synthesized images
- Sample finding (not yet published)
 - Students with high initial efficiency expectations experienced lower growth in responsibility for their own learning outcomes.

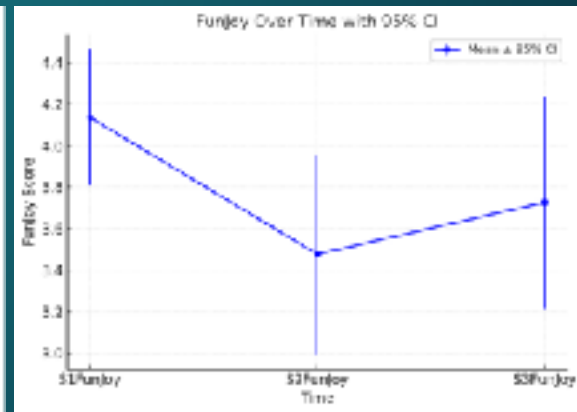
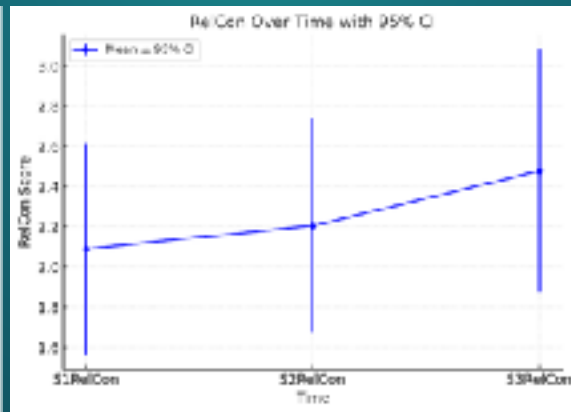
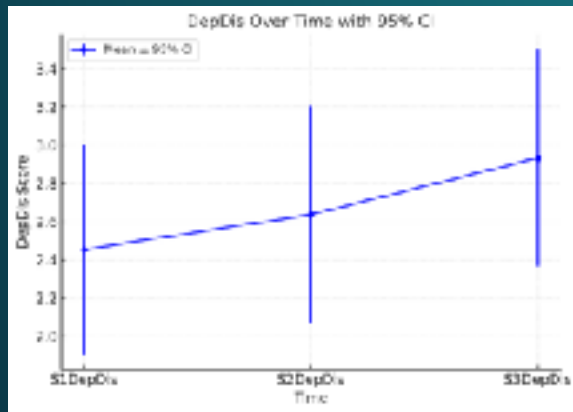


Student-customized LLMs: Recent Implementations & Research

1. Customized AI Companions
2. AI-vatar Self as personal learning assistant

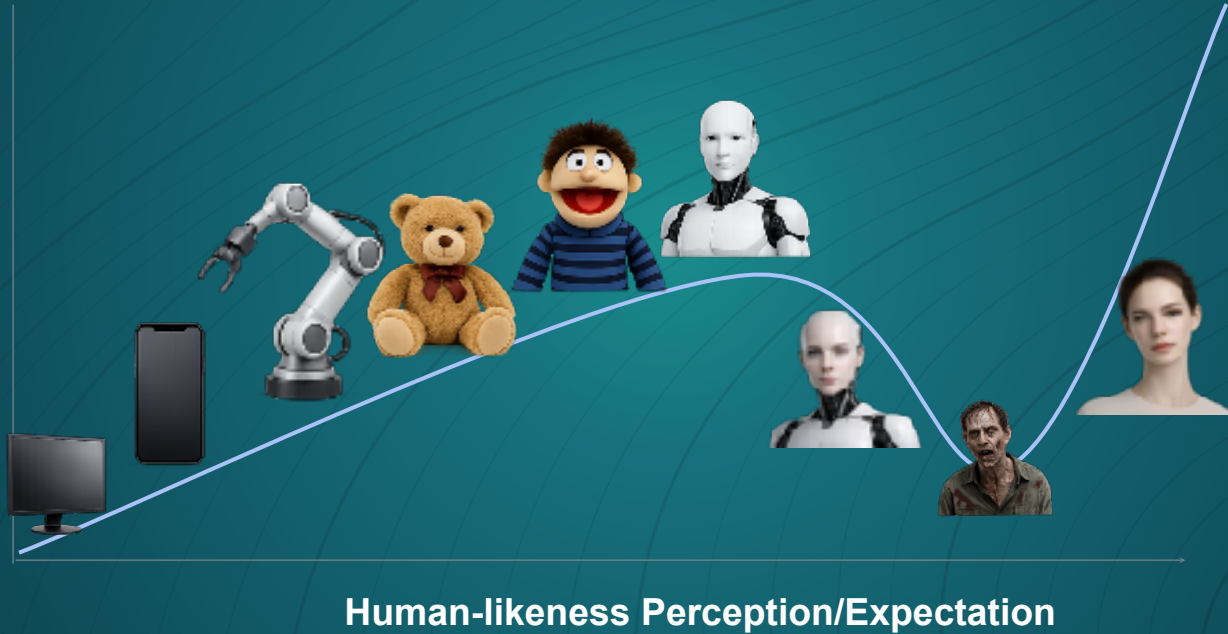
1) Customized AI Companions (LLMs)

- Stanford Black Mirror + Comm Theory class (N = 25)
- Customization: Name, personality, style, quirks, etc.
- 2-3 ~10-min conversations/week x 3 weeks
- Me-search project for class (based on reflective surveys/essay)
- “From Friend to Tool to Something Between: Perceptions of Customized AI Companions Over Three-Week Relationships” - Presenting in June with Stanford undergrad co-authors

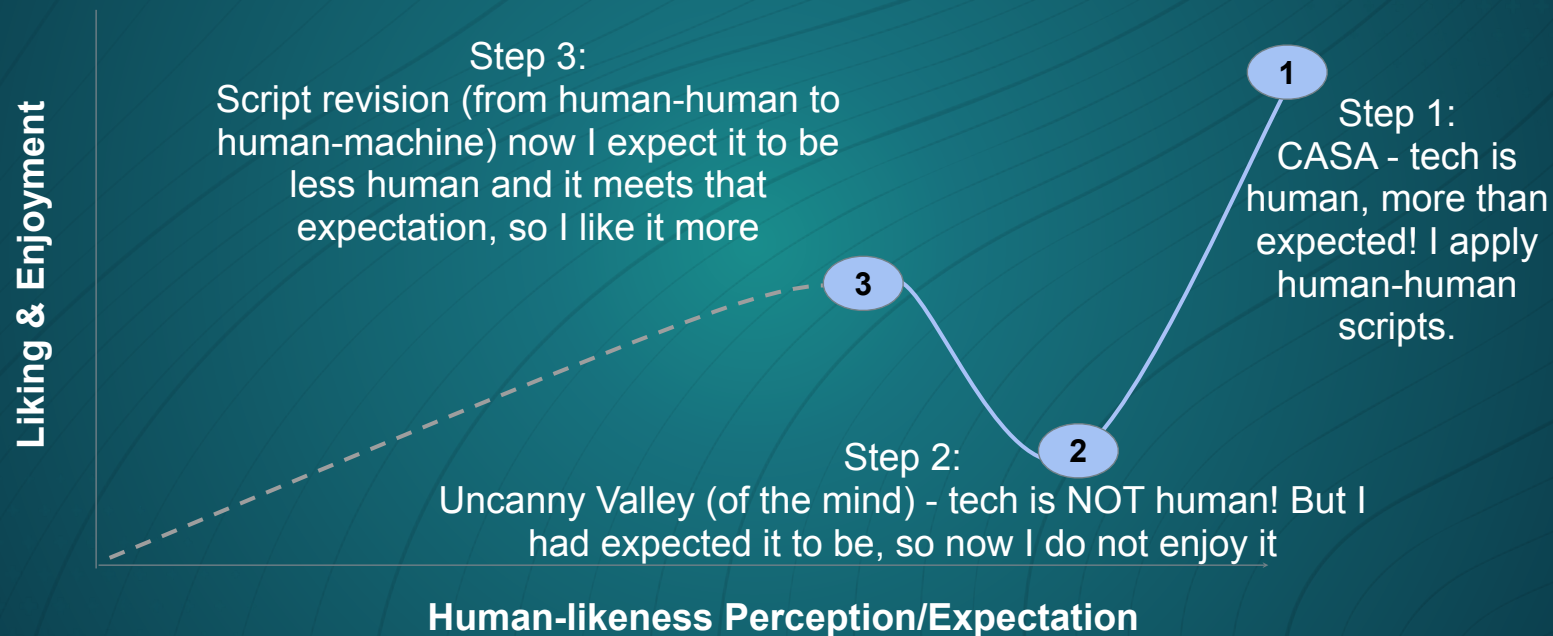


Uncanny Valley

Liking & Enjoyment



Do the study findings explain the Uncanny Valley of the (nonvisual) Mind?



2) AI-vatar Self as personal learning assistant

- MSU Avatar Psychology class (N = 34)
- Customization: “mirror self”; interests, style, etc.
- AI-vatar responds to materials/students compare
- (Learning & Reflection)
 - “I thought the AI-vatar was great at pointing out interesting aspects of each chapter that I might not have highlighted/that I might have overlooked.”
- Productive discomfort
 - “What was a little freaky though was how the AI was able to connect certain concepts in chapters to interests of mine that I gave it earlier in the semester”
 - “The fact that ChatGPT actually had my personality down to a tee is so crazy and a little amazing... it’s a little too accurate and it scared me a bit.”
- AI Literacy
 - “Rather than using it as a tool to find a loop around class, it was being used as a tool as an assignment itself.”

Constructive critique

“The downside was that some replies came off generic or off-base, highlighting AI's limits.”

Moving Beyond Meet Space in Research, Teaching, & Work

Project supported by NSF grant #2128803 on virtual meetings on the future of work

Collaborators: Maxwell Foxman, David Beyea, Alex Leith, Brian Klebig, Brian Winn

Chaeyun Lim, Dayeoun Jang, Dalton Bouzek, Alex Lover, Oskar Milik

More details: www.beyondmeet.space/



Beyond Meetspace (BMS) - Public

Created by: GELLabMeetSpace

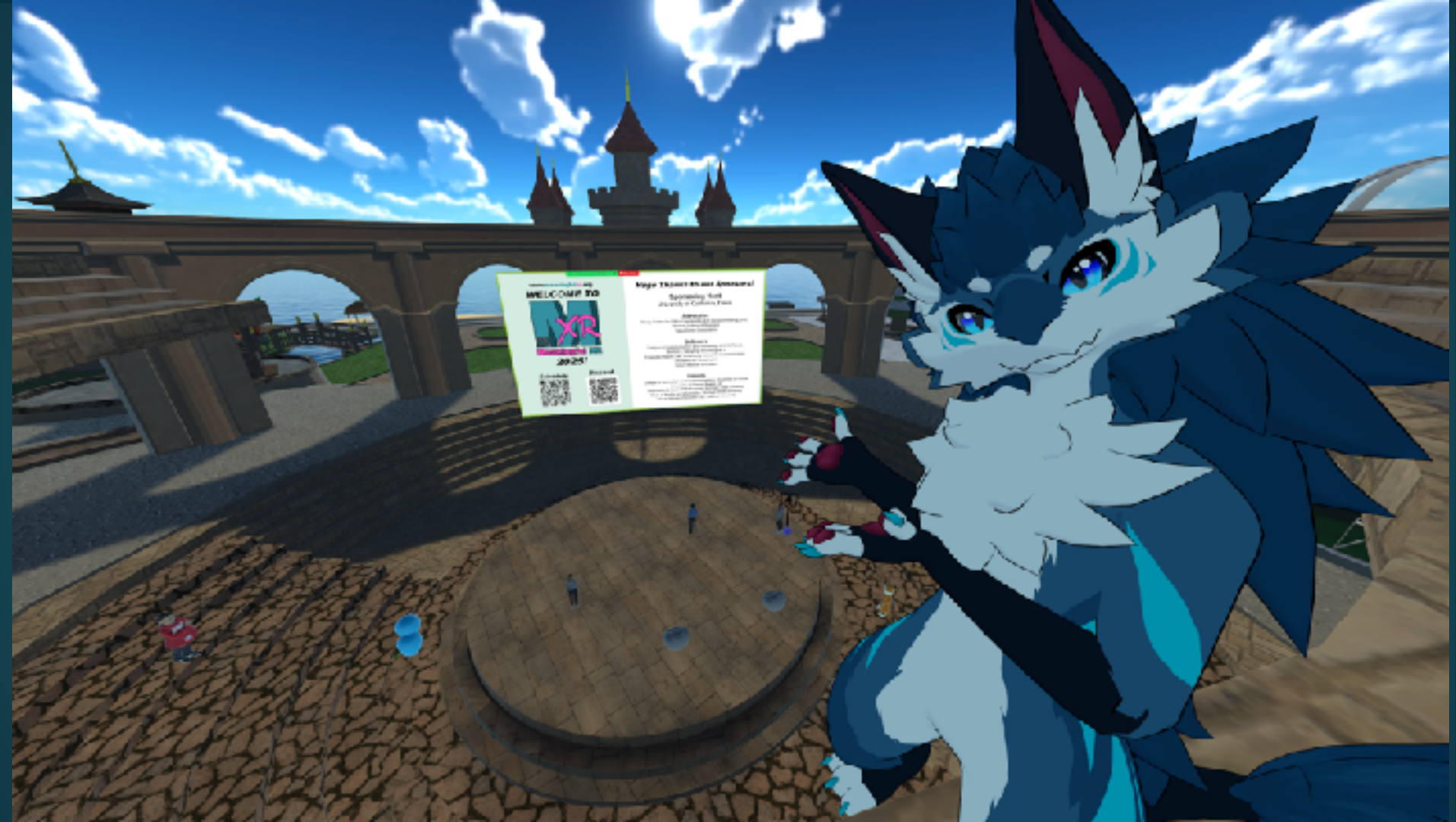
Launch
World

Invite Me

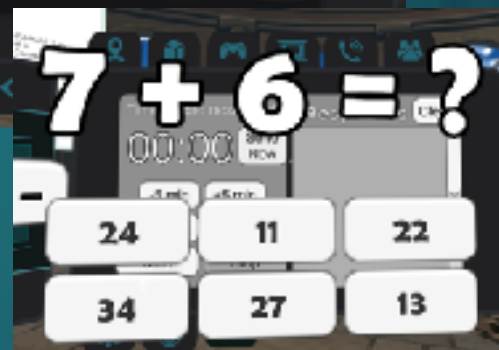
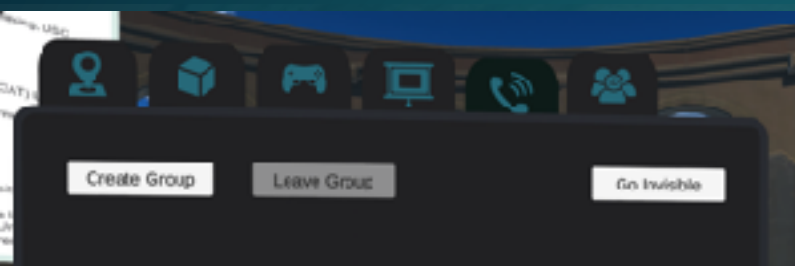












THANK YOU!

What questions do you have?



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