

Evaluating VR-mediated experiences

A Cultural Presence Questionnaire

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EDCR2016



Glasgow,
12/12/2011

In one {LEAP}



{LEAP} {LEarning of Archaeology through Presence}

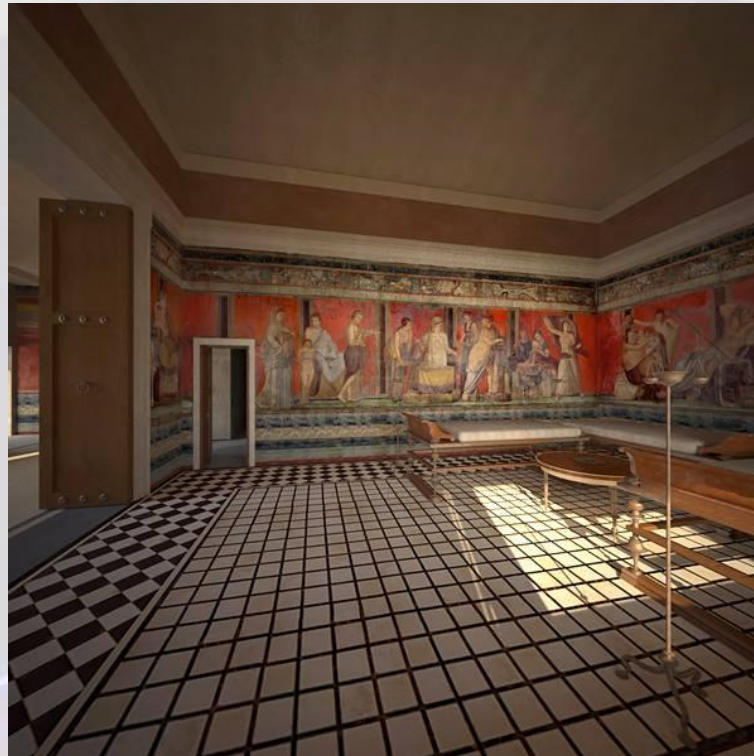


Call: FP7-PEOPLE-2013-IEF
Grant Agreement n.: PIEF-GA-2012-625537
Scientific Panel: Social Sciences and Humanities
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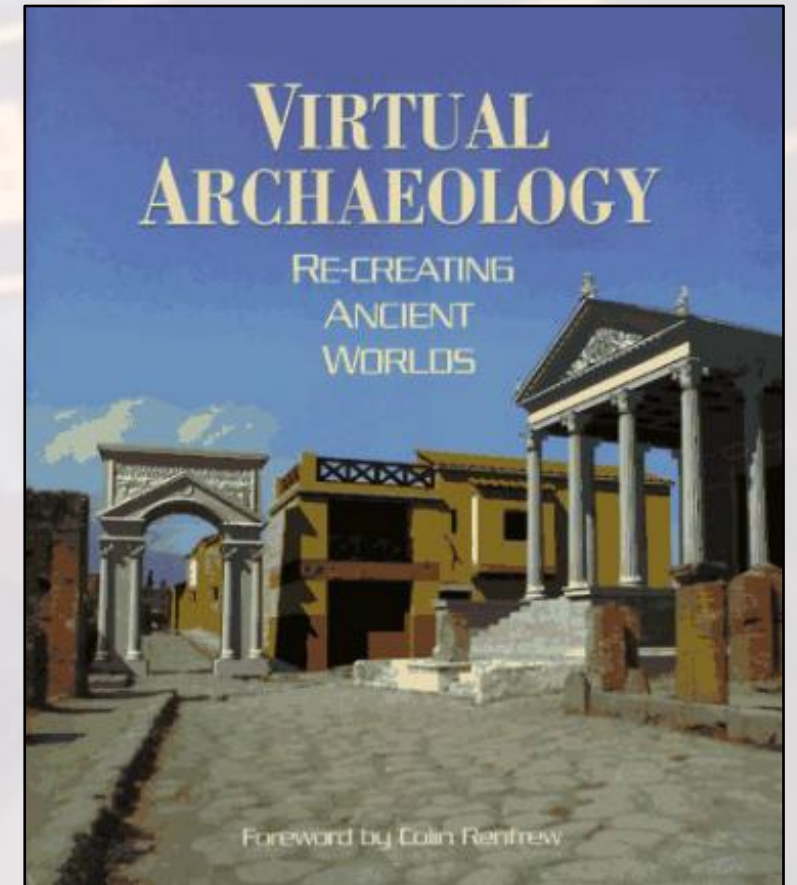


By {LEAP}s and bounds (I)

1. Aimed at showing the past / Empty
2. Lack of evaluation



Villa of the Mysteries, Pompeii.
Stanton-Abbot Associates



Forte & Siliotti, 1997

By {LEAP}s and bounds (II)

1. Lack of explicit theoretical archaeological framework / pedagogical goal (instructivist).
2. Implicit belief: objective, enhances learning ← immersive, photorealistic, “interactive” // evaluations show otherwise – e.g. Pujol & Economou, 2009; Saltzman et al. 1999.



| | Culture History | Processualism | Critical Theory |
|-------------|-----------------------|---------------------------|-----------------------------------|
| Content | Architecture | Environment/Landscape | Lived spaces (objects and people) |
| Focus | Monuments | Economy | Symbolism, daily life |
| Aim | Visualization | Analysis | Comprehension |
| Goal | Description of record | Explanation of record | Interpretation of record |
| User | Sight / awe | Intellect | Multi-sensoriality, empathy |
| Interaction | Navigation | Navigation / manipulation | Manipulation / alteration |
| Format | Closed model | Metadata | Game |

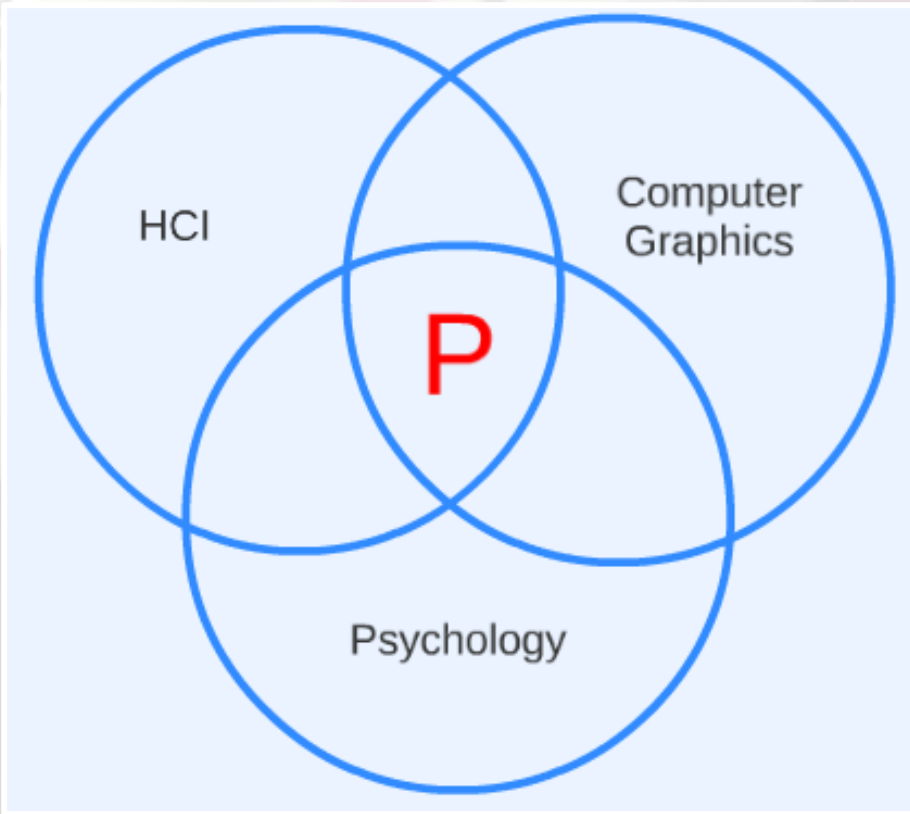
{LEAP}ing at opportunities

General aim:

To research, implement and evaluate a new conceptual and technological **framework**, *Cultural Presence*, aimed at enhancing the **understanding** of past societies by experts and audiences through the **experiencing** of immersive, populated, interactive reconstructions of sites.



A {LEAP} into (Cultural)Presence (I)



International Society for Presence Research

Membership

Become a member of the International Society for Presence Research (ISPR) and support the telepresence community. Membership fees help us pay for the administration of the ISPR conferences, best paper and presentation awards, student travel fellowships, ISPR Presence News and expanded services such as those on the ISPR web site.

Members receive the following benefits:

- A discount on ISPR conference registration fees
- The opportunity to vote, and run in, Board of Directors elections
- The opportunity to vote on organization issues such as the location of future conferences, winners of fellowships and other competitors, and more
- The opportunity to submit materials for the presence bibliography
- The opportunity to support and help stage a new multi-disciplinary event (work Journal/Journal of Telepresence)
- The opportunity to sell directly as a member of the only international academic organization specifically focused on telepresence
- Custom swag (t-shirts, coffee mugs, etc.) provided exclusively for members

Membership levels:

MIT Press Journals

PRESENCE

Janet Weisenberger and Roy Radtke, Co-Editors-in-Chief
Nathaniel L. Dierbach, Consulting Editor

The first journal for serious investigators of teleoperators and virtual environments, *Presence: Teleoperators and Virtual Environments* is filled with stimulating material applicable to these advanced electromechanical and computer systems.

Incorporating perspectives from physics to philosophy, *Presence* appeals to a wide audience, particularly mechanical and electrical engineers concerned with teleoperators; computer scientists, high-tech artists, media people, and others interested in virtual environments; and psychologists involved in the study of human-machine interfaces and sensorimotor/cognitive behavior.

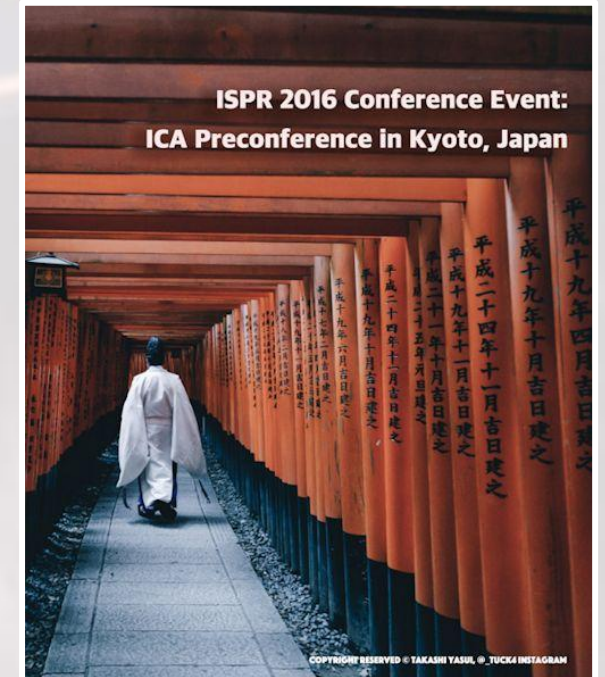
Call for Papers - ALL: Submit your work to *Presence!*

Quarterly (winter, spring, summer, fall)
\$28.00 per issue
8 1/2 x 11, illustrated
Founded 1992
ISSN 1054-7460
E-ISSN 2331-3283
2013 Impact Factor: 0.912

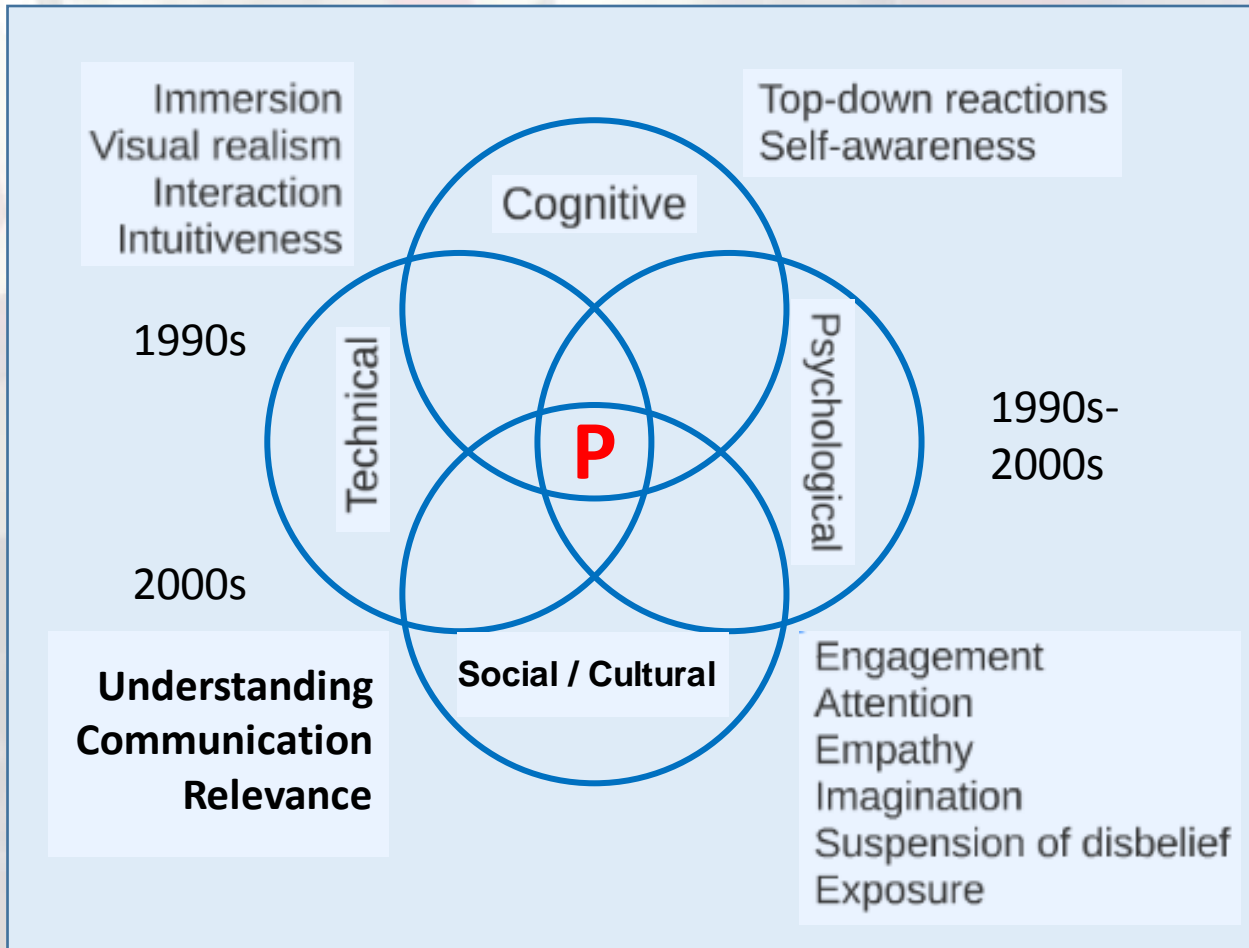
KEY: ● = Full ● = Partial ● = No Access

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A {LEAP} into (Cultural)Presence (II)



- Established theoretical & methodological framework(s) for design and evaluation.
- Investigated suitability for learning (e.g. constructivism, embodied interaction).
- Investigated underlying factors.
- Ex. of application to CH to understand other cultures (Jones, 2005)

**“The feeling of being there”
(Steuer, 1995)**

A {LEAP} into (Cultural)Presence (III)

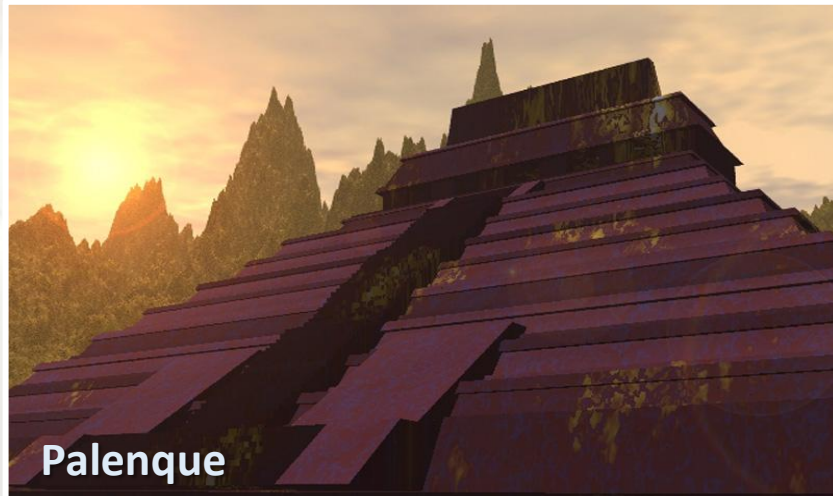
“The feeling of being there and then”= place, material culture, behaviours... (/ visual realism).

“The subjective experience of feeling one is aware of, appreciative of, learning more about, or thematically immersed in past/other believe systems”

(Pujol & Champion 2007)

CP is a means, not an end!

A {LEAP} into (Cultural)Presence (IV)



2016 was a {LEAP} year (I)

Development

1. Research

- Import and expand the concept of CP.
- Research on classical concept of P.
- Theory of (Material) Culture.
- What defines archaeological cultures (2 consultations with {LEAP} User Group).
- How to depict it (defining "Catalhöyükness").

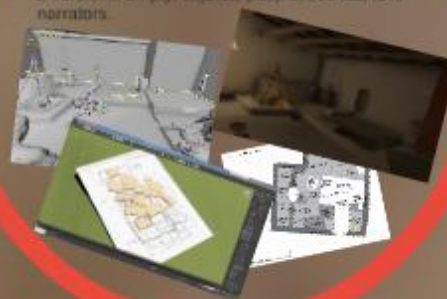
Cultural Presence

- 2002: Cultural approach by G. Riva, C. Castelnuovo, A. Saggio and P. Martini: Presence as a social construction: cultural framework + region (on factors and meanings).
- 2011: Ethnographic action based approach by A. Spagnoli, D. Sotera and C. Intonaco: Di-tension between space and place = response of presence, action (social affordance) + qualitative analysis (discourse analysis).
- 2005: Naturalistic responses of humans (M. Genu et al.).
- 2004: Place as space = meaning. Sense of place = sense of (virtual) presence. Need for qualitative methodologies from SSCG (S. A. P. Turner).
- 2010: Social realism in games (F. Boers and M. Heide).
- 2013: Changing bodies changes minds (L. Malson et al.).



2. Implementation

- Build a VR mediated experience of Catalhöyük (B49):
- 5 POIs
- 3 versions: empty, objects, people, scenes, text/ narrators.



3. Evaluation

Operational definition of CP: Term for evaluating the subjective experience of feeling one is aware of, appreciative of, learning more about or feeling thematically immersed in past believe systems (Puppi & Champion 2007)

P is a means and a measure



- Focus on outcomes of current models.
- More CP = More learning.
- Compare learning, engagement, understanding across different versions and correlate with P.

4. Dissemination

2016 was a {LEAP} year (II)

Defining "çatalhöyükness"

ÇH3D: Questionnaire for experts

The experience you kindly accepted to participate in is part of the EU-funded research project LEAP (Learning of Archaeology through Immersion), conducted at Pompeu Fabra University of Barcelona by Dr. Laia Pujals-Tost. More information can be found at www.leap-project.eu. The ultimate goal of this project is to find new ways to design and evaluate archaeological virtual reconstructions. This is why I need the input from different experts.

I would like to ask you to devote 15 minutes of your time to answer a short questionnaire related to (1) the actual experience you have participated in on site, at the reconstructed house, and with the images; (2) the definition of Çatalhöyük as a culture; and (3) the use of Virtual Reality to depict Çatalhöyük.

The data obtained from the video recordings and the questionnaire will be only used for research purposes and will remain completely anonymous. We would like to ask your permission to essentially use anonymous still images from the recordings or to quote your answers in scientific publications and/or oral presentations.

Do you give your permission? YES / NO.

Let's start!

ABOUT YOURSELF

1. What is your name? _____

2. What is your academic background? _____

3. What is your role at CH? _____

DIFFERENCES BETWEEN MEDIA

The site

4. In what way did the site help you in your explanations there?

5. Please rate how much you agree with the following statements:

| | Totally disagree | 1 | 2 | 3 | 4 | 5 | Totally agree |
|--|------------------|---|---|---|---|---|---------------|
| a) The site helped me tell about architectural features. | | | | | | | |
| b) The site helped me tell about life in the past. | | | | | | | |
| c) The site helped me tell about how archaeology works. | | | | | | | |

The reconstructed house

6. In what way did the reconstructed house help you in your explanations there?

7. Please rate how much you agree with the following statements:

| | Totally disagree | 1 | 2 | 3 | 4 | 5 | Totally agree |
|---|------------------|---|---|---|---|---|---------------|
| a) The house helped me tell about architectural features. | | | | | | | |
| b) The house helped me tell about life in the past. | | | | | | | |
| c) The house helped me tell about how archaeology works. | | | | | | | |

1

Image 1

8. In what way did image 1 help you in your explanations?

9. Please rate how much you agree with the following statements:

| | Totally disagree | 1 | 2 | 3 | 4 | 5 | Totally agree |
|---|------------------|---|---|---|---|---|---------------|
| a) Image 1 helped me tell about architectural features. | | | | | | | |
| b) Image 1 helped me tell about life in the past. | | | | | | | |
| c) Image 1 helped me tell about how archaeology works. | | | | | | | |

Image 2

10. In what way did image 2 help you in your explanations?

11. Please rate how much you agree with the following statements:

| | Totally disagree | 1 | 2 | 3 | 4 | 5 | Totally agree |
|---|------------------|---|---|---|---|---|---------------|
| a) Image 2 helped me tell about architectural features. | | | | | | | |
| b) Image 2 helped me tell about life in the past. | | | | | | | |
| c) Image 2 helped me tell about how archaeology works. | | | | | | | |

DEFINING "ÇATALHÖYÜKNESS"

12. Please describe the five most defining features of life at Çatalhöyük in the past.

HOW TO DEPICT "ÇATALHÖYÜKNESS" WITH VIRTUAL REALITY

13. Have you seen any archaeological virtual reconstructions? Please give examples of those you liked the most.

14. Have you seen any archaeological virtual reconstructions of CH? Please describe.

15. How would you imagine a virtual reconstruction of Çatalhöyük?

2

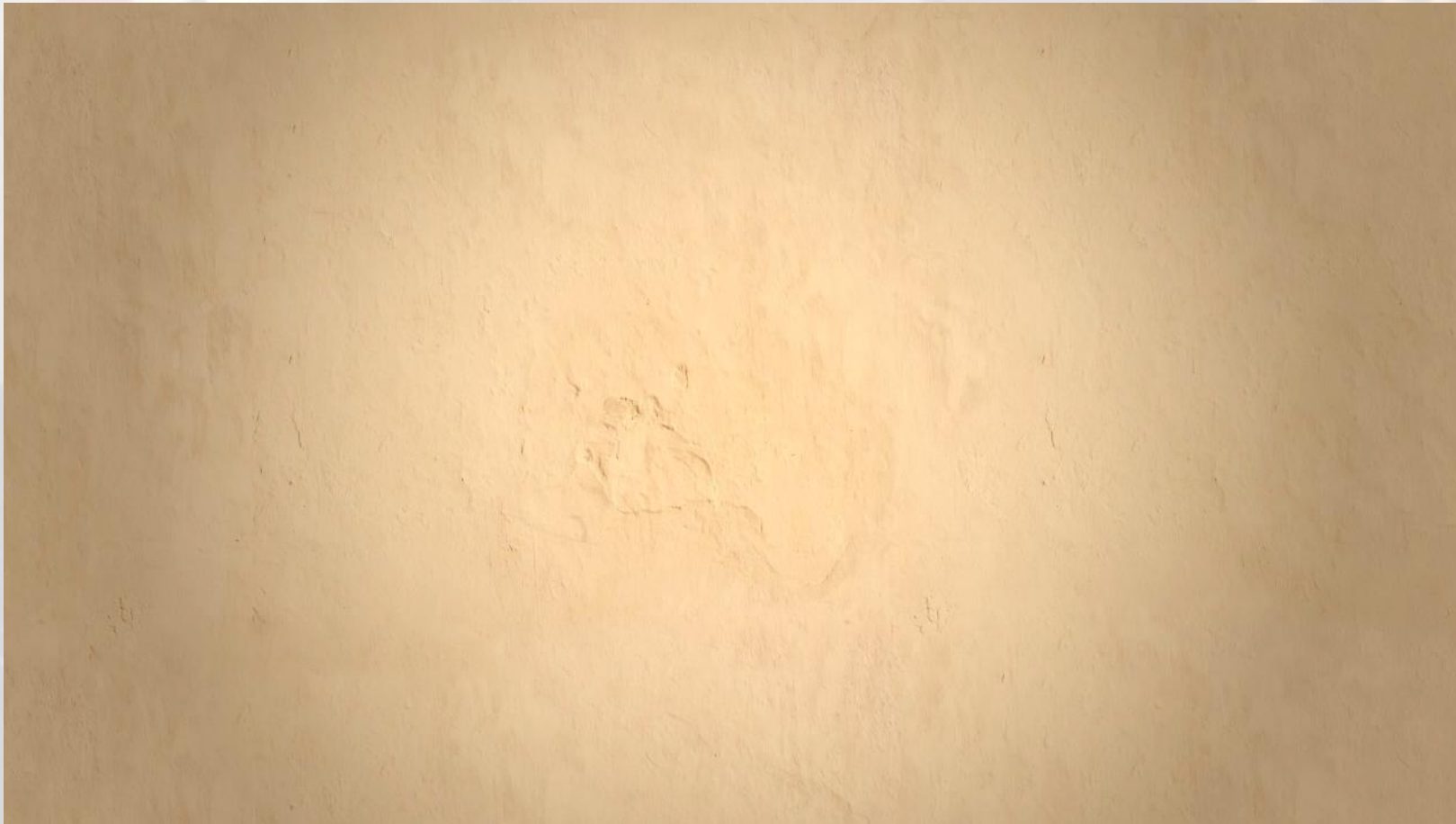
Subjective approach



Objective approach



2016 was a {LEAP} year (III)



The {LEAP} forward (I)

- To explore which factors are specifically related with the sense of CP (e.g. architecture, objects, presence of characters, user features...).
- To see if there is a correlation between CP and learning.
- “H0= The higher P, the higher L” (Mikropoulos, 2006; Mikropoulos & Strouboulis 2004; Markaridian & Hwang 2003; Bonini 2008, Witmer and Singer 1998).

P is a good predictor of learning potential + help design suitable VLE by modifying its different factors.

The {LEAP} forward (II)

| | | | | |
|--|-------------------|-------------------------|------------------|--------------------|
| Questionnaire number: | | Condition (1-6): | | |
| Pre-experience questionnaire | | | | |
| Please reply to the following questions by circling one option: | | | | |
| 1. How old are you? | | | | |
| 10-19 | 20-29 | 30-39 | 40-49 | 50+ |
| 2. You are... | | | | |
| Woman | Man | Other (please specify): | | |
| 3. How often do you use computers? | | | | |
| Once a month or less | 2-3 times a month | Once a week | 2-3 times a week | Daily |
| 4. How often do you play with computer-games? | | | | |
| Less than once a month | Once a month | Once a week | 2-3 times a week | Daily |
| 5. How many times have you experienced an immersive virtual environment (e.g. Oculus, CAVE)? | | | | |
| Never | 1-2 times | Around 5 times | Around 10 times | More than 10 times |
| 6. How interested in Archaeology are you? | | | | |
| (1) Not at all | 2 | 3 | 4 | (5) Very much |
| 7. Please answer briefly: What is the Neolithic Period? | | | | |
| | | | | |
| 8. How skilled are you with technology? | | | | |
| (1) Not at all | 2 | 3 | 4 | (5) Very much |
| 1 | | | | |

Pre-experience form → questions related to:

- Demography
- Previous knowledge about CH, VR and Neolithic societies.
- Attitudes towards CH, VR technologies, and Neolithic societies.

The {LEAP} forward (III)

| | | | | | |
|--|------|------------------|------|------|------|
| Questionnaire number: | | Condition (1-6): | | | |
| Observation during ÇH3D | | | | | |
| 1. Time in each POI: | | | | | |
| PO1 | POI2 | POI3 | POI4 | POI5 | POI6 |
| | | | | | |
| 2. Overall time in ÇH3D: | | | | | |
| | | | | | |
| 3. Comments during experience (evidences of learning, difficulties, engagement, disappointment, etc.). | | | | | |
| | | | | | |
| 4. Where was help sought? | | | | | |
| | | | | | |
| 5. Navigation path: | | | | | |
| | | | | | |

Observation form → multimodal analysis, indicators of presence (Freeman, 2000):

- Timings (POI and overall)
- Comments during experience (evidences of learning, difficulties, engagement, disappointment, etc.).
- Where help sought:
- Navigation path:
- Reflex body responses (what and where):
- Non-verbal social behaviours (what and where)
- Change in postures (what and where):

The {LEAP} forward (IV)

| | | | |
|-----------------------|--|------------------|--|
| Questionnaire number: | | Condition (1-6): | |
|-----------------------|--|------------------|--|

Post-experience questionnaire

1. How would you describe the experience to a friend?

Now, please reply to the following questions by circling one option:

2. While in the virtual world, how much did you feel you were at Çatalhöyük in the Neolithic period?

| | | | | |
|----------------|---|---|---|---------------|
| (1) Not at all | 2 | 3 | 4 | (5) Very much |
|----------------|---|---|---|---------------|

3. When looking back at the experience, how much do you feel you visited a place (rather than computer generated images)?

| | | | | |
|----------------|---|---|---|---------------|
| (1) Not at all | 2 | 3 | 4 | (5) Very much |
|----------------|---|---|---|---------------|

4. When looking back at the experience, how much do you feel you visited another culture (rather than a computer generated depiction)?

| | | | | |
|----------------|---|---|---|---------------|
| (1) Not at all | 2 | 3 | 4 | (5) Very much |
|----------------|---|---|---|---------------|

5. While in the virtual world, how much did you feel you were in a scientific computer simulation?

| | | | | |
|----------------|---|---|---|---------------|
| (1) Not at all | 2 | 3 | 4 | (5) Very much |
|----------------|---|---|---|---------------|

6. While in the virtual world, how much did you feel you were in a computer game (i.e. for entertainment)?

| | | | | |
|----------------|---|---|---|---------------|
| (1) Not at all | 2 | 3 | 4 | (5) Very much |
|----------------|---|---|---|---------------|

7. How much did your experience in the virtual world seem similar to real world experiences?

| | | | | |
|----------------|---|---|---|---------------|
| (1) Not at all | 2 | 3 | 4 | (5) Very much |
|----------------|---|---|---|---------------|

4

Post-experience form → Cultural Presence Questionnaire (**CPQ**), built and pilot-tested (4) after an exhaustive review of Presence assessment tools (e.g. Slater, Useoh, Steed, 1994; Witmer & Singer 1998)

Subscales related to:

- General feeling of Cultural Presence
- Perception
- Self-perception
- World's behavior
- Interaction
- Attention
- Willingness to experience Presence
- Emotions
- Characters
- Culture
- Detailed questions about learning.

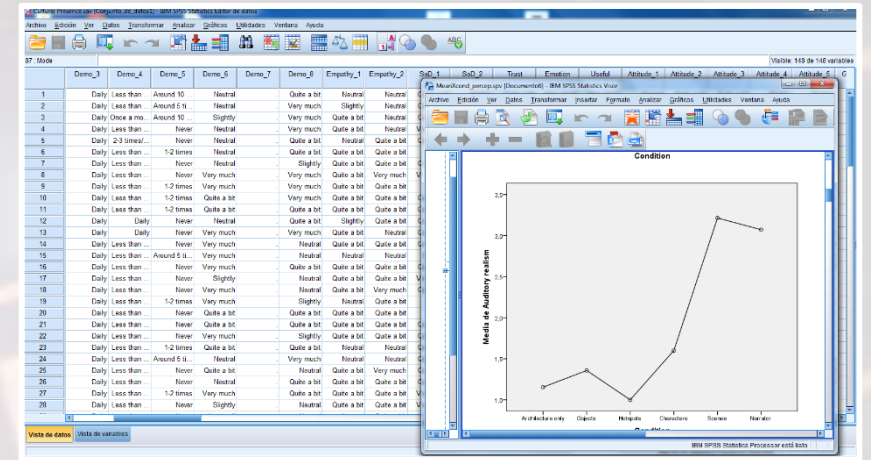
A {LEAP} in the dark

- Between-subjects experimental design.
- “Mobile” location.
- 85 participants:
 - 47% male and 53% female.
 - 12-80 years old.
 - Diverse backgrounds.
 - Different levels of experience with technology and Cultural Heritage).
- Explored ÇH3D while being recorded, and filled in two questionnaires.



{LEAP}ing at conclusions

- **EFAs** → the concept of CP is sound and composed by three main factors:
 1. Plausibility of the VE + Distinctive cultural elements.
 2. Human characters + Sound
 3. Perception and interaction.
- **Correlation** analyses & X^2 → positive but not linear relation between learning and CP (Learning = compromise between richness in content, affordances for exploration, and narrative explanations).
- **ANOVAS** → virtual reconstructions are NOT a universal tool. User factors:
 1. Suspension of disbelief.
 2. Expertise in related fields.
 3. Experience with computer games.
 4. Experience with IVR.



| Pattern matrix ^a | | Factor | | |
|-----------------------------|---|--------|-------|-------|
| Subscale | Variable | 1 | 2 | 3 |
| Virtual Env. | VE was culturally plausible | .747 | -.190 | .001 |
| Cultural Presence | Visited a specific culture | .665 | .032 | -.040 |
| Cultural Presence | Perceived specific cultural traits | .593 | -.071 | .023 |
| Virtual Env. | VE scientifically authentic | .558 | -.080 | -.132 |
| Cultural Presence | Visited an inhabited place | .519 | .227 | -.017 |
| Virtual Env. | VE behaved autonomously | .470 | .109 | -.074 |
| Attention | Feeling absorbed | .422 | .181 | -.380 |
| Virtual Env. | Continuity of events | .341 | .130 | -.182 |
| Susp. of disbelief | Willing to be transported to the past | .328 | .012 | .097 |
| Susp. of disbelief | Willing to be in the inhabitants' shoes | .103 | .031 | .047 |
| Social Presence | Characters behaved in a realistic way | .009 | .889 | -.078 |
| Social Presence | Characters looked realistic | .096 | .842 | .050 |
| Social Presence | Presence of people | -.140 | .830 | -.104 |
| Social Presence | Autonomous characters | .175 | .775 | .063 |
| Auditory aspects | Surrounded by auditory aspects | -.093 | .488 | -.035 |
| Auditory aspects | Auditory realism | .047 | .460 | .149 |
| Interaction | Feeling disoriented | .108 | .105 | .760 |
| Interaction | Control device interferes with navigation | .023 | .237 | .712 |
| Attention | Distraction by control device | .075 | -.043 | .711 |
| Visual aspects | Experience disrupted by display device? | -.035 | -.134 | .402 |
| Visual aspects | Surrounded by visual aspects | .357 | -.098 | -.397 |
| Visual aspects | Visual realism | .371 | .127 | -.386 |
| Visual aspects | Distraction by display device | .022 | -.025 | .369 |
| Interaction | Naturality of navigation | .285 | .226 | -.366 |
| Interaction | Exploration of elements | .204 | .101 | -.300 |
| Cultural Presence | Feeling of seeing everyday life | .257 | .269 | -.286 |

Extraction method: Principal Axis Factoring.
Rotation method: Oblimin with Kaiser normalization.

{LEAP}ing for joy!

Thank you very much for your attention

- More info:
 - <https://www.facebook.com/theleaproject/>
 - @TheLEAPproject
 - www.upf.edu/leap
- Laia.Pujol@upf.edu



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