Personal space in virtual reality

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The virtual ‘close-talker’

Motivation

- The effect of invasion of interpersonal space is well documented in the Social Psychology literature (Hall, 1963) .
- 3D display technology is widely used in virtual environments (ie. IMAX™, CAVE™).
- Stereoscopic display is believed to improve the sense of presence.
- Interpersonal influences on viewer comfort have not been widely studied.

Methods - Experiment 1

Subjects

- n=22
- Naïve Psychology undergraduate students
- All had normal stereopsis (Randot Stereotest™)

Stimuli

- Stereoscopic images
- Two digital cameras were used to capture 3D images of people (4) and objects (4).
- Stimuli were photographed at 3 distances (0.5, 1 and 2m).

Methods

- Images were projected using an Electrohome CRT projector, onto a 2.35 x 1.73m back-projection screen.
- Stereographics™ 3D shutter glasses were worn
- Subjects sat 1m from the display at all times.
- Head position was maintained using a chin-rest.

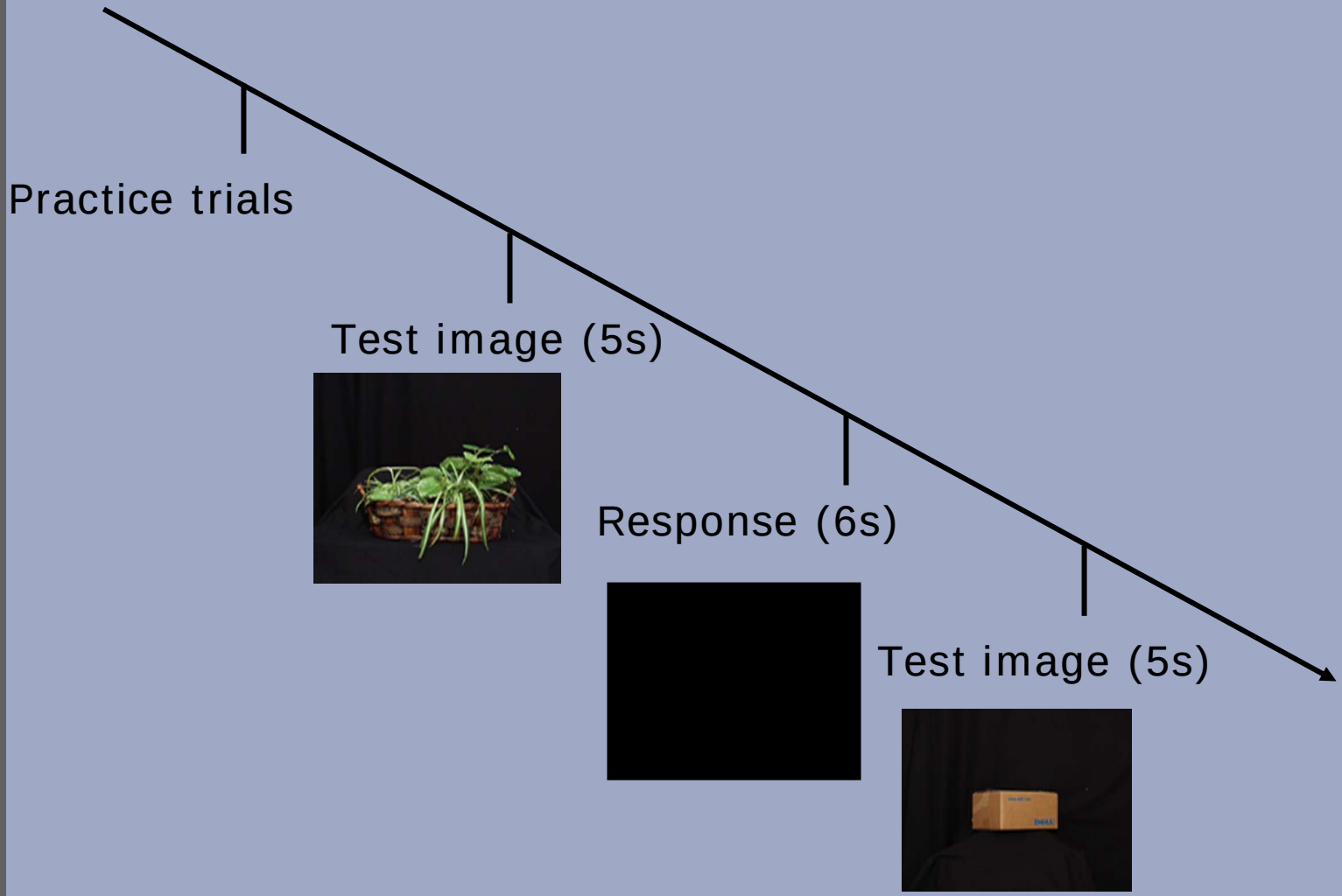
Experiment 1 - Procedure

- Each image was viewed for 5s
- Subjects rated their comfort level using a 7 point Likert scale:

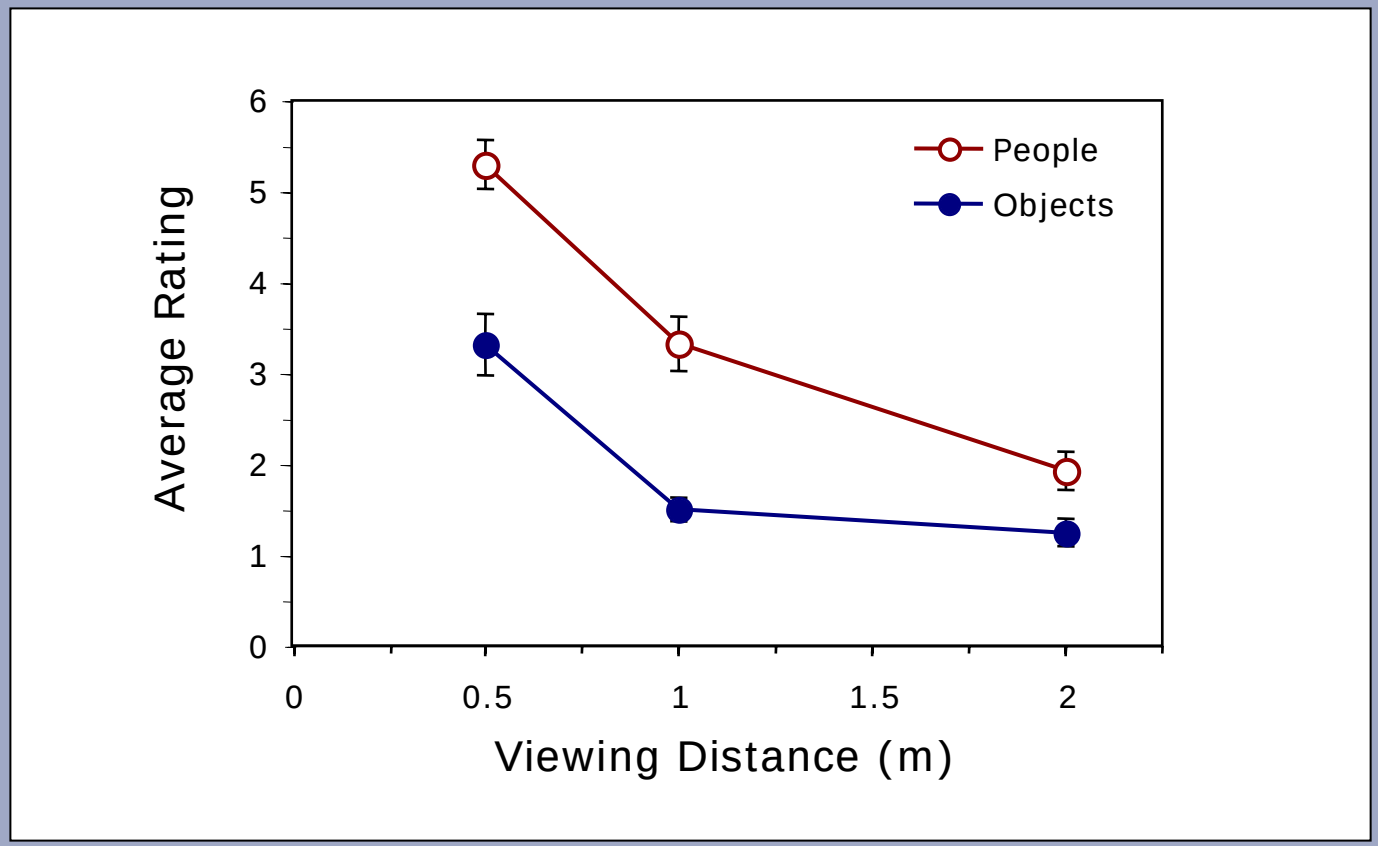
  1 = comfortable, not intrusive

  7 = very uncomfortable, very intrusive

Experiment 1 - Procedure



Experiment 1 - Results



Experiment 1 - Summary

- There is a ‘close-talker’ effect in virtual environments

- As in the real world, negative reactions to invasions of interpersonal space:

  1. Increase as viewing distance decreases

  2. Are triggered by people, more so than objects.

Experiment 2 - Rationale

1. How does this effect compare with ‘live’ presentation?

2. Is there a corresponding physiological response?

Experiment 2 - Methods

Subjects

- n = 16
- Naïve graduate students from neighbouring labs.
- All had normal stereopsis (Randot Stereotest™)

Stimuli

- Virtual stimuli created and presented as in Experiment 1.

- The same stimuli were also used in Live test conditions.

Methods

- Objects were mounted on pedestals
- People serving as stimuli sat on a stool with averted gaze (20° to the right, expressionless).

Methods

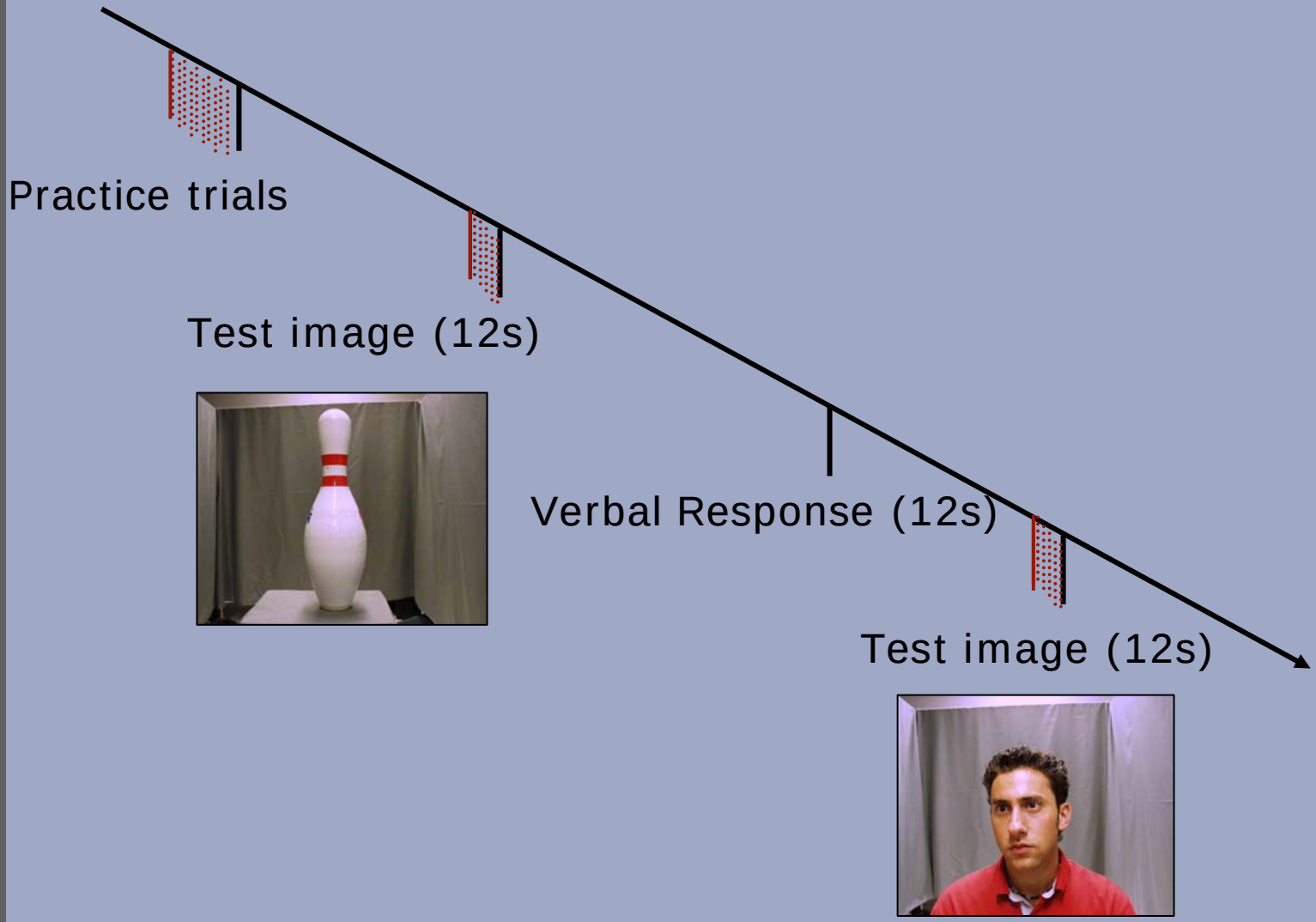
Procedure

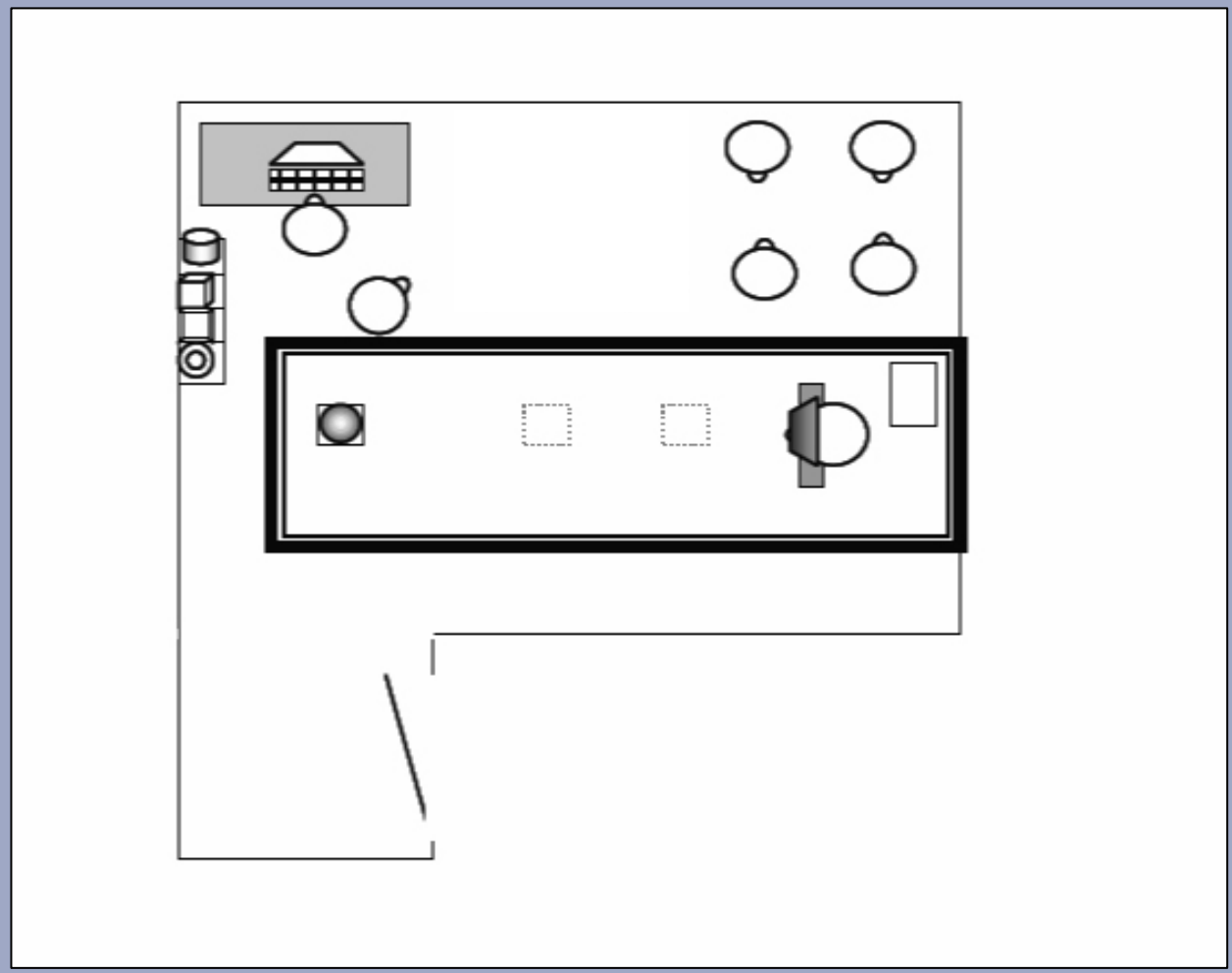
- Ratings were made as in Experiment 1
- Physiological measures of arousal were made using a Beckman GSR recorder.

Methods

- Surface electrodes were connected to the middle and index finger
- Baseline electrodermal activity (EDA) was recorded for 120s prior to testing.
- EDA was measured 2s before the onset of each trial until the trial ended (14s total).

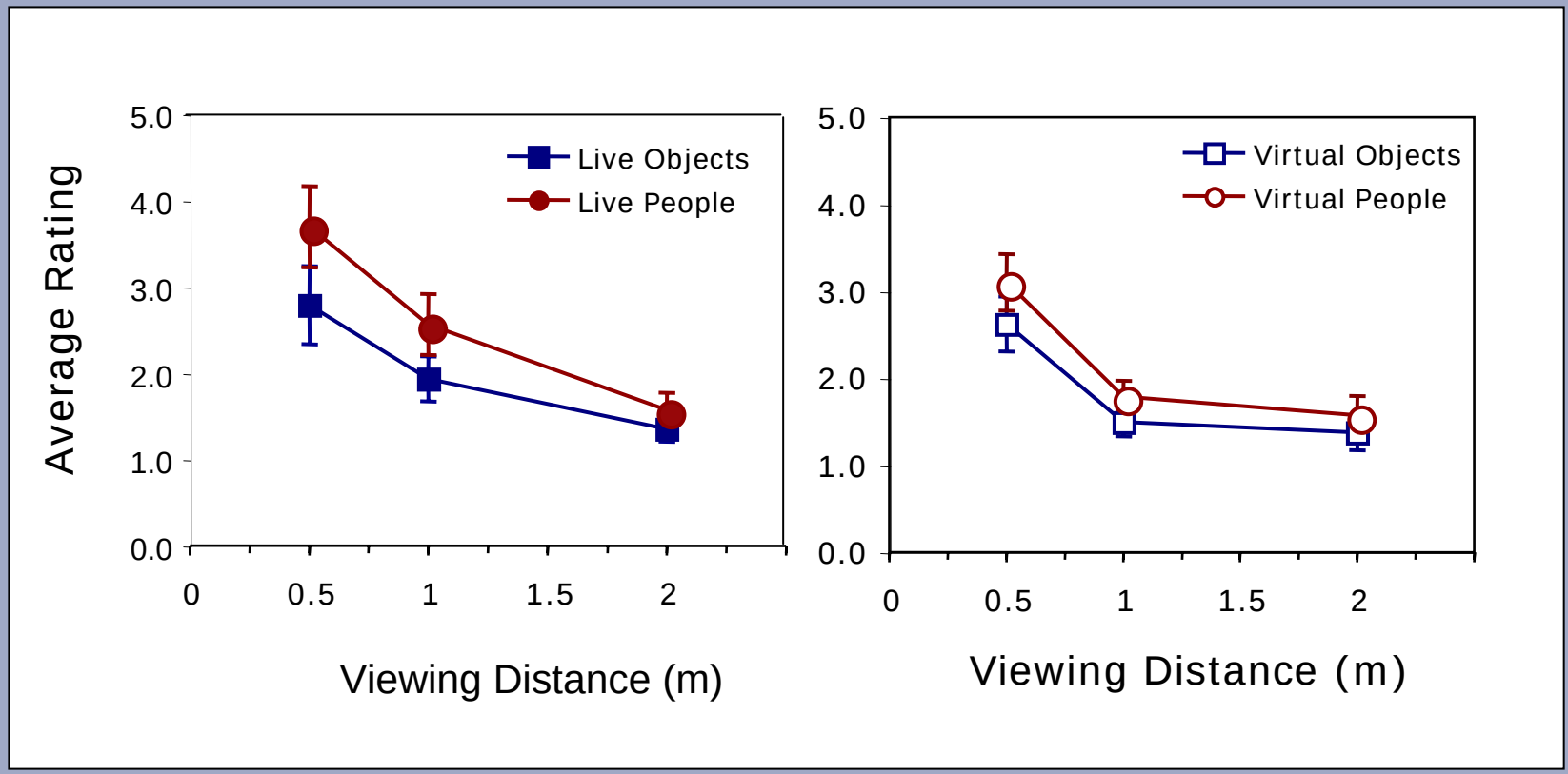
Experiment 2 - Procedure



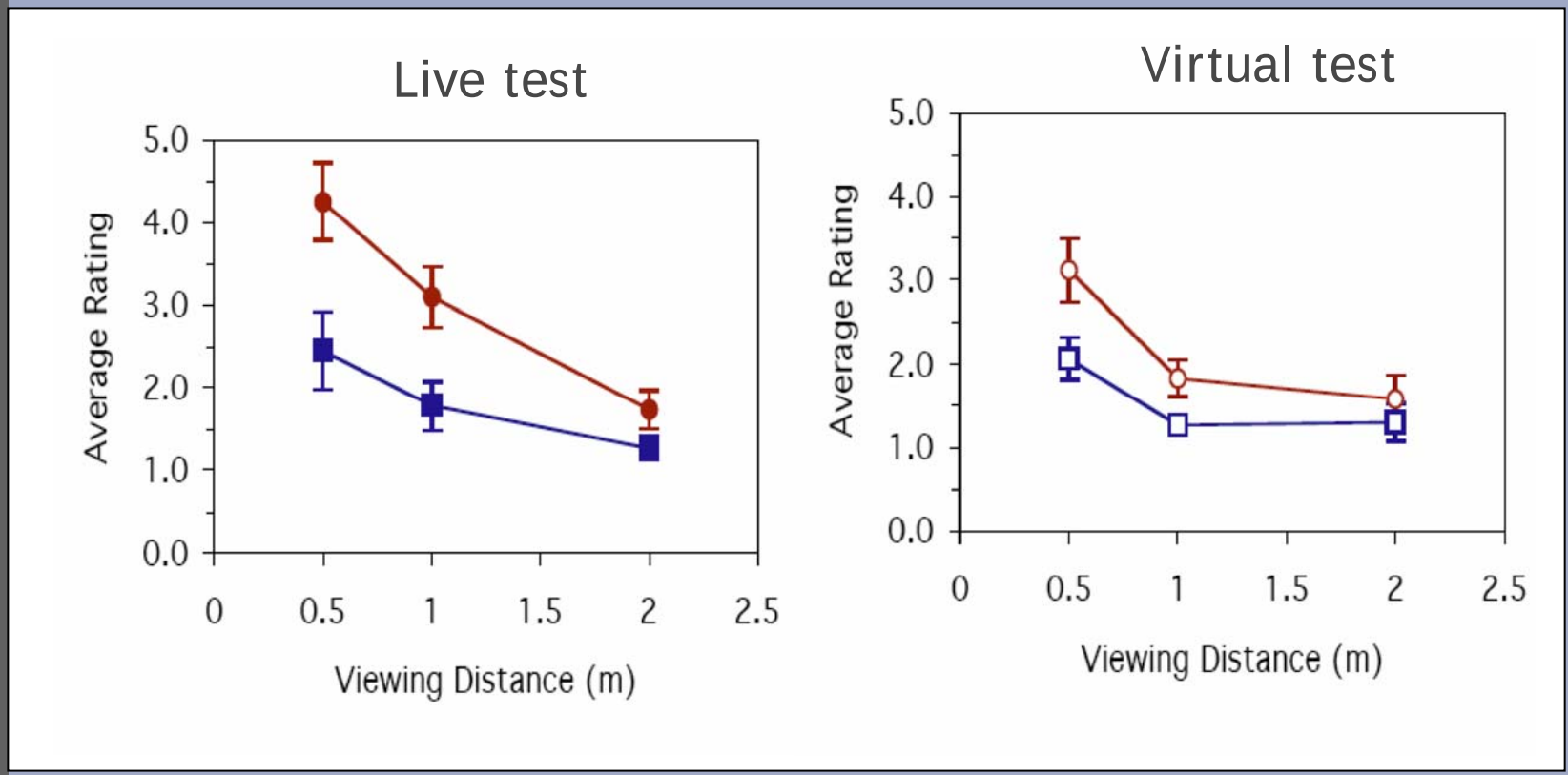


Experiment 2

Rating Results

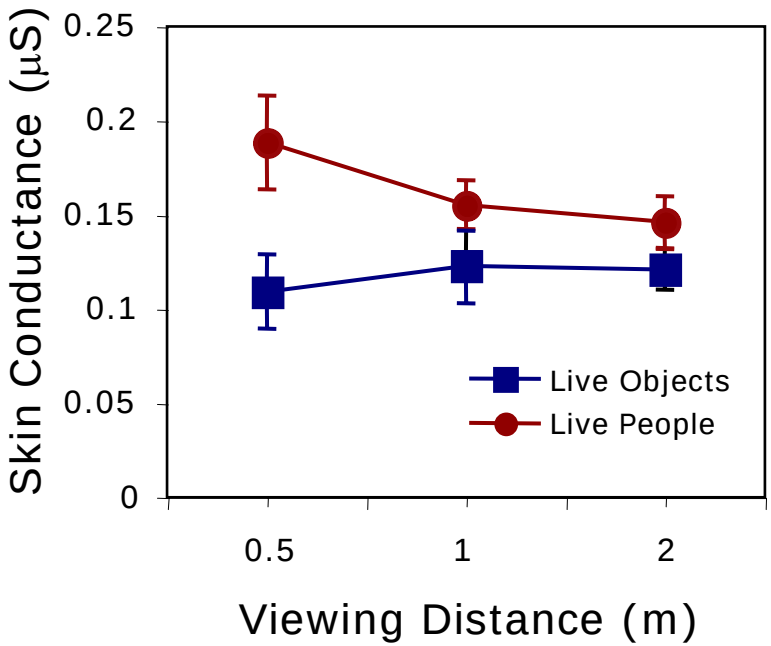


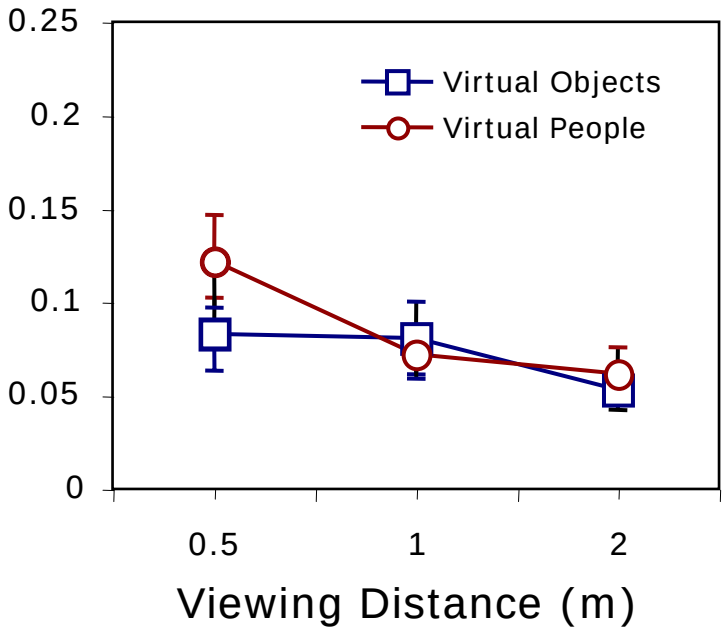
Experiment 2 -Rating Results



Experiment 2

EDA Results





Experiment 2 - Summary

- The rating results were similar to those of Experiment 1
- The EDA results were consistent with the rating data
- Comparison of Live vs. Virtual test conditions showed the same negative reactions to invasions of interpersonal space.

Conclusions

- There is a virtual ‘close-talker’ effect.
- Our results are consistent with research using avatars (Bailenson et. al, 2001).
- This negative reaction occurs when viewing stereoscopic still images.
- The reaction is as strong in the virtual test condition as it is ‘live’.

The improved sense of presence provided by 3D display technology elicits both the positive and negative aspects of interpersonal interactions in the real world.

So, the choice of 3D imagery should be made with the intended consequences in mind...

Thank-you !