The Impact of a Virtual Agent's Non-Verbal Emotional Expression on a User's Personal Space Preferences

Andrea Bönsch[1], Sina Radke[2], Jonathan Ehret[1], Ute Habel[2], Torsten W. Kuhlen[1]

[1]Visual Computing Institute, RWTH Aachen University   [2]Department of Psychiatry, Psychotherapy & Psychosomatics, Uniklinik RWTH Aachen
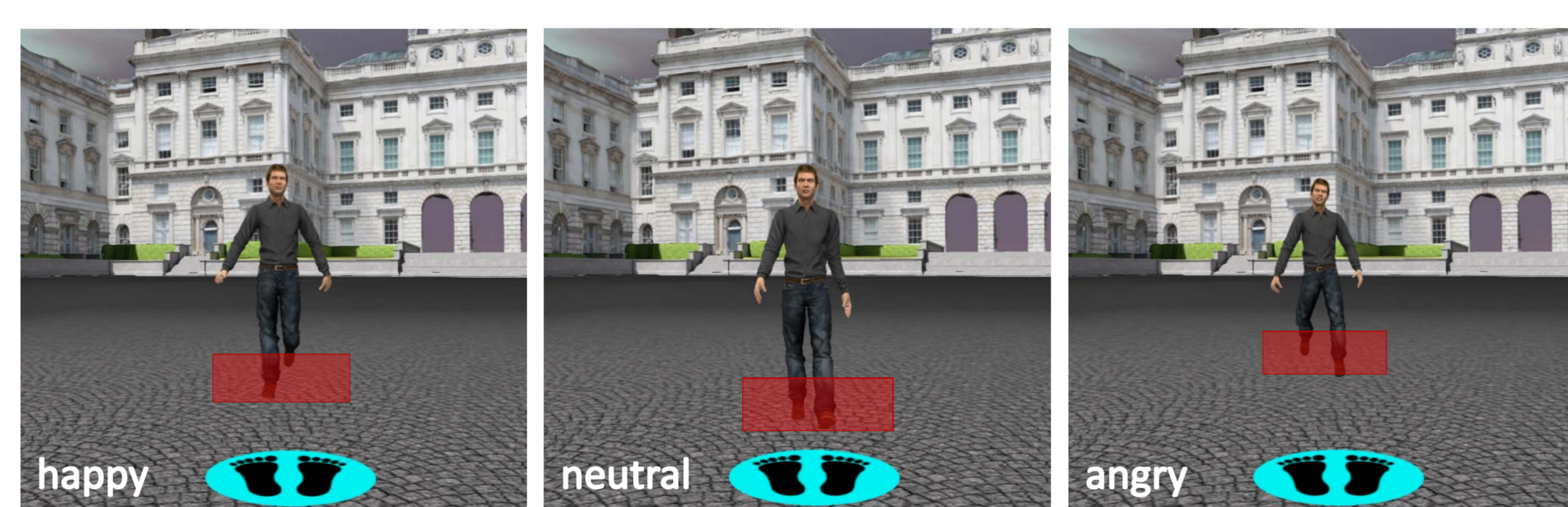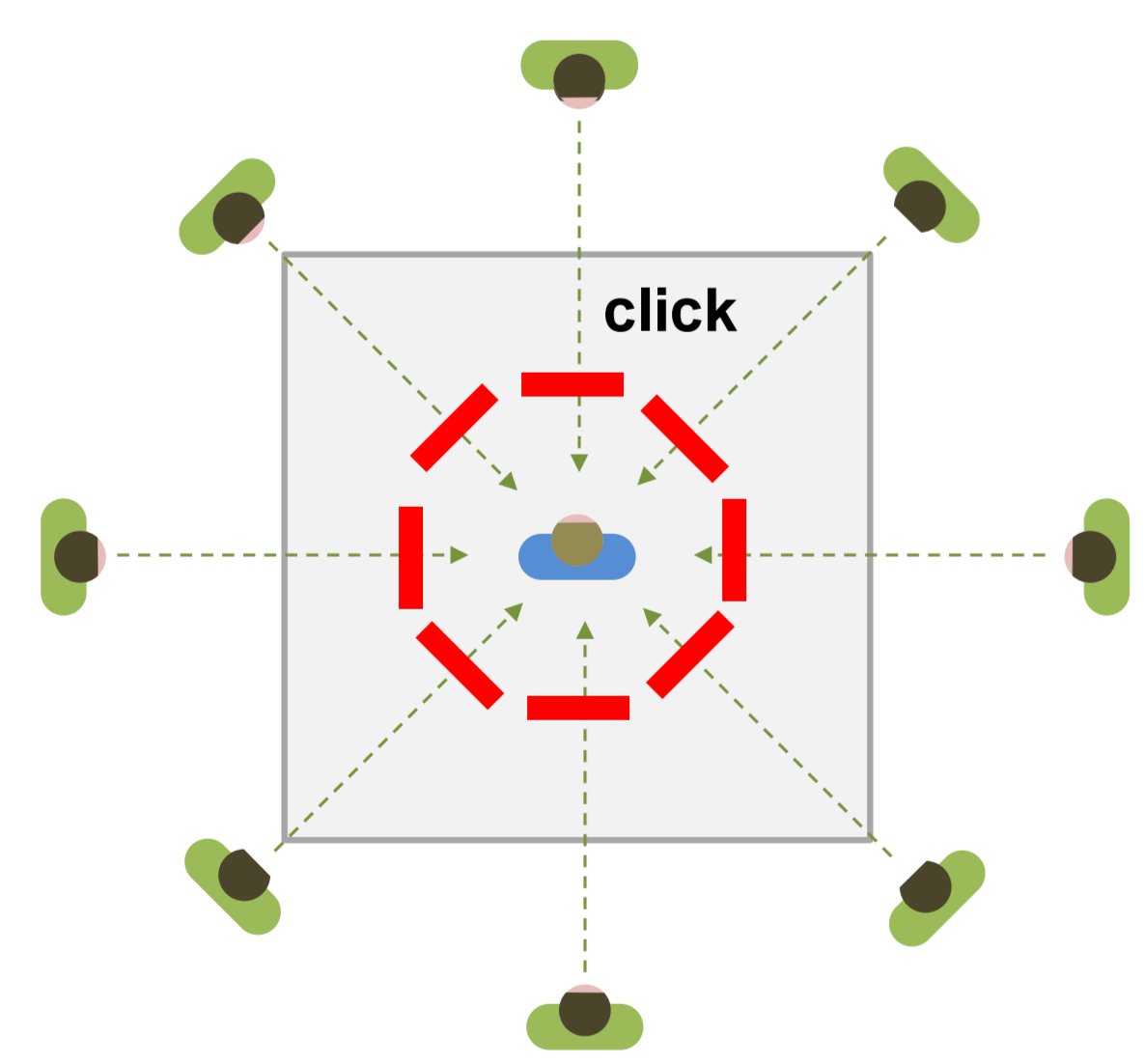
Introduction

- Managing interpersonal distances is a key aspect in everyday social interactions
- Real-life observation: interpersonal distance preference influenced by emotional expressions of interactant
  → *Does this also apply in VR settings?*

- Two-fold research objective:
  - Use virtual agents for VR-based behavioral studies
  - Improve proxemic behavior of virtual agents
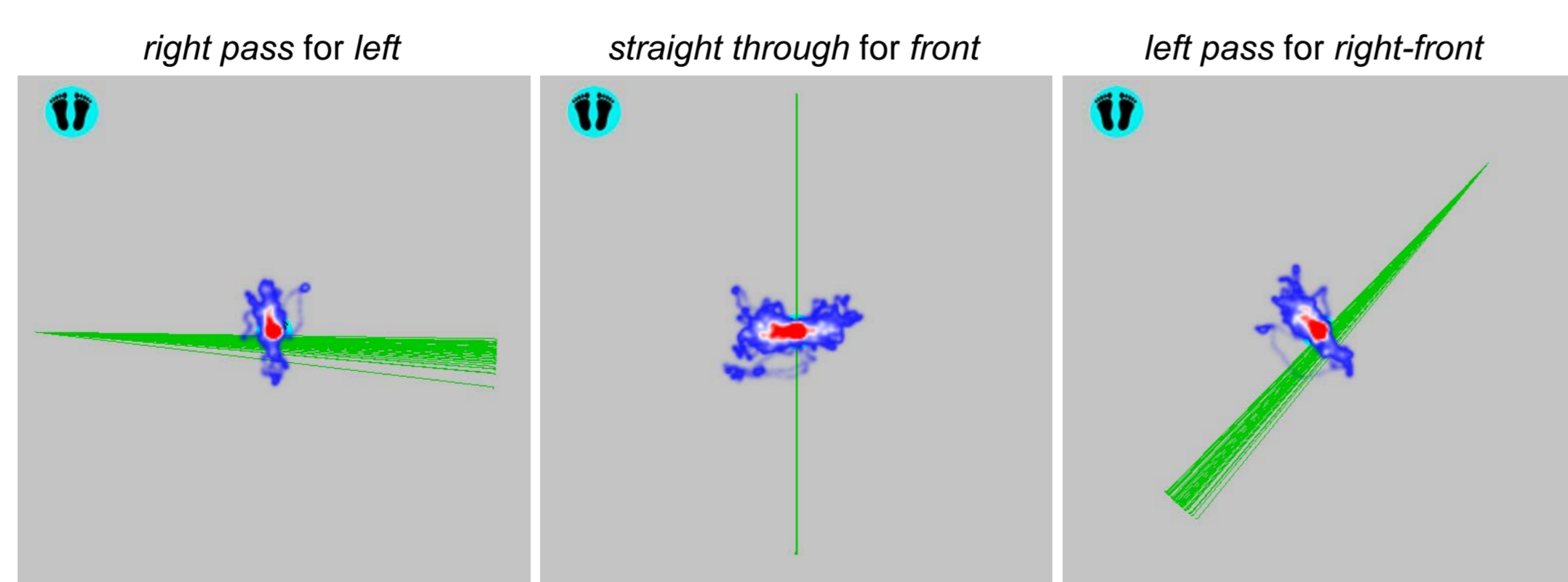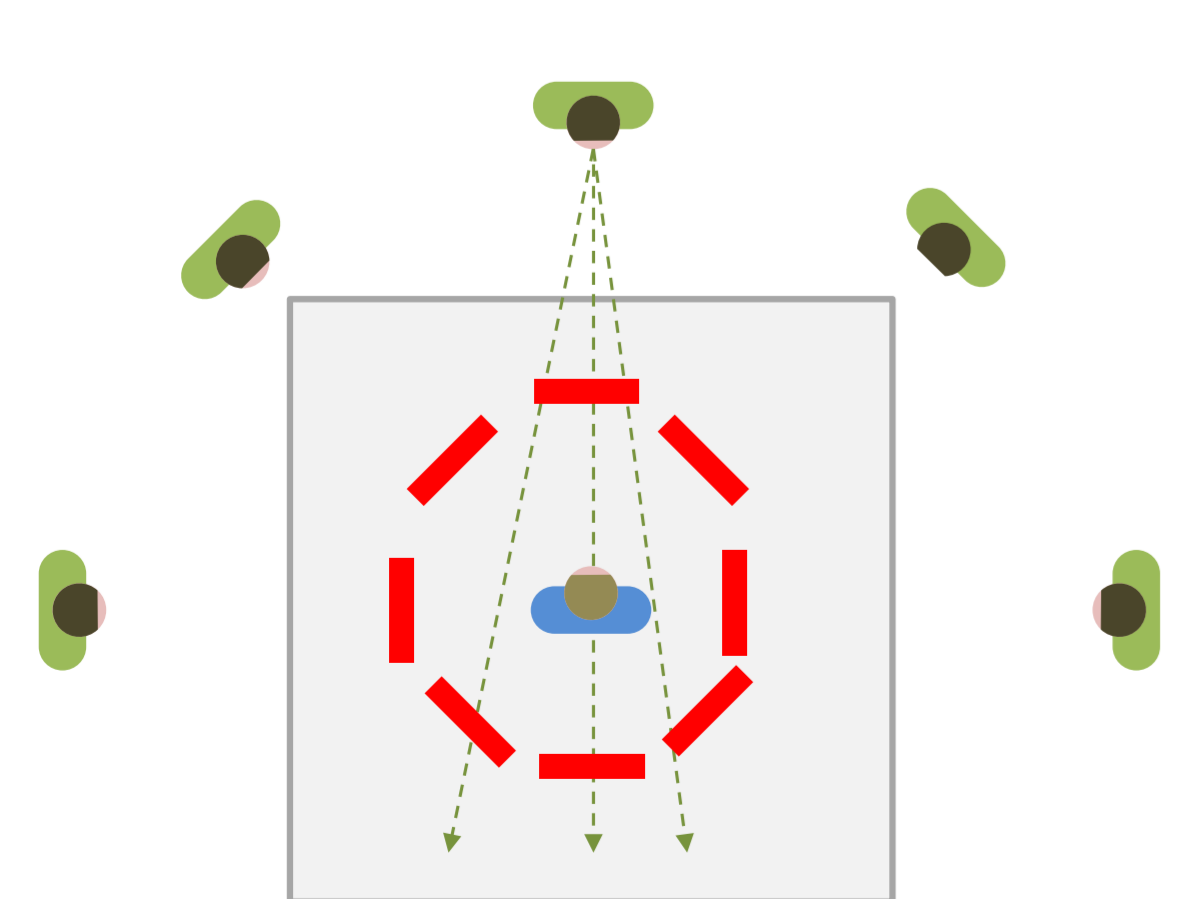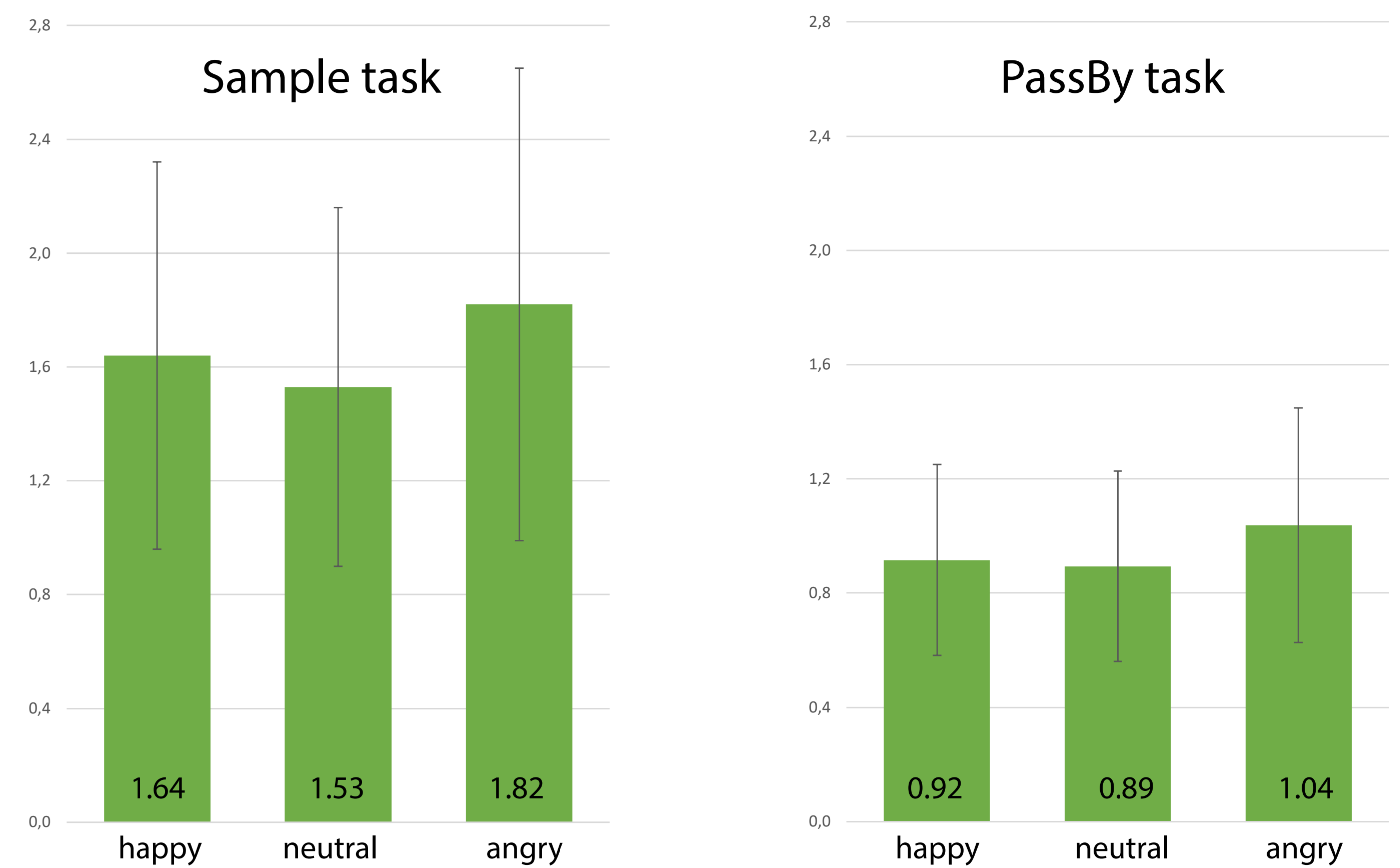
Agent's Emotional Expressions

happy   neutral   angry

Study Tasks

Sample Task:

PassBy Task:

right pass for left   straight through for front   left pass for right-front

subjects' orientation
green lines — VA's trajectories
heat map for subjects' positions
0 transparent / 1/3 blue / white / 2/3 / 1 red

Impact: Emotions

Sample task   PassBy task

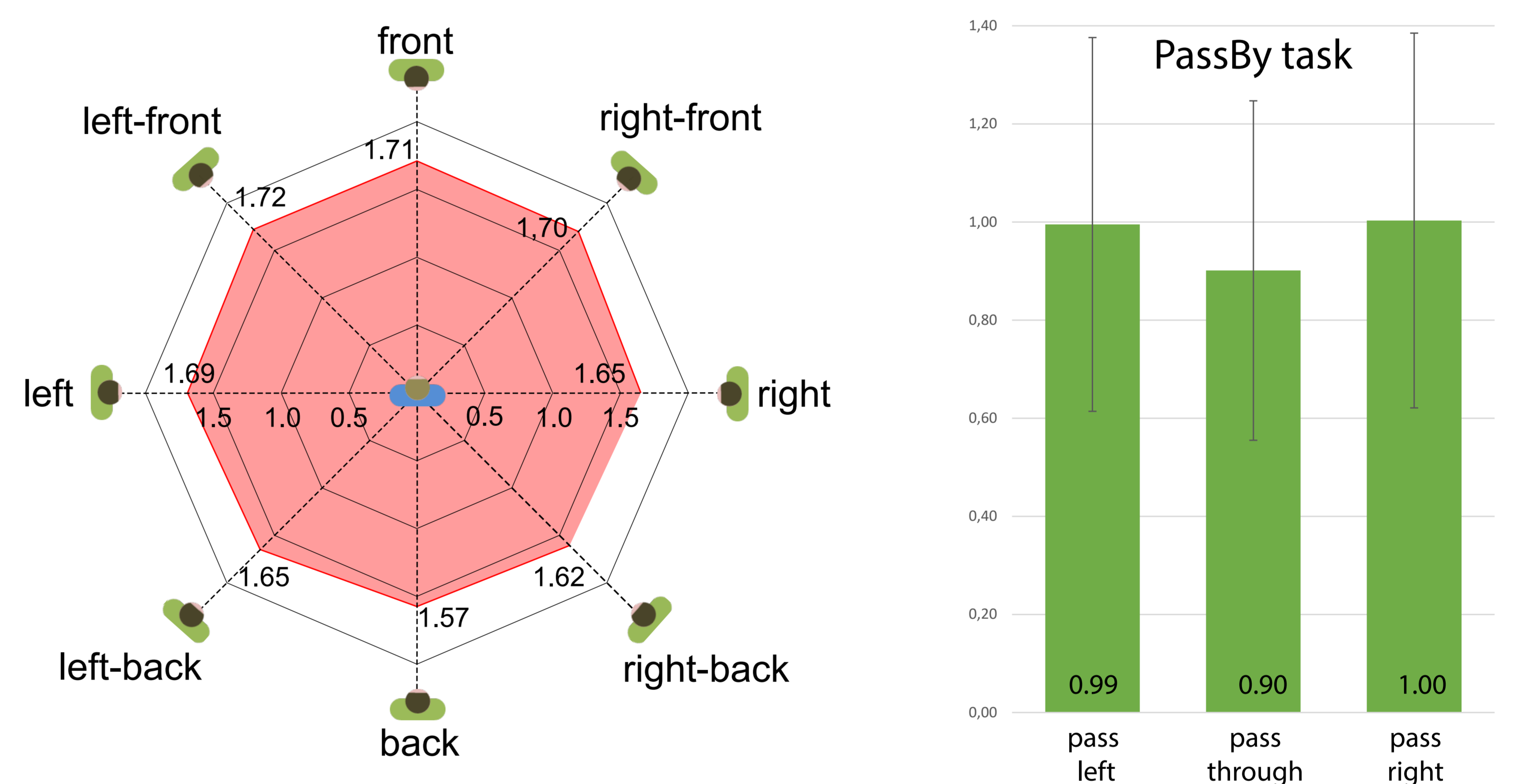| happy	neutral	angry		happy	neutral	angry
1.64	1.53	1.82		0.92	0.89	1.04

Take aways:

- Larger distances to angry-looking interactant
- Passive scenarios (Sample task) within Hall's social zone
- Active scenarios (PassBy task) require smaller distances

Impact: Spatial Constellations

front 1.71, left-front 1.72, right-front 1.70, left 1.69, right 1.65, left-back 1.65, right-back 1.62, back 1.57

PassBy task

pass left	pass through	pass right
0.99	0.90	1.00

Take aways:

- Personal space slightly elliptical
- Handedness impact (90% right-handed)
- Less identifiable trajectories (cp. pass left/right) of interactant result in larger interpersonal distances

Impact: Display Systems

- Sample task: no significant differences
- PassBy task: larger distances in CAVE

- Assumption: missing body reference in HMD minimizes perceived danger of collision

- Take away: proxemic adaptations required when using an HMD-based application in a CAVE

PassBy task

CAVE	HMD
0.99	0.91