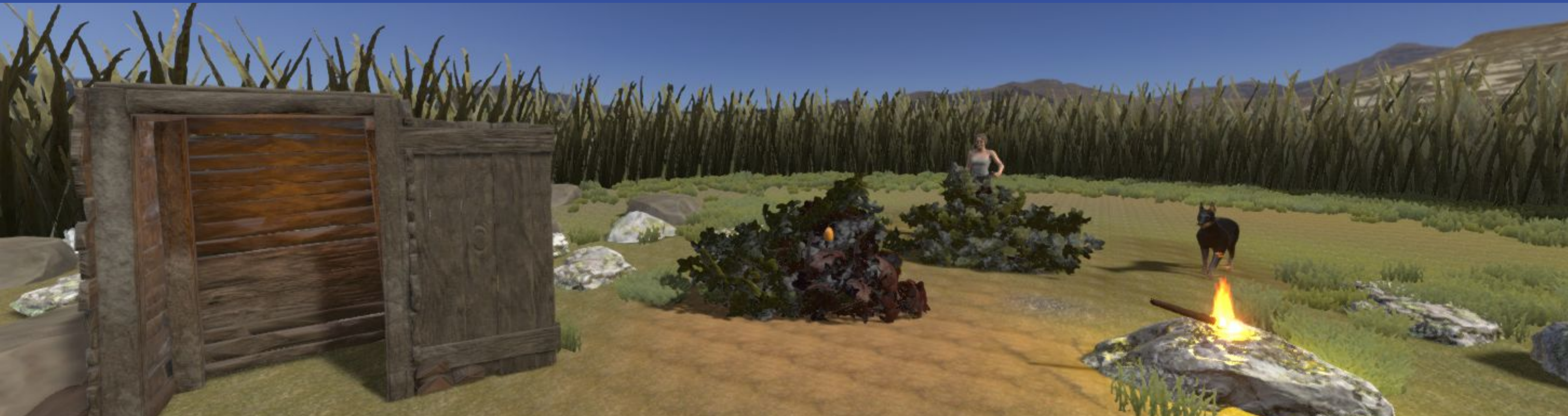


Improving Immersion in VR Threat Simulations through Interaction and Behavioral Design

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MOTIVATION

- VR Threat studies human behavioural responses to simulated threat in virtual reality environments
- Immersion is essential for obtaining valid, high-quality data
- In VR, immersion depends on agent behavior, interactions, and environmental responsiveness

FRUIT PICKING TASK

before: one-step action



1) touch fruit



2) fruit is collected

after: two-step action



1) touch fruit



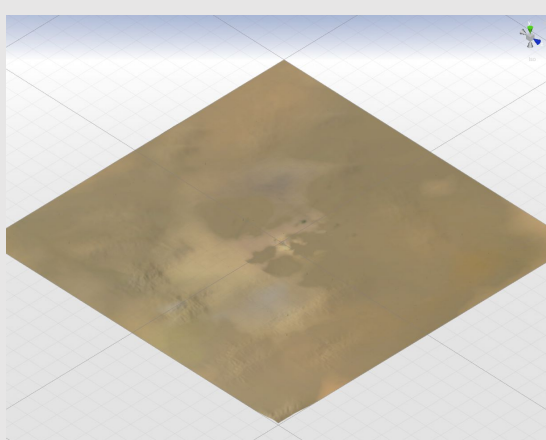
2) hold fruit in hand



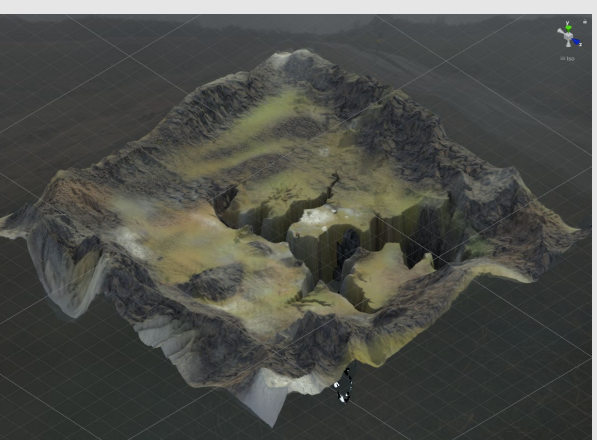
3) collect fruit in basket

TERRAIN

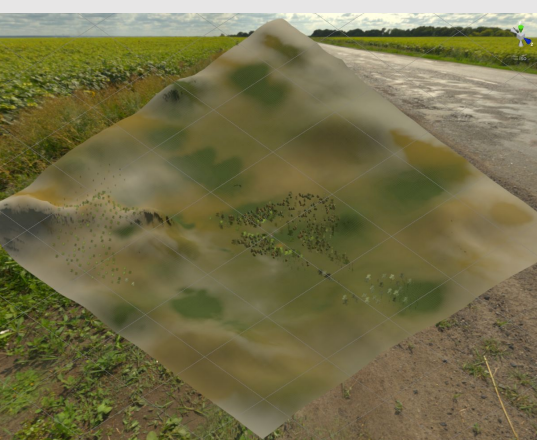
- over ten different environments
- some with performance issues → lagging, crashing
- analyzed bottlenecks:
 - high terrain height map resolution
 - high amount of generated trees



savanna: high performance (flat terrain, no trees)



ravine: low performance (detailed terrain, few trees)



forest: lowest performance (simple terrain, biggest amount of trees)

improve performance by:

- decreasing terrain height map resolution
- disabling tree colliders

THREAT BEHAVIOUR/WEAPON IMPROVEMENT

before

- Torch has a stop moving zone
- Threat stops all movement once entered

after

- Stop moving zone is enlarged while the threat is inside
 - ensures no in between states
- Inside zone, threat runs reaction sequence once
- Out of zone, zone shrinks and threat returns to old sequence (run towards player).



1) threat stops when in range of torch



1) threat runs towards player



2) stops and reacts submissively



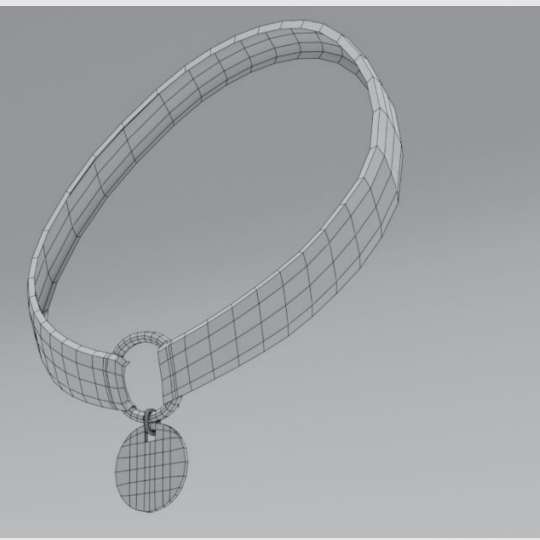
3) walks backwards from torch

DOBERMAN MODEL & SOUND EFFECT

- New aggressive barking sound to doberman threat
- It has metal clinking sounds in the background, so a collar is needed
- For a dynamic moving collar, the collar model was attached to the Doberman model in blender, then imported into game



Collar Nr. 1

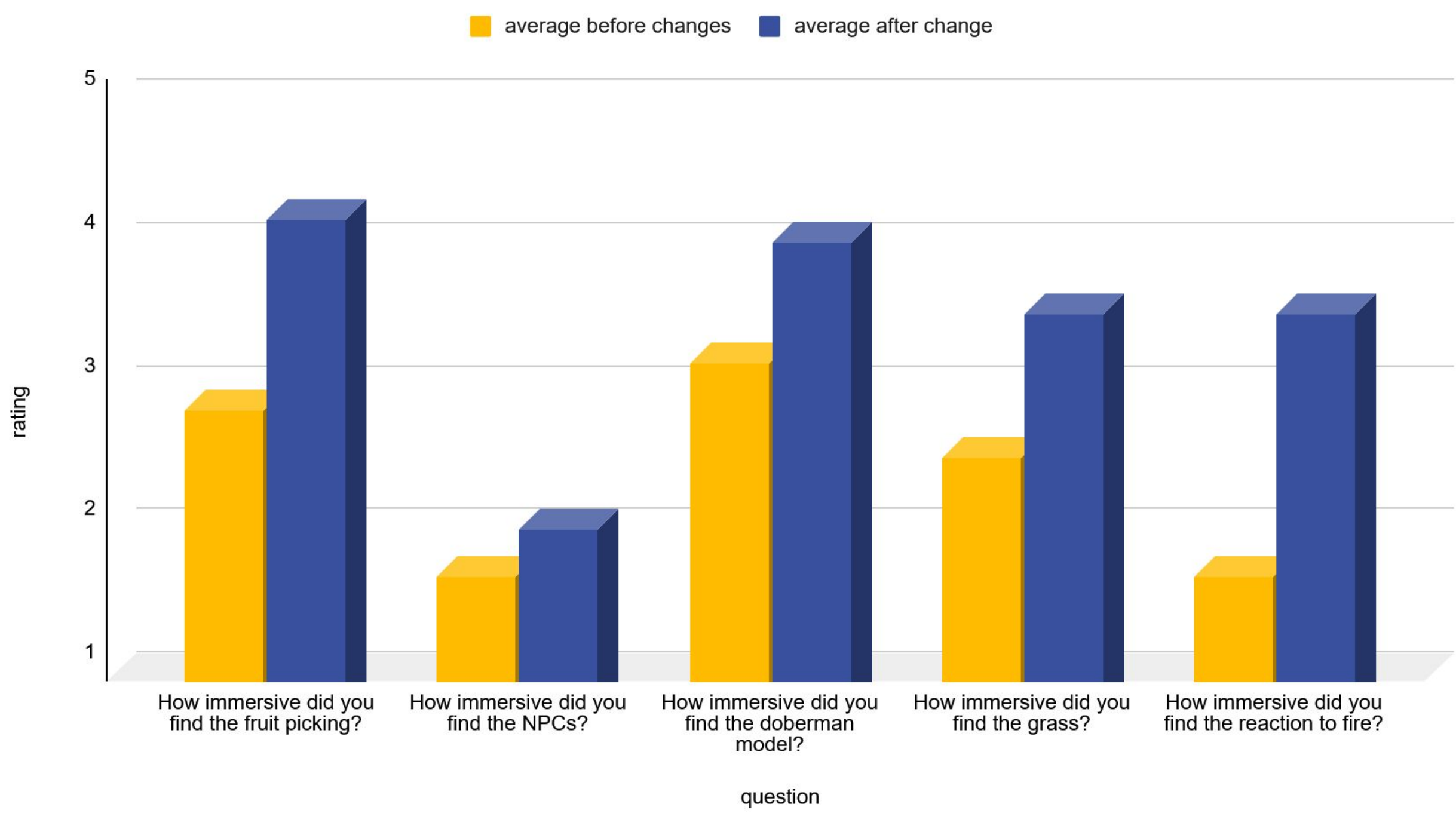


Collar Nr. 2

RESULTS

- Tested with six participants in the VR lab, each participant played a scene pre and post our improvements
- They were asked to fill out a questionnaire grading the immersion of each scene

Comparing Immersion Score Before and After Changes Were Applied (N = 6)



NPC ANIMATION



before:

- NPC "pantomiming" picking a fruit



after:

- NPC holds fruit in hand
- basket attached to NPCs waist

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