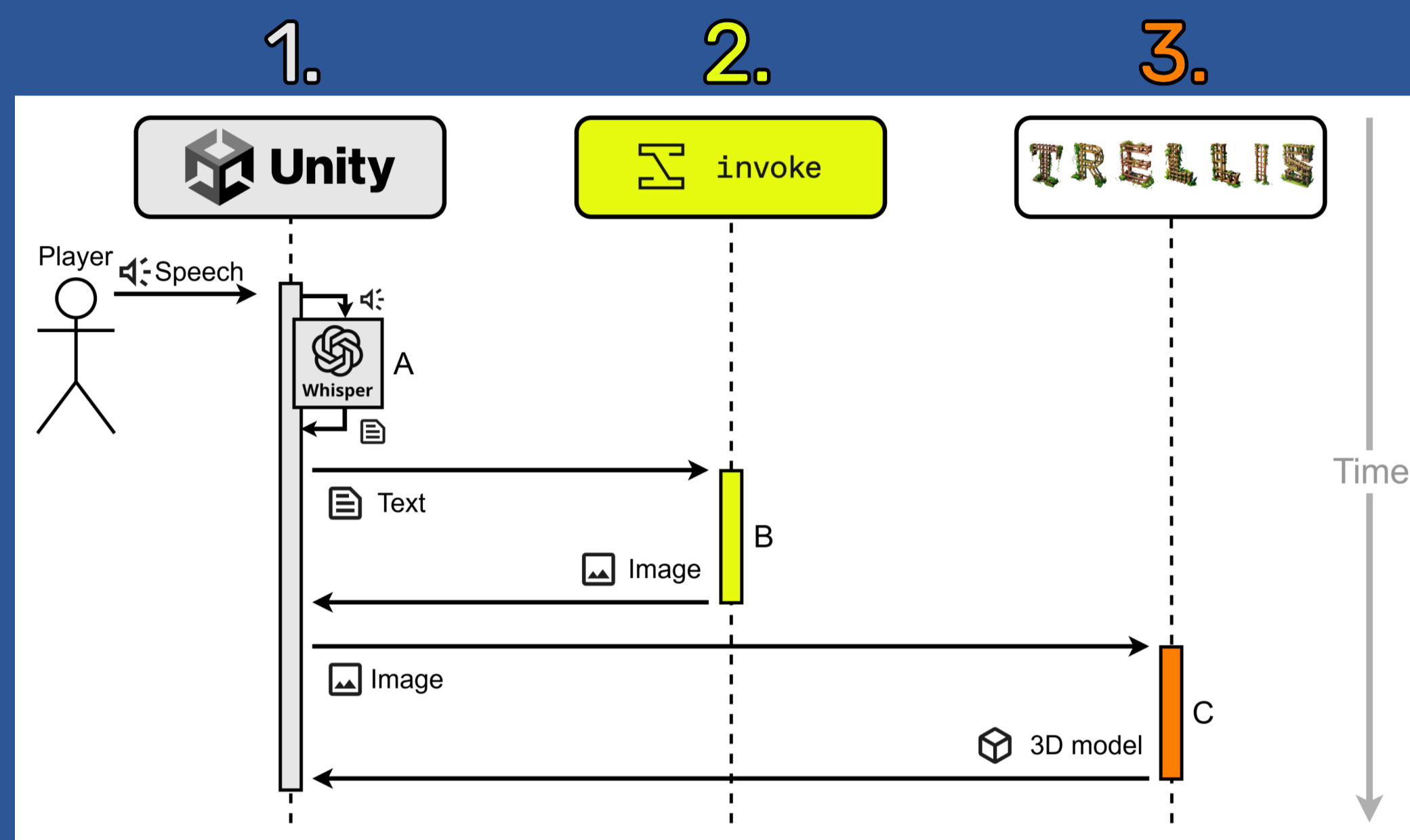


Player-Prompted 3D Model Generation Game Mechanics

Imagine a video game where players can create 3D objects through natural language speech. This thesis explores how to design **game mechanics** that use such a system.

Speech-to-3D Pipeline

1. **Unity** game engine streams player speech to Whisper AI model running inside Unity. Whisper transcribes player speech to text.
2. Unity sends the transcribed text to **InvokeAI**. InvokeAI uses the Stable Diffusion XL model to generate an image based on the text.
3. Unity sends the generated image to **TRELLIS**. TRELLIS generates a 3D representation of the input image.



Mini-Games



Delta Cafe

Order anything you can image, and the cafe waiter will bring it to you!

Archery Range

Save Delta from a UFO attack by transforming the UFOs into anything you can imagine, and then shooting them using bow and arrows!



Shape Detection

Use your spatial and linguistic thinking to solve a puzzle that requires creating and positioning objects with specific geometric shapes, to help out a locked-up professor!



Playtesting

CGVR Computer Graphics Expo

23.01.2026



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usability issues discovered and fixed

Game In Tartu event

22-23.02.2026



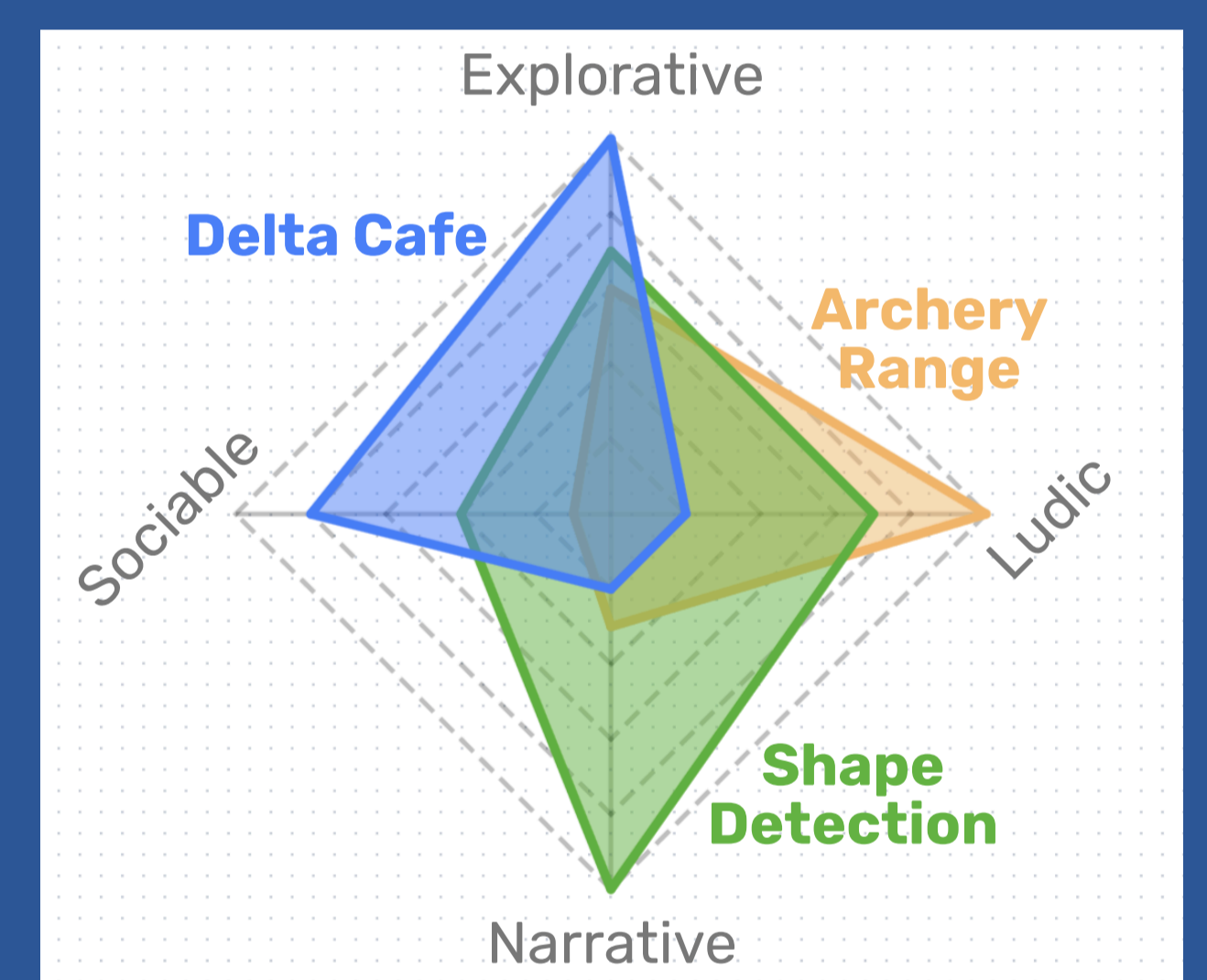
13

usability issues discovered and fixed

Playthrough videos

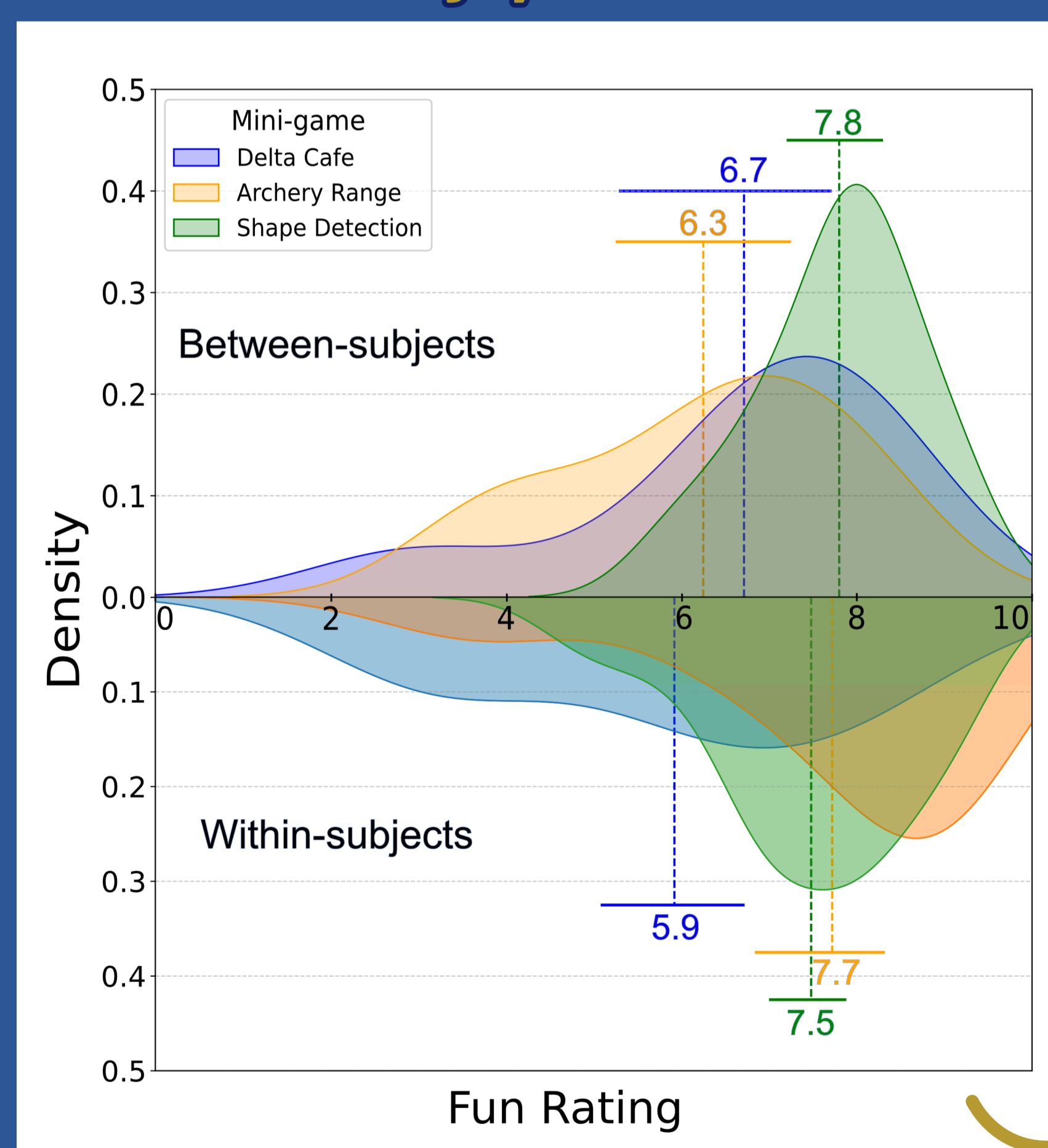


These mini-games emphasize different combinations of **gameplay element types** (explorative, ludic, narrative and sociable element), ensuring that these game mechanics are tried out in different gameplay contexts.



Enjoyment

Experiment



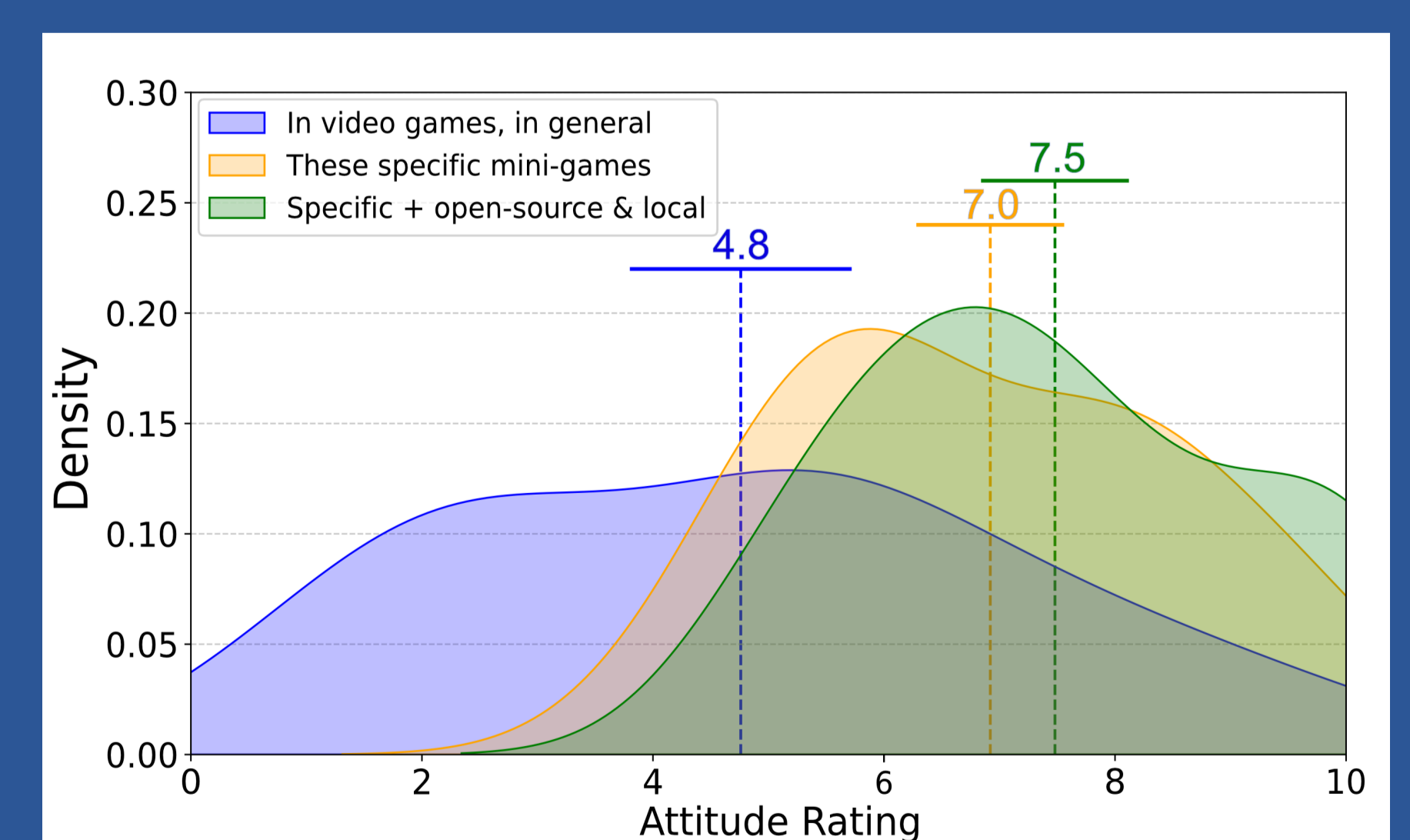
Analysis of fun, difficulty and intuitiveness ratings of the three mini-games suggests that player-prompted 3D model generation...

- cannot sustain engagement with its novelty alone.
- can effectively enhance already engaging mechanics.
- is most effective when the geometric properties of generated models play an integral role in gameplay.

Attitudes towards GenAI

Participants' attitudes towards GenAI use in video games were measured in three different contexts:

1. in video games, in general
2. in these specific mini-games
3. local & open-source GenAI in these mini-games



UNIVERSITY OF TARTU
Institute of Computer Science

Henri Sellis
Computer Science, Master's Thesis
Supervisors:
Raimond-Hendrik Tunnel, PhD
Jaanus Jaggo, MSc

