Investigation Into The Representation Of 4D Shapes

24/11/2021

The 2 Weeks Progress Report

- Playing around with Colour texturing
  - RGBW - with lighting - probably the best
  - W+red and W-Blue - interesting
  - Experimented with a few others but were not very good
  - Intend to try overlaying textures, but struggling to think of something that will work well
- I think I understand how to do the rotors - derived expressions, but do not work as expected - I think I have the signs for each term messed up
- Redoing plans for testing
  - Worked on elements for explanation video + script
  - Each user tries each representation - within each representation are a series of tests
  - Within each test is a series of textures
  - Between groups - try rotation - unsure about this
- Built a Pentachoron

Questions

- Would it be better to have rotation between groups or within groups
  - People will probably do better if the practice with 1 type of rotation
  - Cannot do within user comparisons
- Unsure what would make good textures
  - Don’t want to give user too much to think about
  - Don’t want to not give enough information
- When I get rotors working - what would be best to “match the pose”
  - Randomly rotate the object in 3D and 4D rotation
  - Randomly rotate the object in just 4D and use the 3D in combination with the main object so the user can check out all sides of both objects in 3D space

Plan Ahead

Take 2 weeks (Weeks 3 and 4) to research papers focused in the fields of geometrical representation and interaction.

Week 4: take first steps into intuitive rotation

Week 5: rotation mechanic using click-and-drag and an arc/grab ball. - FAIRLY SUCCESSFUL - needs work - Week 8

Week 6: Implement Rotors - FAIL. Begin new Unity project for more polished scenes

Week 7: Implement and test onion skin interpretation of the 4th dimension. Implement a 3D perspective that in real time mimics the 4D rotation.

Week 8: Create intuitive UI/UX for users to manipulate shapes with.

Week 9: Create a demo to "match the shapes pose". Add more shapes - cone, capsule, pentachoron.

Week 10: Plan and script a walk through for users to play with shapes and attempt to identify them. Set up a new demo for shape matching.

Week 11-12: Tutorial videos that explain why shapes behave they do, and traits to identify what the shape is. Polish the program to be a "final product".

Am I on schedule

Yes - VERY close with rotors

Intend to experiment with image texturing - done research now need to implement