

A world map with a dark blue background, showing continents in green and brown. Numerous glowing blue and white lines radiate from a point in North America, representing fiber optic connections. A white arc is visible in the upper left, and a small orange dot is in the upper right.

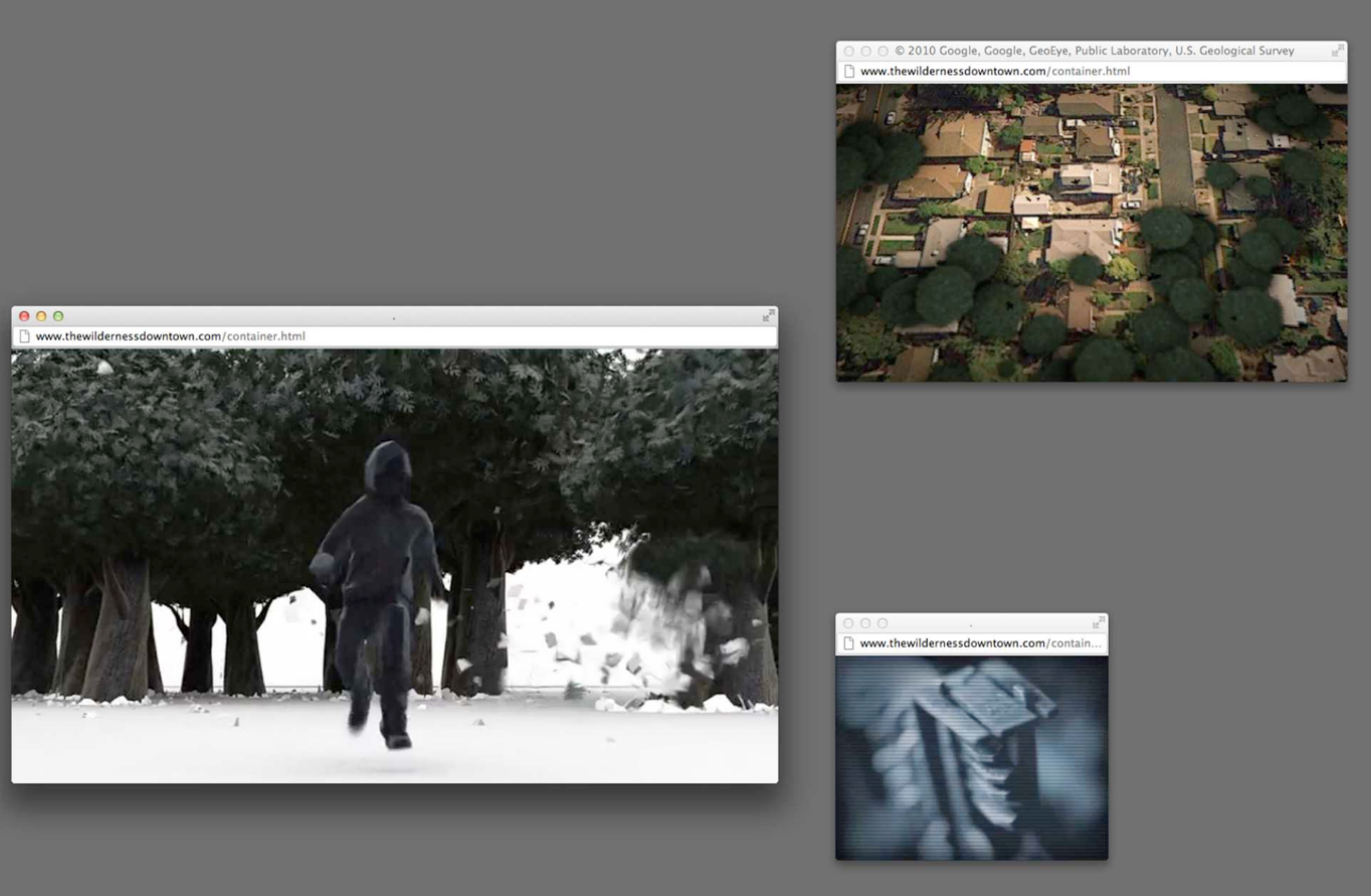
Getting started with WebGL and three.js

The Graphical Web 2014

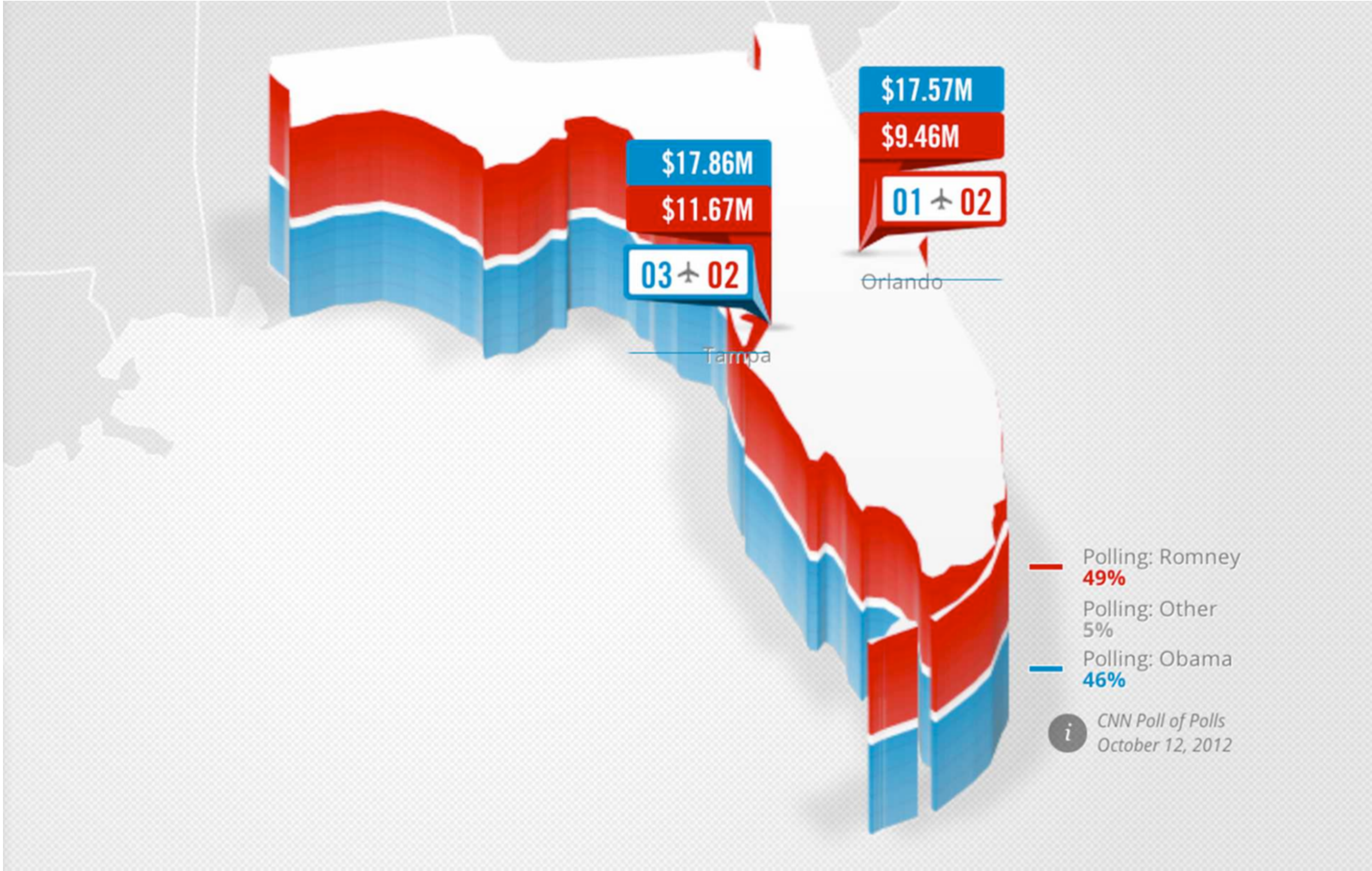
Jaume Sanchez Elias

<http://www.clicktorelease.com>

@thespите



The Wilderness Downtown | Chrome Experiment | CSS + Canvas



Google/CNN Campaign Tracker | SVG + Canvas



CUBE

A game about Google maps

[Watch the Explore your world video](#)

[Visit Start here](#)



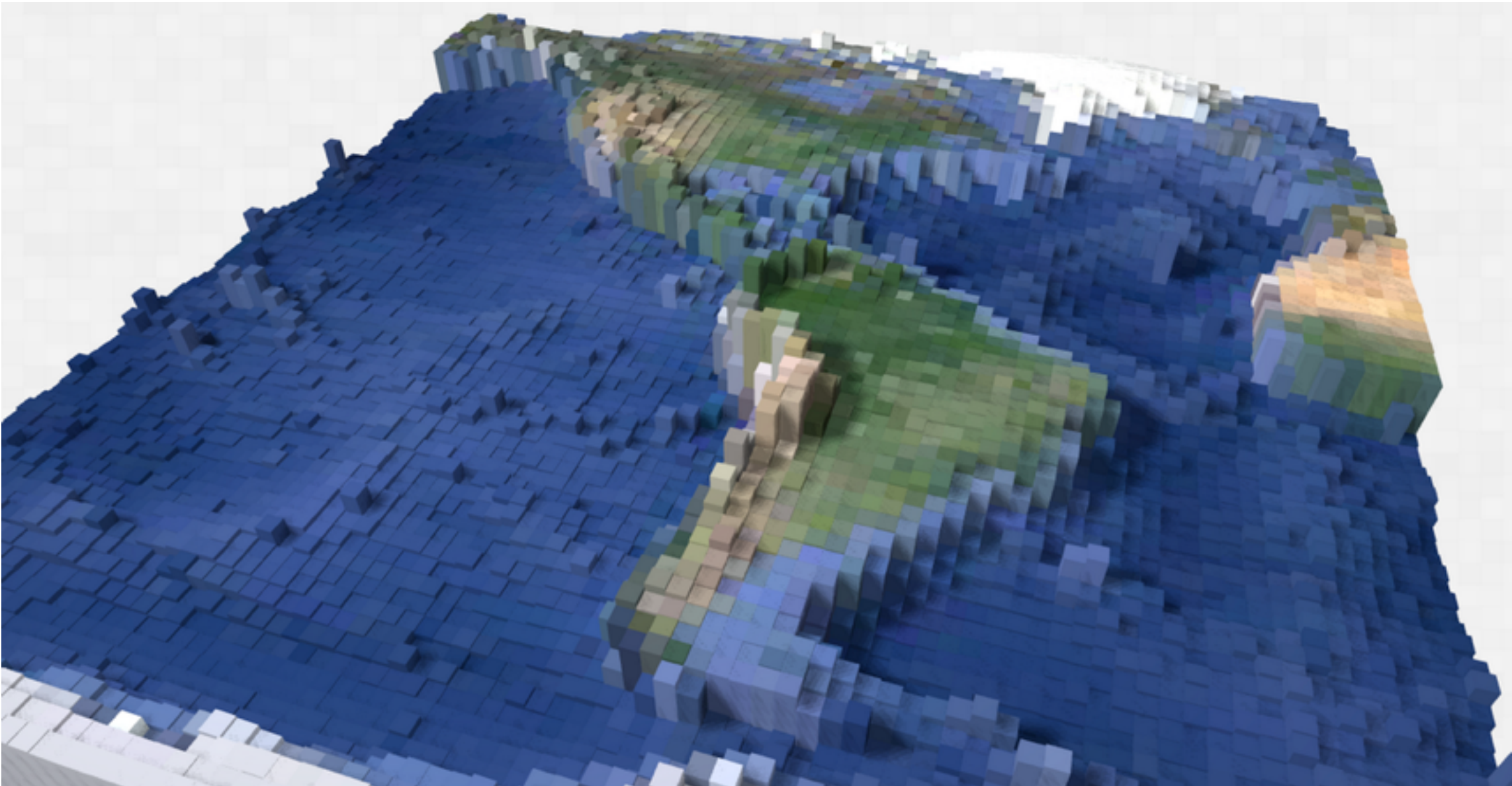
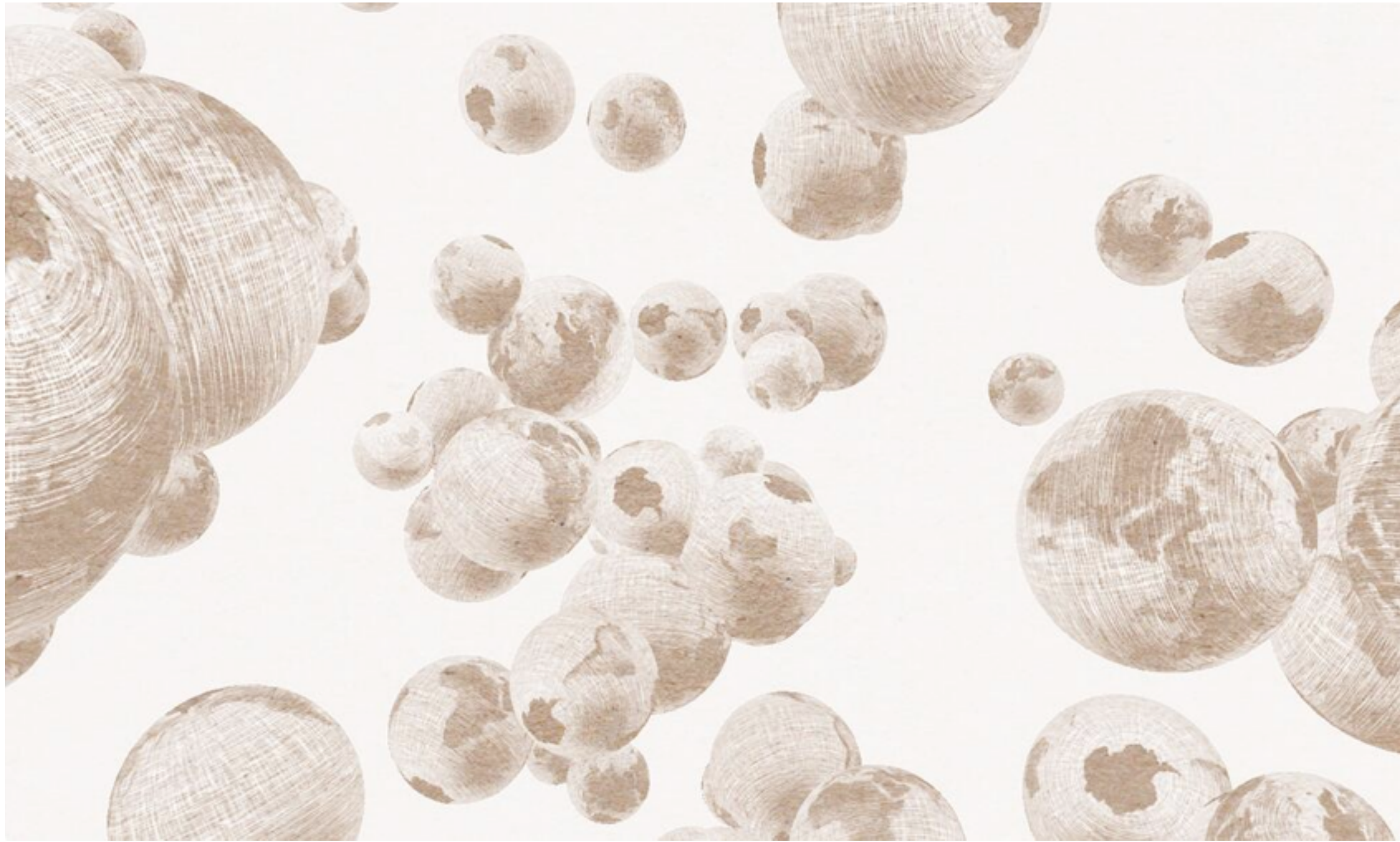
Level 4/8: [Find the fastest subway route to the Big Ben!](#) Your Time: 00:02 Best: 00:06 [Restart](#)

Google Maps Cube Game | Chrome Experiment | WebGL

B REEL



Gravity | Official movie website | WebGL



Surfacing, shading, post-processing

WebGL

"WebGL (Web Graphics Library) is a JavaScript API for rendering interactive 3D graphics and 2D graphics within any compatible web browser without the use of plug-ins."

<http://www.khronos.org/webgl/>

Fundamentals of WebGL

GPU overview

A graphics processing unit (GPU) is a specialised electronic circuit designed to rapidly manipulate and alter memory to accelerate the creation of images in a frame buffer intended for output to a display.

Modern GPUs are very efficient at manipulating computer graphics, and their highly parallel structure makes them more effective than general-purpose CPUs for algorithms where processing of large blocks of data is done in parallel.

Fundamentals of WebGL

From OpenGL to WebGL

WebGL is a cross-platform, royalty-free web standard for a low-level 3D graphics API based on OpenGL ES 2.0.

It's exposed through the HTML5 Canvas.

Very close to the OpenGL ES 2.0 specification with some concessions made for JavaScript.

three.js

"The aim of the project is to create a lightweight 3D library with a very low level of complexity — in other words, for dummies.

The library provides <canvas>, <svg>, CSS3D and WebGL renderers."

<http://threejs.org/>

Setting up

```
<script src="js/three.min.js"></script>
<script>

var scene = new THREE.Scene();
var aspectRatio = window.innerWidth / window.innerHeight;
var camera = new THREE.PerspectiveCamera( 75, aspectRatio, 0.1, 1000 );

var renderer = new THREE.WebGLRenderer();
renderer.setSize( window.innerWidth, window.innerHeight );
document.body.appendChild( renderer.domElement );

var geometry = new THREE.BoxGeometry(1,1,1);
var material = new THREE.MeshBasicMaterial( { color: 0x00ff00 } );
var cube = new THREE.Mesh( geometry, material );
scene.add( cube );

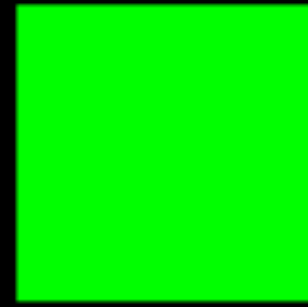
camera.position.z = 5;

function render() {
    requestAnimationFrame(render);
    renderer.render(scene, camera);
}

render();

</script>
```


Congratulations! It's a... cube?



Geometries

BoxGeometry
CircleGeometry
CubeGeometry
CylinderGeometry
ExtrudeGeometry
IcosahedronGeometry
LatheGeometry
OctahedronGeometry
ParametricGeometry
PlaneGeometry
PolyhedronGeometry
RingGeometry
ShapeGeometry
SphereGeometry
TetrahedronGeometry
TextGeometry
TorusGeometry
TorusKnotGeometry
TubeGeometry

Materials

LineBasicMaterial
LineDashedMaterial
MeshBasicMaterial
MeshDepthMaterial
MeshFaceMaterial
MeshLambertMaterial
MeshNormalMaterial
MeshPhongMaterial
PointCloudMaterial
RawShaderMaterial
ShaderMaterial
SpriteCanvasMaterial
SpriteMaterial

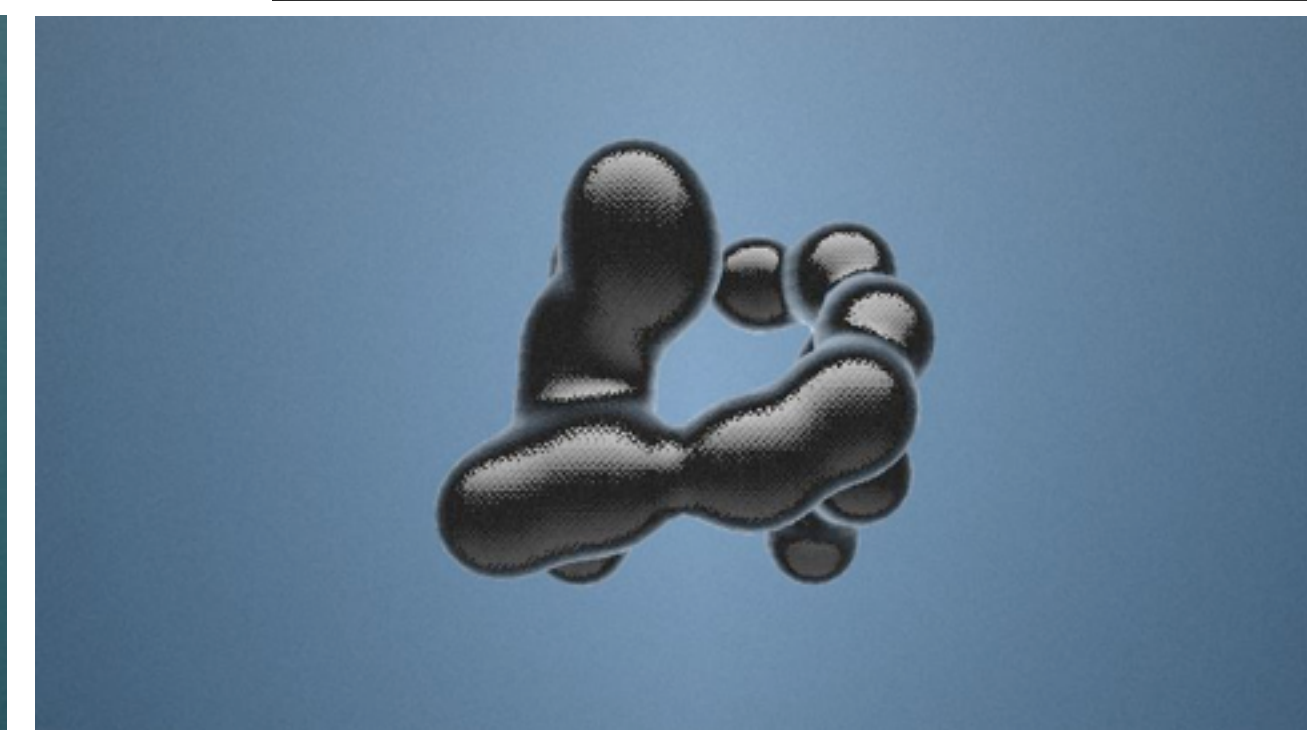
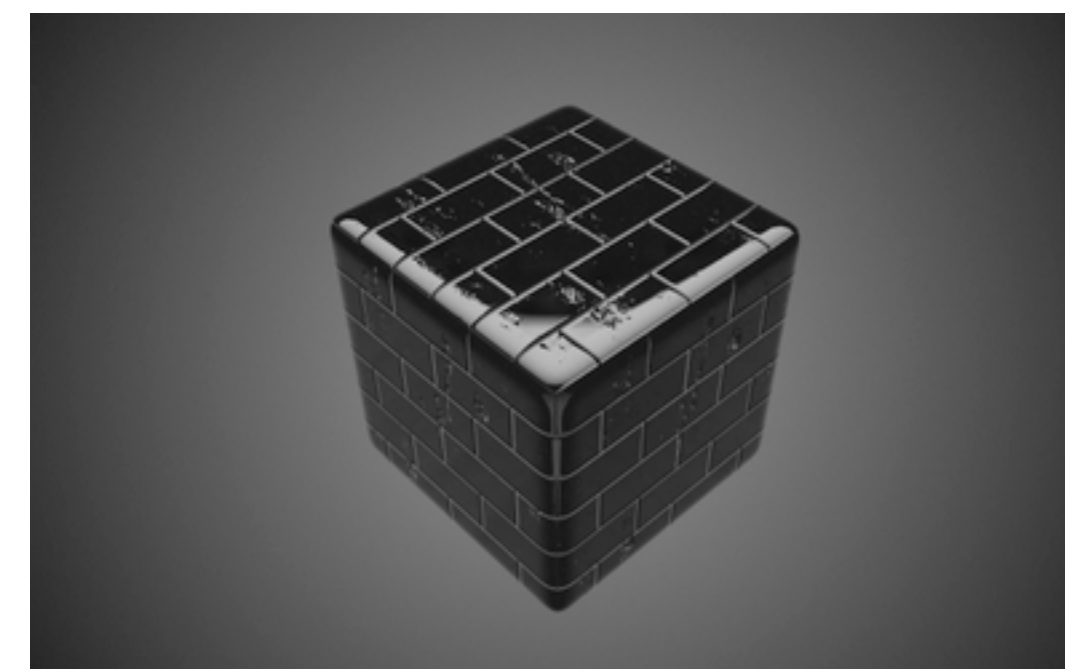
Lights

AmbientLight
AreaLight
DirectionalLight
HemisphereLight
PointLight
SpotLight

Cameras

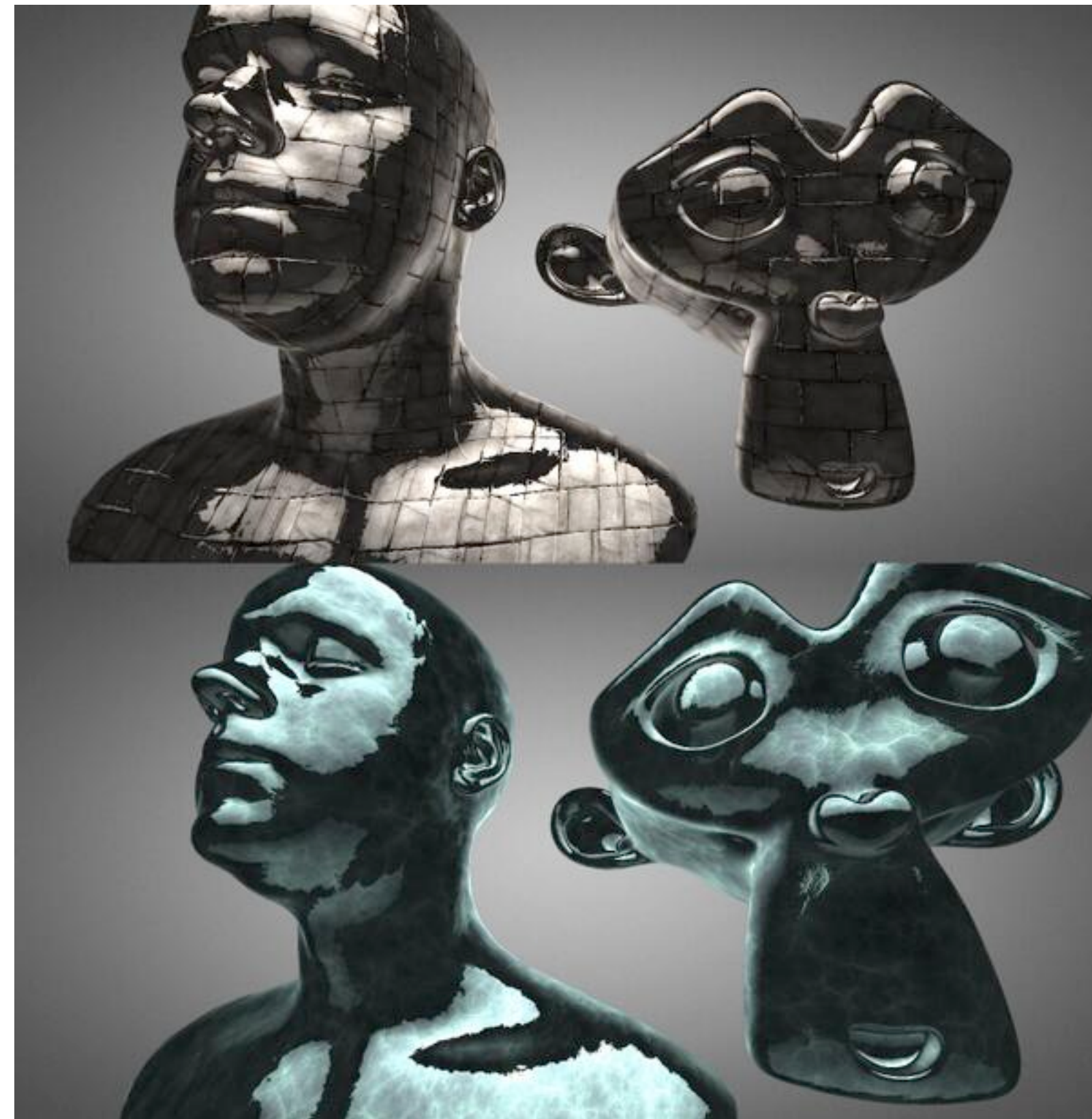
OrthographicCamera
PerspectiveCamera

Setting the scene

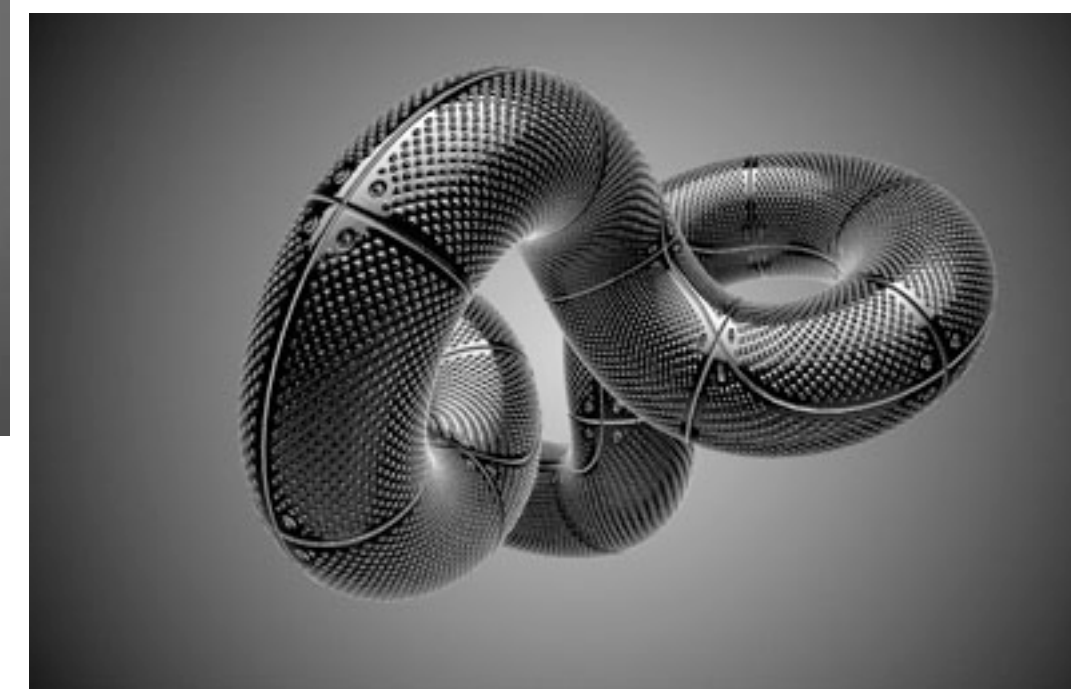
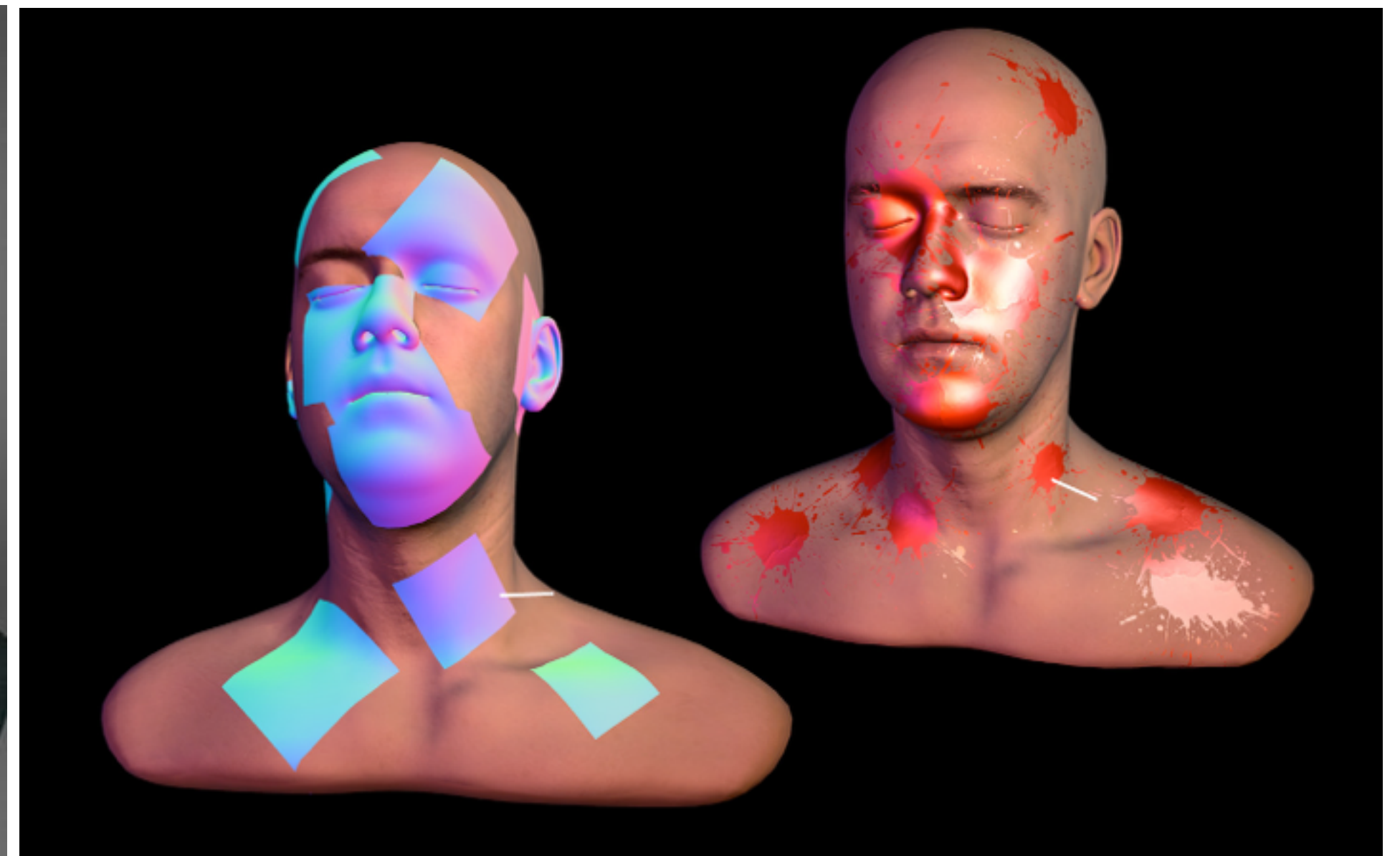


Loaders

BufferGeometryLoader
ImageLoader
JSONLoader
MaterialLoader
ObjectLoader
TextureLoader
XHRLoader



Enough cubes!



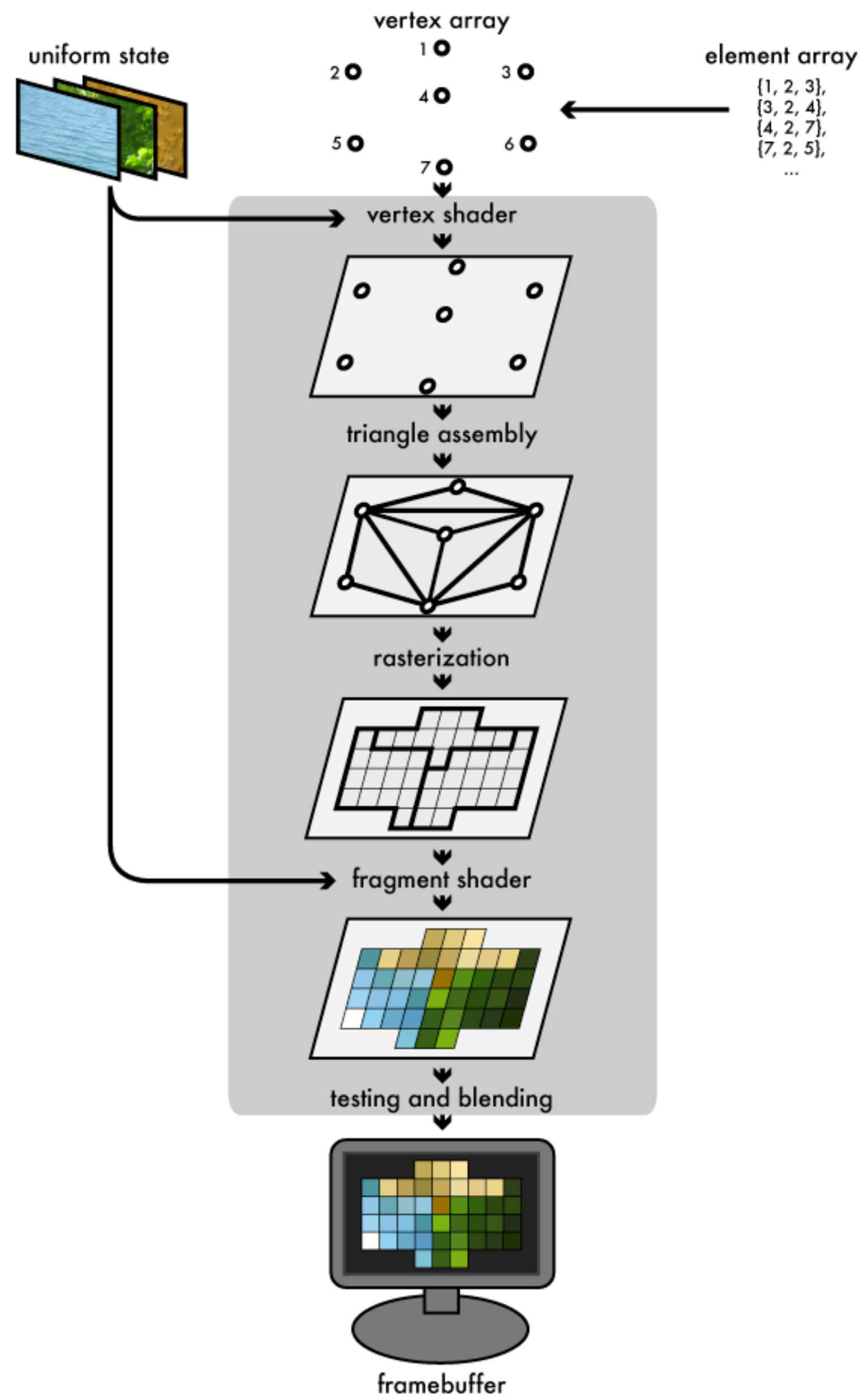
A 3D rendered landscape featuring a winding river on the left and a path leading through a field of tall grass on the right. The scene is rendered with a high level of detail, showing individual blades of grass and the texture of the water. The lighting is warm, suggesting a sunset or sunrise, with long shadows cast across the terrain.

The true power of WebGL Shaders!

Vertex Shaders
Fragment Shaders

Small or large programs
written in GLSL

Porting your equations
to please the GPU.



Thanks!

Questions?

Afraid of polygons?

Programmable pipelines make you queasy?

Let's talk!

Jaume Sanchez @thespite

<http://www.clicktorelease.com>

<https://github.com/spite>