Geometric Morphing with the Vertex Shader

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Morphing a Sphere into a Circle

Blend = 0.00

Blend = 0.25

Blend = 0.50

Blend = 0.75

Blend = 1.00
out vec2 vST;
out float vLightIntensity;
out vec3 vColor;
const float TWOPI = 2.*3.14159265;

// original model coords (sphere):
vec4 vertex0 = gl_Vertex;
vec3 norm0 = gl_Normal;

// circle coords:
vST = gl_MultiTexCoords0.st;
float radius = 1. - vST.t;
float theta = TWOPI * vST.s;
vec4 circle = vec4( radius*cos(theta), radius*sin(theta), 0., 1. );
vec3 circlenorm = vec3( 0., 0., 1. );

vST += vec2( OffsetS, OffsetT );

// blend:
vec4 theVertex = mix( vertex0, circle, Blend );
vec3 theNormal = normalize( mix( norm0, circlenorm, Blend ) );

// do the lighting:
vec3 tnorm = normalize( vec3( uNormalMatrix * theNormal ) );
vec3 LightPos = vec3( 5., 10., 10. );
vec3 ECposition = vec3( uModelViewMatrix * theVertex );
vLightIntensity = abs( dot( normalize(LightPos - ECposition), tnorm ) );
if( vLightIntensity < 0.2 )
    vLightIntensity = 0.2;

vColor = gl_Color.rgb;
gl_Position = gl_ModelViewProjectionMatrix * theVertex;
Original texture map

Mapped onto a Sphere

Morphed into a Circle

A possible vis application??
Morphing a Cow into a Sphere

```
vec4 vertex = gl_Vertex;
vertex.xyz *= 4. / length(vertex.xyz);
```

Note: the “face” in the sphere cow is there because the normals were not morphed into sphere normals – they were left as cow normals.
Morphing a Cow into a Cube

```c
const float SIDE = 2.;
vec4 vertex = gl_Vertex;
vertex.xyz *= 4. / length(vertex.xyz);
vertex.xyz = clamp(vertex.xyz, -SIDE, SIDE);
```

Note: the “face” in the cube cow is there because the normals were not morphed into cube normals – they were left as cow normals.
What about “Real Morphing”? 

“Real Morphing” involves interpolating vertices from one object into vertices in another. This flies in the face of graphics hardware’s philosophy of dealing with one triangle and then getting rid of any record of it. We got away with it here because we knew the equation of a disk, a sphere, and a cube;

The first morphing I can remember is from the fantasy movie *Willow*

There is also some great morphing in Michael Jackson’s *Black or White* video:  
https://www.youtube.com/watch?v=F2AitTPi5U0  
The morphing starts at around 5:30