



# Parameterization<sup>the Where and the How</sup>

*Identifying and resolving problem areas.*

< 1 | 2 | 3

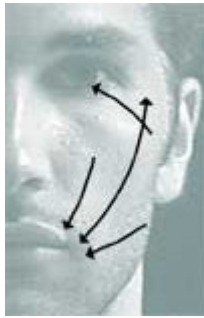


**Since the factors** (the shape and motion of the surface) that influence topology are independent of each other, there are certain regions on the human head where they demand conflicting structures. One example region is the promontory of the cheekbone.



**Bone** primarily determines the surface shape of this region. The cheekbone creates a straight ridge that begins in the base of the skull behind the ear and runs seamlessly into the eye bone which circumnavigates the eye. Presumably, the parameterization to define this shape should flow along the same line.

However, the *motion* of the skin in this region, is manipulated directly and indirectly by several different muscles which push and pull the skin in a variety of directions -- directions that don't necessarily flow along the topographical (again, don't confuse with

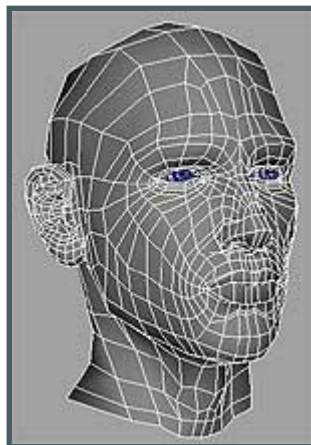


*topology*) lines. Smiling pushes the skin up and back; kissing pulls it down toward the mouth; while squinting pulls it up and in toward the eye. In the illustration, you can see that the movements just described run along lines that are diagonal to the cheekbone.



In summary, the surface's **shape** requires a horizontal/vertical grid, while the surface's **motion** demands a diagonal configuration. When you place a diagonal grid over a horizontal grid you end up with something that is incompatible with NURBS and undesirable for Maya subd surfaces: 3 and 5 sided faces.

Resolving conflicting parameterization usually entails beginning with the structure demanded by the motion and adjusting it as much as possible to conform with topographical concerns.



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**Examine** the solution for the cheekbone topology in this wireframe. Also notice the solution for a similar problem on the nose where the direction of surface shapes and the direction of the motion conflict. (*Sneering pushes the skin above the wings of the nose up and forward creating very characteristic wrinkles on the nose. This motion runs diagonal to the direction of the most prominent surface shape in that region: the nose itself.*)

### Suggested workflow:

Make several copies of a drawing/photograph of your character.

On one picture, draw lines indicating the direction of major shapes of the surface.

On another picture, draw lines indicating the direction of the movement of the surface using the facial muscles as reference.

Copy the lines from both pictures onto a third picture and begin connecting the lines that seem to flow into each other to form what [Bay Raitt](#) refers to as **Edge Loops**.

All lines must end up roughly parallel or perpendicular to the lines closest to it so that a grid of sorts can be constructed. When surface lines and motion lines don't overlap, aren't parallel and aren't perpendicular -- *you've officially found a problem spot*.

Decide what is most important and resolve it the best you can (remember, with Maya subds, avoid creating faces with more or fewer sides than 4; but if necessary, almost always give preference to a five-

side over a three-side. Refer to the [Subdivision Modeling Resource Page](#) maintained by Tamás Varga, for dealing with odd numbered faces).

< [1](#) | [2](#) | **3**

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