

Hair Styling

A Teenager's Dream, An Artist's Nightmare

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- ③ Lots of variation: initially wanted 32 different hair styles, plus beards
- ③ Needed quick turnaround on resource creation
- ③ Hair is difficult: identified individual problems, tackled each in turn
 - ③ Different styles
 - ③ Modeling
 - ③ Shading
 - ③ Animation
- ③ Presentation covers mostly modeling, some shading



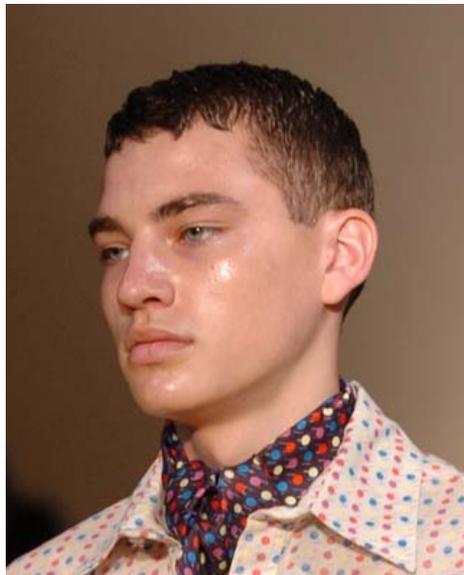
Hair types

- ④ Different types need different approaches
 - ④ Buzzcut
 - ④ Short
 - ④ Long
 - ④ Beards
 - ④ Stylistic (Final Fantasy, cartoony, ...)



Hair type: Buzzcut

- ⊕ Snazzy shader, no complex modeling required
- ⊕ None in DA





Hair type: Short

- ⊕ Minor modeling work, shader for highlights





Hair type: Long

- ⊕ Major modeling work, shader for highlights, potential alpha-sorting issues





Hair type: Beards

- Similar to long hair, yet can have different characteristics (scraggly, coarse fibers, not shiny)





Hair type: Stylistic

☹ Pick your pain...





Hair type

- ③ Identify which types will be in your game (more importantly, which will *not* be)
- ③ Again, don't try to solve all problems all at once. Different types have different problems



Previous techniques

- ③ Shells, à la Lengyel
 - ③ Require many shells to look good
 - ③ Difficult to get different styles, good only for fluffy fuzzy things with uniform-length hair





Previous techniques

- ⊕ Cards/sheets/fins
 - ⊕ Time consuming to get good results
 - ⊕ Only good for short straight hair styles





Tools

- ④ **Painter:** uses MAX's vertex paint
- ④ Artist specifies hair “clumps” and paints them down with a brush object
- ④ Clump orientation can be random or oriented towards a specified point
- ④ Can also paint down splines to act as guides for lofting



Tools

- ④ **Lofter**: artist paints down splines and specifies a shape to loft along the curve
- ④ Can rotate/scale control sections of the curve
- ④ Uses NURBS, get texcoords for free



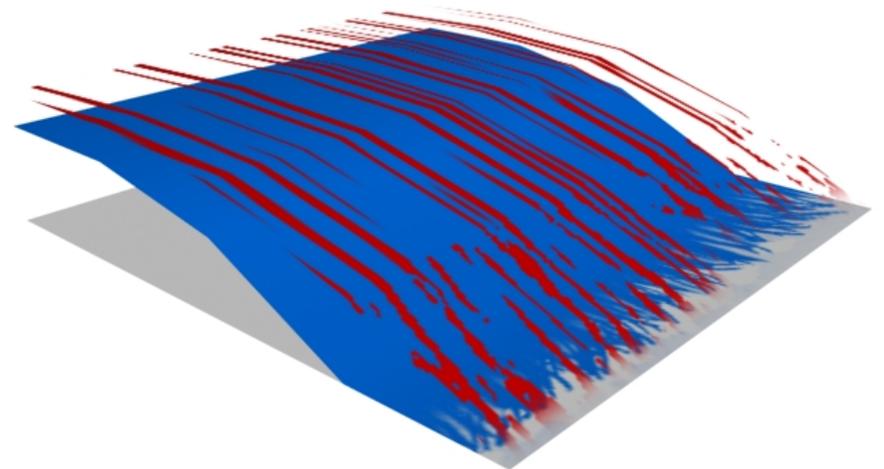
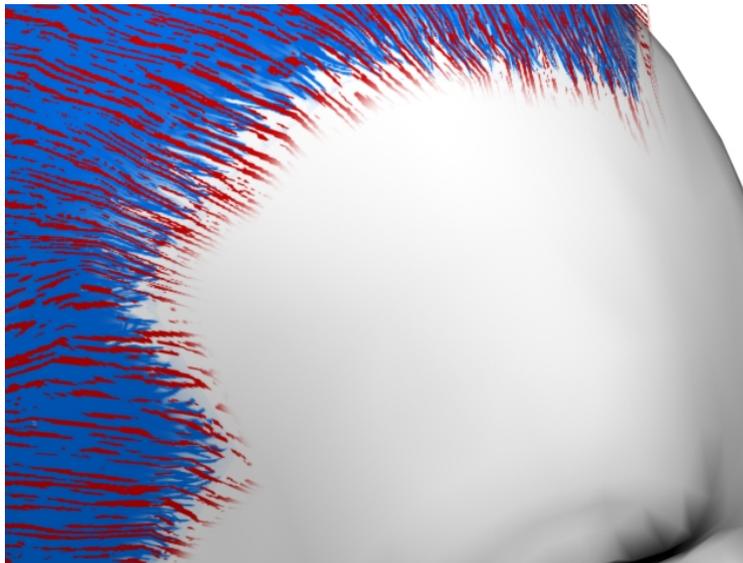
Tools

- ④ **Grower**: randomly scatters clumps across selected faces
- ④ Artist can specify per-face density, clump spacing, scale variation, orientation variation



Hair/scalp line

- ⊕ Parallax at scalp line helps sell the model





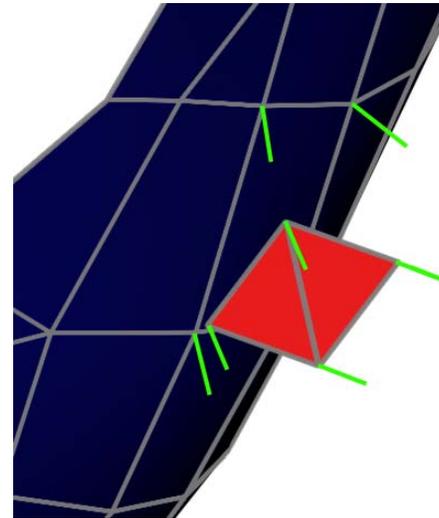
Hair/scalp line





Silhouette

- ③ Cards: can be used to hide silhouette
 - ③ Normals need to be oriented correctly otherwise they'll catch light





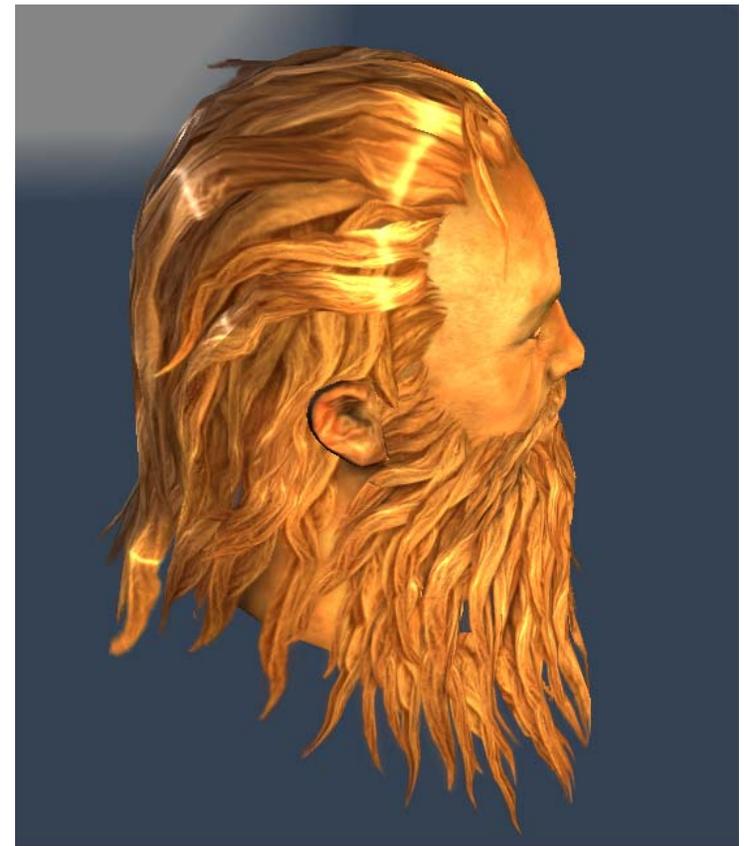
Shader

- ④ Sheuermann, SIGGRAPH 2004
- ④ Per-vertex tangent with a noise texture and a shift texture
 - ④ Specified using U-direction of separate unwrap





Shader





Shader: Alpha-sorting

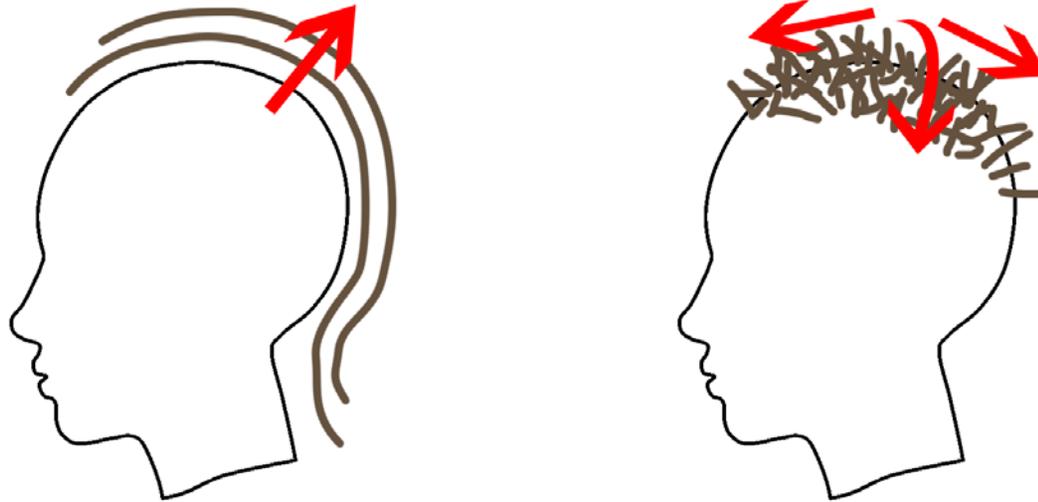
- ⊕ Hair isn't really that transparent
- ⊕ 4-pass Sheuermann method
 - ⊕ Essentially render opaque bits first with z-write, render transparent next without z





Shader: Alpha-sorting

- ⊕ Still requires inside-out polygon order
 - ⊕ Polys can be sorted on export/in a pre-process step
 - ⊕ Break ponytails into separate part





References

- ④ J. Lengyel, E. Praun, A. Finkelstein and H. Hoppe, 2001, “Real-Time Fur over Arbitrary Surfaces”, *ACM 2001 Symposium on Interactive 3D Graphics*
- ④ T. Scheuermann, 2004, “Practical Real-Time Hair Rendering and Shading”, *Proceedings of ACM SIGGRAPH 2004 Sketches*



Questions?



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