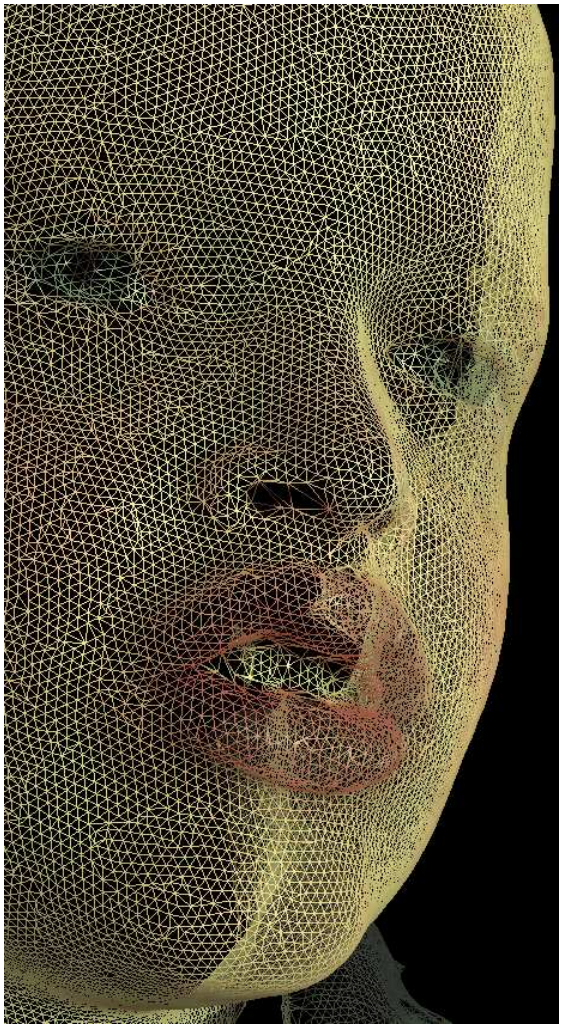
3D Facial Analysis & Ectodermal Dysplasia

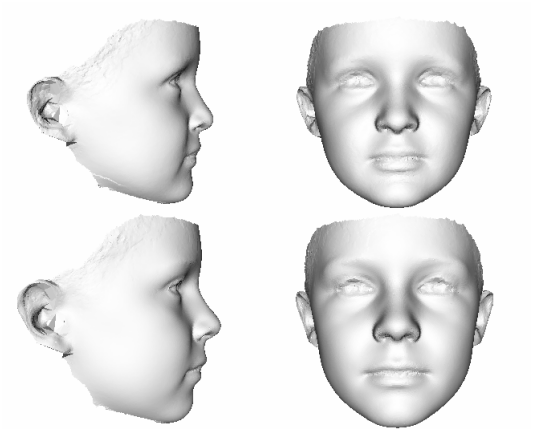
by Peter Hammond & Neil MacBeth

At the Ectodermal Dysplasia conference held at London Zoo in 2005, an area adjacent to the presentations was used to take 3D photographs of faces. Families were able to volunteer to have face scans recorded between sessions. Of course, besides the fun of seeing your face spinning like a top or inside out, there was an underlying serious reason for taking these special photographs.

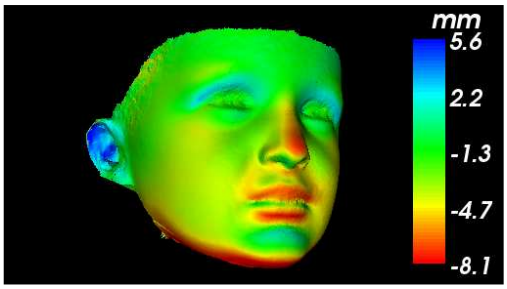
Children and adults with ectodermal dysplasia have subtle differences in face shape when compared to the general population. These variations are attributable to the genetic coding of the individual. Professor Hammond (along with other medics and computer scientists) has already shown that 3D facial photographs in combination with special computer software developed at UCL can be used to identify such differences very accurately. We hope that differences detected for ED might eventually assist in the diagnosis of individuals with a mild presentation of the condition. Moreover, we hope the information will be used by the medical team to plan dental restoration if teeth are missing.



The picture above shows the mesh of points captured on Jack Perry's face. The camera captures as many as 20,000 points on a face producing a very accurate map of its contours. Using the UCL software, a collection of 3D face surfaces of individuals with the same genetic syndrome can be combined to find an average or typical face for that condition.



The first two images above show a portrait and a profile of the average face of 15 of the children whose 3D pictures were taken at the conference. The second pair shows the same views of an average face of 100 children with no known genetic condition and of a similar age range. By eye, there are obvious differences in the shapes of these two average faces. But a computer-based analysis can detect much more subtle differences as the figure below demonstrates where the colour coding shows differences in the mid-face but also above the eyelids and on the ears.



By making a model of the average face shape of children with a confirmed diagnosis for ectodermal dysplasia and comparing it with the average of a control group of children of a similar age, it is hoped that subtle characteristics of the condition will be readily detected. Eventually, we hope to use this information to test how similar an individual's face is to the average ED face, or to the average control group face. To enable this research

to be undertaken in a sound scientific fashion we have to collect a large number of images, in order to build an accurate model of a typical face shape in each group. These average face shapes can then be used to test whether an individual's face has a closer affinity to a particular profile and could help to diagnose ED.

Collecting enough images to carry out this scientific validation will take some time. But as we produce preliminary results we will report back to the ED families through this newsletter and future conferences when we hope more of those attending will take part. Every family who volunteered in London for 3D photography has been sent a CD containing computer software that will let them view their pictures. So, as the scientific analysis of the faces continues, the children (and maybe some of the adults) can have some fun spinning, colouring and playing with the 3D faces.

We are only able to complete this kind of research with the support of families. So we thank everyone who took part and we look forward to meeting many of you again next time